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CHAMBERS'S
TECHNICAL DICTIONARY

Comprising terms used in Pure and Applied Science:
Medicine: the chief Manufacturing Industries:
Engineering: Construction: the Mechanic Trades

With Definitions by recognised Authorities

EDITED BY

C. F. TWENEY
Editor of *A Technological and Scientific Dictionary,*
Standard Books, etc. etc.

AND

L. E. C. HUGHES
A.C.G.I., D.I.C., B.Sc., Ph.D., A.M.I.E.E.,
A.M.I.R.E., M.A.S.A.
Lecturer in Electrical Communication
City and Guilds College
Imperial College of Science and Technology, London

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PREFACE

THE aim of this dictionary is to give, in the light of present knowledge and opinion, definitions of terms that are of importance in pure and applied science, in all branches of engineering and construction, and in the larger manufacturing industries and skilled trades. It is a dictionary of technical terms, written by specialists, partly for other specialists but more particularly for the technically minded man-in-the-street, and for students and interested workers of all kinds and ages : indeed, for all who wish to understand what scientists and engineers have to say to each other.

What, it may be asked, is a technical term ? It may be defined as a word or expression which has special significance and value to a person learned or dexterous in a branch of knowledge relating to some particular human activity or to some particular aspect of nature. A dictionary of technical terms, therefore, must aim at including, as far as its scope allows, all terms having such 'special significance and value.' It will naturally include many thousands of words which form no part of daily speech. On the other hand, it will also include very many which do form part of daily speech but which, having acquired at the hands of scientists and technical workers 'special significance and value,' have become technical terms. *Accuracy, error, mistake, efficiency, work, speed*—all these are technical terms because they mean more (or, at any rate, something more definite) to the scientist than to the ordinary man. Similarly, many everyday words (e.g. *canaries, miser, capitalist,* even *plum* and *apple*), having acquired meanings which will be totally unsuspected by most people, are as 'technical,' and therefore eligible for inclusion, as, say, *pericardiomediastinitis* or *diplochlamydeous chimaera.*

To be safe, indeed, one must regard technical language as a language apart from ordinary speech. Technical terms are in reality symbols adopted, adapted, or invented by specialists and technicians to facilitate the precise expression and recording of their ideas. Without them they would find themselves hindered in their mental processes, just as the ancients were hindered by the lack of a convenient system of numbering. Each word or expression is a short method of denoting a particular idea ; it is a term *ad hoc,* and its meaning cannot safely be guessed. Etymological deduction may, and often does, help, but it is dangerously apt to mislead, for countless technical terms, many of them relics of a less understanding or a less particular day, are misnomers, e.g. *vitamins, maria* (of the moon), *magnetising force, legal ohm,* and the names of many minerals.

From what has been said above it follows that the safest authorities on the meanings of technical terms are those who understand and use them. The Editors have, therefore, in every field covered by this work, turned without hesitation to specialists who are actively engaged in the practice and teaching of their respective subjects. In the various departments of pure science, as well as in engineering, construction, and mining, the selection and definition of the terms have been entrusted to experienced teachers of the different subjects at university colleges. Each contributor has been charged with setting forth his ideas in an explicit form, and in language more readable, more 'humanised,' than that of the specialised glossaries with which he has normally to deal. Such glossaries have naturally been of great assistance in the compilation of this work, which is not, however, for various reasons rendered superfluous by their existence. For one thing, the glossaries have been prepared to co-ordinate, to codify, the fundamental conceptions in some particular branch of knowledge or activity, and they necessarily demand a specially trained mind for their complete comprehension. Again, the glossaries vary greatly in nature, form, and bulk—not to speak of price and accessibility—from the great medical and botanical dictionaries to the brief specifications of the British Standards Institution. Finally, they take time to compile: that of the International Electrotechnical Commission was thirty-four years in the making.

Meanwhile the world must go on, and for many years the need has existed for a convenient yet sufficiently comprehensive dictionary. Much, very much, has happened in the development of science and technology since the senior editor of the present work brought out, in 1906, his earlier *Technological and Scientific Dictionary*. While it is broadly true that there is much technical language that will never change, it is also true that with time the special meaning of a technical term may expand or contract, as more kinds of things are shown to have common attributes, or when the subject of a technical term is seen to be more complex than was at first imagined, or to consist of perhaps discordant elements which may require separate definition; for example, when the generality of *isotopes* was established the definition of the *atom* had to be slightly revised. In addition, however, to such adjustments, scientific and industrial activity proceeds apace, and the advancing complexity means on balance an increasing collection of technical terms. The Editors and Publishers of the present work believe that they are here presenting a very full and representative cross-section of the language of science and technology to-day.

Scope.—In SCIENCE, many thousands of astronomical, meteorological, geological, mineralogical, chemical, and physical terms are defined. In zoology and botany the terms selected relate mainly to the conditions, growth, and functions of animal and vegetable parts. The larger subdivisions of the plant and animal kingdoms are adequately treated, as are all the important types of rocks and minerals. The medical and veterinary terms are largely supplemented by those occurring in zoology, biology, physiology, psychology, chemistry, and botany.

In ENGINEERING, the terms used in every branch, including metallurgy, are fully dealt with. In electrical engineering due consideration has been given to terms in electrical communication, telephony, radio, and television. Particular attention has been given to the rapidly developing subject of acoustics, with its applications in cinematography. Mining terms have presented a special difficulty, for there are many thousands of them with but a very localised currency. Within the limits set, our contributor has attempted to give a representative selection of such terms as enjoy general usage.

In MANUFACTURES, the terms cover a wide range of industries, including raw materials, processes of manufacture, machinery, and, in the textile industries, fabrics, bleaching, and dyeing.

In CONSTRUCTION, the terms are similarly comprehensive, including buildings, bridges, ships, and docks. Materials and methods are named and defined, as are structural parts and features.

Appendix, Supplement.—The Appendix (pp. 923-951) contains useful tables in the fields of chemistry, geology, botany, and zoology; while to the present (second) edition of the dictionary is added a Supplement (pp. 952-975) which both amplifies existing topics and embraces new ones.

A full list of the subjects covered by this dictionary is given on page viii.

Pronunciations.—Bearing in mind the very great diversity in the pronunciation of technical terms, even among technical men themselves, it has not been deemed advisable to superimpose a thoroughgoing pronunciation system upon the present work. Instead, the Editors have asked contributors to indicate their own pronunciation and accentuation in cases where they think such an aid helpful. Accordingly, if the reader pronounces or accents a word as shown in the dictionary, he may rest assured that he is doing so in good company. A very large number of terms have no pronunciation indicated; in these the ordinary rules of pronunciation and accentuation of ordinary English speech may be said to hold good.

Where pronunciations are indicated by respelling, the following system of phonetics is used:

a	as in	**fat**	ī	as in	pine	ü	as in	Fr. *pur,* Ger. *für*
ā	,,	**fāte**	o	,,	hop			
ah	,,	**Ah !**	ō	,,	hope	g	,,	**go**
aw	,,	**cause**	oo	,,	**hoop**	j	,,	**jam**
e	,,	**met**	ow	,,	**cow**	s	,,	**seat**
ē	,,	**meet**	u	,,	**cub**	zh	,,	plea**s**ure
ė	,,	**her**	ū	,,	**cube**	ahn^{g}	,,	Fr. *blanc*
i	,,	**pin**				on^{g}	,,	Fr. *mont*

Where pronunciations are not indicated by respelling, the following general rules apply:

(1) An accent after a syllable indicates stress on that syllable. If the accent is placed after a vowel, that vowel is long (e.g. **adre′nal**); if it is placed after a consonant, the vowel preceding that consonant is short (e.g. **adren′aline**).

(2) In words derived from Greek, **ch** is commonly pronounced **k**.

(3) In chemical terms the suffix **-ine** is commonly pronounced **-ēn** (e.g. **aniline** =an′il-ēn; **alkaline**=al′kal-īn is an exception).

Alphabetical Arrangement.—Certain departures have been made from the conventional arrangement of articles in strict alphabetical order as determined

LIST OF SUBJECTS AND ABBREVIATIONS

Acoustics (*Acous.*).
Aeronautics (*Aero.*).
Agricultural Machinery (*Agric. Mach.*).
Agriculture (*Agric.*).
Ammunition.
Anatomy (*Anat.*).
Architecture (*Arch.*).
Artillery.
Astronomy (*Astron.*).
Automatic Telephony (*Auto. Teleph.*).
Automobiles.
Bacteriology (*Bacteriol.*).
Biology (*Biol.*).
Bookbinding (*Bind.*).
Boots and Shoes.
Botany (*Bot.*).
Brewing (*Brew.*).
Building (*Build.*).
Cables.
Carpentry (*Carp.*).
Cathode Ray Tubes.
Chemical Engineering (*Chem. Eng*).
Chemical Warfare (*Chem. War.*).
Chemistry (*Chem.*).
Cinematography (*Cinema.*).
Civil Engineering (*Civ. Eng.*).
Cotton Spinning.
Crystallography (*Crystal.*).
Cytology (*Cyt.*).
Decoration (*Dec.*).
Dielectrics (*Diel.*).
Ecology (*Ecol.*).
Electrical Communication (*Elec. Comm.*).
Electrical Engineering (*Elec. Eng.*).
Electricity (*Elec.*).
Embryology (*Embryol.*).
Engineering (*Eng.*).
Entomology (*Entomol.*).
Food Technology (*Foods*).
Foundry Practice (*Foundry*).
Fuels.
Furniture (*Furn.*).
Furs.
Gas Fittings.
Gas Manufacture (*Gas*).
Genetics (*Gen.*).
Geology (*Geol.*).
Geometry (*Geom.*).
Glass Manufacture (*Glass*).
Glove Making (*Gloves*).
Heat.
Heating.
Highway Engineering (*Highways*).
Histology (*Histol.*).
Horology (*Horol.*).
Hosiery.
Hydraulic Engineering (*Hyd. Eng.*).
Hydraulics (*Hyd.*).
Internal-Combustion Engines (*I.C. Engs.*).
Illumination (*Illum.*).
Industrial Heating (*Ind. Heat.*).
Instruments.
Jewellery (*Jewel.*).
Joinery (*Join.*).
Lace Manufacture (*Lace*).
Leather Manufacture (*Leather*).
Light.
Linen Manufacture (*Linen*).
Magnetism (*Magn.*).
Masonry.
Mathematics (*Maths.*).
Mechanics (*Mech.*).
Medicine (*Med.*).
Metallurgy (*Met.*).
Meteorology (*Meteor.*).
Microscopy (*Micros.*).
Military Science (*Mil.*).
Mineralogy (*Min.*).
Mining.
Moulding.
Nutrition (*Nut.*).
Obstetrics (*Obstet.*).
Oceanography (*Ocean.*).
Oils.
Optics.
Painting (*Paint.*).
Paper Making (*Paper*).
Photo-electric Cells.
Photo-electronics.
Photography (*Photog.*).
Physics (*Phys.*).
Physiology (*Physiol.*).
Plaster-work (*Plast.*).
Plastics.
Plumbing (*Plumb.*).
Pottery (*Pot.*).
Printing (*Print.*).
Psychiatry.
Psycho-analysis (*Psycho-an.*).
Psychology (*Psychol.*).
Psycho-pathology (*Psycho-path.*).
Quarrying.
Radio.
Radiology.
Railways (*Rail.*).
Sanitary Engineering (*San. Eng.*).
Sewage Disposal (*Sewage*).
Ship Construction (*Ship Const.*).
Ships.
Signalling (*Sig.*).
Silk Manufacture (*Silk*).
Small Arms.
Soap Manufacture (*Soap*).
Spinning.
Structures (*Struct.*).
Surgery (*Surg.*).
Surveying (*Surv.*).
Tanning.
Telegraphy (*Teleg.*).
Telephony (*Teleph.*).
Television.
Textiles.
Thermionics.
Timber.
Tools.
Typography (*Typog.*).
Veterinary Science (*Vet.*).
Weaving.
Woollen Manufactures (*Woollen*).
Worsted Manufacture (*Worsted*).
Zoology (*Zool.*).

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***Note.*—An asterisk ★ after an article or cross-reference directs attention to the Supplement**

A, *a*

a-. A prefix meaning *not, lacking, without*; sometimes used in the forms **an-, ap-.**

a (*Chem.*). A symbol for *activity* (2).

***a*-** (*Chem.*). An abbrev. for (1) Asymmetrically substituted.—(2) *Ana*-, i.e. containing a condensed double aromatic nucleus substituted in the 1.5 positions.

a (*Elec. Eng.*). See **A** (*Elec. Eng.*).

[**a**] (*Light*). A group of dark lines in the red of the solar spectrum, having a head at wavelength 7164 725 A. The group is due to absorption in the earth's atmosphere. See **Fraunhofer lines.**

α (*Chem.*). A symbol for (1) Degree of electrolytic dissociation.—(2) Angle of optical rotation.

α- (*Chem.*). A symbol indicating (1) Substitution on the carbon atom of a chain next to the functional group.—(2) Substitution on a carbon atom next to one common to two condensed aromatic nuclei.—(3) Substitution on the carbon atom next to the hetero-atom in a heterocyclic compound.—(4) A stereo-isomer of a sugar.

$[\alpha]_D^t$ (*Chem.*). The symbol for the specific optical rotation of a substance at *t*° C., measured for the D line of the sodium spectrum.

α-brass, α-iron, etc. (*Met.*). See **alpha brass, alpha iron,** etc.

α female (*Zool.*). See **alpha female.**

α-particle (*Phys.*). See **alpha particle.**

α-rays (*Phys.*). See **alpha-rays.**

A (*Chem.*). The symbol for *argon.*

A (*Chem.*). Symbol for (1) Free energy—*Helmholtz.*—(2) Atomic weight.

A or **a** (*Elec. Eng.*). The commonly used abbreviation for *ampere*; e.g. 25A signifies a current of 25 amperes.

[**A**] (*Light*). A strong absorption band in the deep red of the solar spectrum (wavelength 7621·28 Å.U.), caused by oxygen in the earth's atmosphere. The first of the Fraunhofer lines.

A (*Phys.*). Abbrev. for *absolute temperature.*

Å, Å.U., A, A.U. (*Phys.*). Abbrevs. for *Ångstrom unit.*

A-amplifier (*Elec. Comm.*). The amplifier associated with, or immediately following, a high-quality microphone, as in broadcasting studios.

A-battery (*Elec. Comm.*). The battery or power supply for heating the cathodes of thermionic valves to a temperature suitable for the emission required.

A-digit-selector (*Auto. Teleph.*). In a Strowger system, the first two-motion switch, which is operated by dialling, and which engages a free director.

A-operator (*Teleph.*). The operator who asks for subscribers' requirements and controls local and junction calls.

A-position (*Teleph.*). A section of the switchboard allocated to an A-operator.

A-position keysending (*Teleph.*). The setting-up of trains of impulses by the A-operator in a manual system to extend a call into an automatic system.

A-service-area (*Radio*). That region around a broadcasting station where the field strength is greater than ten millivolts per metre.

A-side (*Teleg.*). The double-current channels in a quadruplex system.

A-type pole (*Elec. Comm.*). Support for open-wire lines constructed from two inclined poles fastened together at the top and braced with a cross-tie.

A-wire (*Teleph.*). The wire of the subscriber's pair which is connected to the T or tip-wire of the answering plug of the cord circuit and so to the positive (earthed) end of the battery. It is normally a few volts below earth potential to expose faults.

a.a. (*Photog.*). Abbrev. for *take one of each* in photographic solution recipes.

a.b. (*Build.*). Abbrev. for *as before.*

ab- (*Elec. Eng.*). A prefix attached to the practical electrical units to obtain names for the absolute electromagnetic units—e.g. *abampere, abohm, abvolt,* etc. Used chiefly in America.

abac'tinal (*Zool.*). See **abambulacral.**

ab'acus. A term applied to various early forms of an instrument used for mechanically performing addition and subtraction.

abacus (*Arch.*). The upper member of a column or pilaster, on which the architrave rests.

abacus (*Carp., etc.*). The part of a baluster on which the handrail rests.

abambula'cral (*Zool.*). Pertaining to that part of the surface of an Echinoderm lacking tube-feet.

abamu'rus (*Build.*). A supporting wall or buttress, built to add strength to another wall.

aba'pical (*Zool.*). Pertaining to, or situated at, the lower pole: remote from the apex.

abatement (*Join.*). Waste of timber in shaping to size.

abatjour, ab-a-joor' (*Build.*). An opening to admit light, and generally to deflect it downwards; a skylight.

abattoir, ab-at-war'. A public slaughter-house.

abatvoix, ab-a-vwa' (*Acous.*). A sounding-board or other arrangement over a pulpit or rostrum, to deflect speech downwards and in the direction of those listening.

abaxial (*Bot.*). The side of a leaf, petal, etc. which is farthest from the axis.—(*Zool.*) Remote from the axis.

abaxial (*Photog.*). Said of rays of light which do not coincide with the optical axis of a lens system.

Abbé refractometer (*Chem.*). An instrument for measuring directly the refractive index of oils, etc.

abbreviated (*Bot.*). Shortened rather suddenly.

A.B.C. process (*Sewage*). A process of sewage treatment in which alum, blood, clay, and charcoal are used as precipitants.

Abderhalden reaction (*Chem.*). A test for the presence of protective ferments in the blood. The prepared albumin and the serum are mixed and any change in optical activity noted; or else the mixture is dialysed and the dialysate tested by the ninhydrin reaction. The test can be used to detect pregnancy, malignant disease, dementia praecox, etc.

abdo'men (*Zool.*). In *Arachnida*, a loose term roughly equivalent to *opisthosoma* (q.v.): in *Insecta*, the third or posterior part of the body behind the thorax: in *Crustacea Entomostraca*, the apodous region behind the genital openings: in *Crustacea Malacostraca*, the posterior part of the body bearing pleiopods and uropods: in *Diplopoda*, the part of the body composed of double segments: in other *Arthropoda*, a posterior part of the body: in tubicolous *Polychaeta*, the posterior part of the body differing from the anterior part (thorax) in arrangement of chaetae and parapodia: in *Tunicata*, the part of the body containing the stomach and intestine: in lower *Vertebrata*, that region of the body which corresponds to the Mammalian abdomen but is not usually demarcated by a diaphragm: in Mammals, the region of the body, lying between the diaphragm and the pelvis, which contains the urinogenital and digestive organs.

abdom'inal (*Zool.*). Pertaining to or situated in the abdomen.

abdominal legs (*Zool.*). Soft, fleshy, unjointed locomotor appendages of the abdomen in some insect larvae; not homologous with the true or thoracic legs.

abdominal pores (*Zool.*). Apertures leading from the coelom to the exterior in certain Fish and in *Cyclostomata*.

abdominal reflex (*Zool.*). Contraction of the abdominal wall muscles when the skin over the side of the abdomen is stimulated.

abdominal regions (*Anat.*). Nine regions into which the human abdomen is divided by two horizontal and two vertical imaginary planes, i.e. right and left hypochondriac, right and left lumbar, right and left iliac, epigastric, umbilical, and hypogastric.

abdominal ribs (*Zool.*). In certain Reptiles, rods of dermal bone in the ventral body wall, between true ribs and pelvis.

abdom'inohyoi'deus (*Zool.*). In *Amphibia*, a muscle continuing the rectus abdominis forward into the throat region.

abdu'cens (*Zool.*). In Vertebrates, the sixth cranial nerve, supplying the rectus externus muscle of the eye.

abduction (*Zool.*). The action of pulling a limb or part away from the main axis.

abductor (*Zool.*). Any muscle that draws a limb or part away from the median axis; e.g. the *abductor pollicis*, which moves the thumb outwards.

Abel flash-point apparatus (*Chem.*). A petroleum-testing apparatus for determining the flash-point.

Aberdeen granite (*Build.*). A grey or pink granite, widely used as a building-stone for heavy work. See **granite.**

aber'rant (*Bot., Zool.*). Showing some unusual difference of structure: having characteristics not strictly in accordance with type.

aberration (*Astron.*). An apparent change of position of a heavenly body, due to the velocity of light having a finite ratio to the relative velocity of the source and the observer.

aberration (*Bot.*). Some peculiarity of an individual plant not capable of transmission to offspring, and usually due to some special environmental condition.

aberration (*Light*).

See **chromatic—** **spherical—**

aberration (*Television*). Distortion in a television image similar in type to one or other of the optical aberrations.

abietic acid, ab-i-et'ik (*Chem.*). $C_{20}H_{30}O_2$, m.p. 153° C. Acid isolated from rosin or colophonium.

abi'ogen'esis (*Zool.*). See **spontaneous generation.**

abjection (*Bot.*). The forcible projection of spores from the sporophore.

abjunction (*Bot.*). The delimitation of a spore from its stalk by means of a septum.—*v.* **abjoint.** —*adj.* **abjointed.**

ablation (*Surg.*). Removal of body-tissue by surgical methods.

Abney colour sensitometer (*Photog.*). An apparatus, using a rotary stepped sector-disc behind a number of apertures, for matching the luminosities of different colours.

Abney level (*Surv.*). A particular form of reflecting level, devised for the measurement of vertical angles.

Abney mounting (*Light*). A form of mounting for a concave diffraction grating, in which the eyepiece (or photographic-plate holder) is fixed at the centre of curvature of the grating and the slit can move round the circumference of the Rowland circle, in order to bring different orders of spectrum into view.

abnormal (*Psychol.*). Said of a person who is badly adjusted to himself and/or to the outside world.

abnormal polarisation (*Radio*). The condition of polarisation of an electromagnetic wave when the magnetic field contains a vertical component.

abomasi'tis (*Vet.*). Inflammation of the *abomasum* (q.v.).

aboma'sum (*Zool.*). In ruminant Mammals, the true or fourth stomach. Also called REED, RENNET.

abo'ral (*Zool.*). Opposite to, leading away from, or distant from, the mouth.

abortifa'cient (*Med.*). Anything which causes artificial abortion: a drug which does this.

abortion (*Bot.*). A state of imperfect or incomplete development, or the product of such defective development.

abortion (*Med.*). Expulsion of the foetus from the uterus during the first three months of pregnancy. Abortion may be spontaneous or induced.

abortion (*Zool.*). Cessation of development in an organ or foetus.

abortion, contagious bovine (*Vet.*). A contagious infection of bovines due to *Brucella abortus.*

abortion, contagious equine (*Vet.*). A contagious infection of equines due to *Bacterium abortus-equi.*

abortive. *Adj.* from *abortion.*

about'sledge (*Eng.*). The large hammer used by a blacksmith's mate, turn-about with the smaller hammer of the blacksmith.

abra'dant (*Eng.*). A substance, usually in powdered form, employed for grinding. See **abrasive.**

abran'chiate (*Zool.*). Lacking gills.

abrasion, a rubbing away.—(*Med.*) A rubbed-away area of the surface-covering of the body; i.e. of skin or of mucous membrane.

abrasion marks (*Photog.*). Scratches on emulsions, visible after development.

abrasive (*Chem.*). A substance used for the removal of matter by scratching and grinding (abrasion); e.g. silicon carbide.

abrasive pencil (*Photog.*). A composition of wax and pumice, for reducing densities in retouching.

abreac'tion (*Psycho-an.*). A release of blocked psychic energy attaching to repressed and forgotten memories and phantasies; effected by living through these in feeling or action.

abreuvoir, ab-roov-war' (*Masonry*). The mortar joint between two arch-stones, or between stones in a wall.

abruptly pinnate (*Bot.*). Said of a pinnate leaf without a terminal leaflet.

abscess (*Med.*). Pus localised in infected tissue and separated from healthy tissue by an abscess wall.

absciss layer (*Bot.*). A layer of parenchymatous cells across the base of a petiole or of a branch, or embedded in bark, through which the leaf or branch, or a scale of bark, separates off. Also called ABSCISSION LAYER, SEPARATION LAYER.

absciss-phelloid (*Bot.*). The unsuberised cells of an absciss layer situated in bark.

abscis'sa (*Maths.*). For rectilineal axes of co-ordinates, the distance of a point from the axis of ordinates measured in a direction parallel to the axis of abscissae, which is usually horizontal. —*pl.* **abscissae.**

abscission (*Bot.*). (1) The organised shedding of a part of a plant by means of an absciss layer.—(2) The liberation of a fungal spore by the breakdown of a sterile portion of the stalk of the spore.

abscission layer (*Bot.*). See **absciss layer.**

absolite (*Min.*). See **earthy cobalt.**

absolute alcohol (*Chem.*). Water-free alcohol; obtained from rectified spirit by adding benzene and refractionating. Very hygroscopic.

absolute ampere (*Elec. Eng.*). The current which, when flowing in a circular conductor of one centimetre radius, produces at the centre a field strength of 2π gauss. The ampere normally used in electrical engineering is one-tenth of this quantity.

absolute ceiling (*Aero.*). See **ceiling (absolute).**

absolute electrometer (*Elec. Eng.*). A high-grade attracted-disc electrometer, in which an absolute measurement of potential can be made by weighing the attraction between two charged discs against gravity.

absolute galvanometer (*Elec. Eng.*). A galvanometer which can be used for making an absolute measurement of a current; the galvanometer constant must be determined from its dimensions and not by calibration.

absolute humidity (*Meteor.*). The number of grammes of water-vapour per cubic metre of the atmosphere: with vapour pressure e and temperature T (absolute) the absolute humidity is represented by $\delta = 216{\cdot}7\ e/T$ gms./cu. m.

absolute hydraulic gradient (*Hyd.*). An imaginary curve parallel to the *hydraulic gradient* (q.v.) but higher by the amount $\frac{po}{w}$, where po = atmospheric pressure intensity, w = density of the fluid in the flow system.

absolute instrument (*Phys.*). An instrument which measures a quantity directly in absolute units, without the necessity for previous calibration.

absolute magnitude (*Astron.*). See **magnitudes.**

absolute potential (*Chem.*). The true potential difference between a metal and a solution.

absolute pressure (*Phys.*). Pressure measured with respect to zero pressure, in units of force per unit of area.

absolute-rest precipitation tanks (*Sewage*). Tanks in which a given amount of sewage is dealt with at a time, as opposed to tanks taking a continuous flow. After two or three hours' settlement, the top water is drawn off from above and the precipitated sludge from below.

absolute temperature (*Phys.*). Temperature measured with respect to the *absolute zero* (q.v.) on a scale having a thermodynamic basis.

absolute transpiration (*Bot.*). The rate of loss of water from a plant, as determined by experiment.

absolute unit (*Phys.*). A unit which may be defined directly in terms of the fundamental units of length, mass, and time.

absolute unit of current (*Elec.*). The current which, flowing in a circular conductor of radius one centimetre, will produce at the centre a magnetic field of strength 2π gauss. The *ampere* is equal to one-tenth of an absolute unit of current.

absolute weight (*Chem.*). The weight of a body in a vacuum.

absolute zero (*Phys.*). The temperature at which a *perfect gas* (q.v.), kept at constant volume, would exert no pressure; equal to $-273{\cdot}1°$ C.

absorber (*Elec. Comm.*). The resistance and condenser in series which is placed across a break in an electrical circuit in order to damp any possible oscillatory circuit which would tend to maintain an arc or spark when a current is interrupted. Also called SPARK ABSORBER.

absorber, harmonic (*Elec. Eng.*). Apparatus for removing harmonics in current or voltage wave-forms, using tuned circuits or a wave-filter.

absorber valve (*Radio*). The valve used in an absorption modulator, to absorb excess energy during troughs of the modulation cycle. In a radio telegraph transmitter, the absorber valve is used to prevent changes of voltage in the power supply during keying.

absorbing hair, absorbing trichome (*Bot.*). A hair which absorbs water.

absorbing well (*Civ. Eng.*). A shaft sunk through an impermeable stratum to allow water to drain through to a permeable one.

absorptiom'eter (*Chem.*). An apparatus for determining the solubilities of gases in liquids.

absorption (*Acous.*).
See **acoustic—** **atmospheric—**

absorption (*Chem.*). Penetration of a substance into the body of another. Cf. *adsorption.*

absorption (*Med.*). The taking-up of fluids or other substances by the vessels and tissues of the body.

absorption (*Radio*). Reduction in the intensity of an electromagnetic wave, due to eddy currents and dielectric losses in the earth. Also called ATTENUATION.

absorption band (*Light*). A dark gap in the continuous spectrum of white light transmitted by a substance which exhibits *selective absorption.*

absorption band (*Photog.*). In a colour filter, the range of approximate limits of wavelength where marked changes in effective transmission of intensity are evident; thus the relative colour-sensitivity of an emulsion is effectively altered by filtering the incident light with filters of suitable absorption bands. With infra-red emulsions, visible light must be removed by a filter.

absorption coefficient (*Chem.*). The volume of gas, measured at N.T.P., dissolved by unit volume of a liquid under normal pressure (i.e. 1 atmosphere).—(*Phys.*) See **absorptivity.**

absorption control (*Radio*). See **absorption modulation.**

absorption dynamometer (*Eng.*). A dynamometer which absorbs and dissipates the power which it measures; e.g. the ordinary rope brake and the Froude hydraulic brake. Cf. *transmission dynamometer.*

absorption edge (*Phys.*). The limit, on the longer wavelength side, of the X-ray absorption band of a substance.

absorption, electrical (*Elec.*). An effect in a dielectric whereby, after an initially charged condenser has been once discharged, it is possible after a few minutes to obtain from it another discharge, usually smaller than the first.

absorption factor (*Illum.*). The ratio of the difference between the total luminous flux falling on a surface and the sum of the fluxes transmitted through and reflected from the surface, to the total luminous flux falling on the surface. Also called COEFFICIENT OF ABSORPTION, ABSORPTION RATIO.

absorption hygrometer (*Meteor.*). An instrument by which the quantity of water vapour in the air may be measured. A known volume of air is drawn through tubes containing a drying agent such as phosphorus pentoxide; the increase in weight of the tubes gives the weight of water vapour in the known volume of air.

absorption keying (*Radio*). A method of keying a radio-telegraph transmitter in which an absorber valve is made conductive during the spacing intervals, causing a reduction in the anode supply voltage to the transmitter valves.

absorption modulation (*Radio*). A method of modulating a radio-telephone transmitter in which an absorber valve is made conductive during the troughs and non-conductive during the peaks of the modulation cycle. The power dissipated by the absorber valve is drawn from the antenna, the current in which is thereby modulated.

absorption ratio (*Illum.*). See **absorption factor.**

absorption refrigerator (*Eng.*). A plant in which ammonia is continuously evaporated from an aqueous solution under pressure, condensed, allowed to evaporate (so absorbing heat), and then reabsorbed.

absorption spectrum (*Light*). The system of absorption bands, or lines, seen when a selectively absorbing substance is placed between a source of white light and a spectroscope. See **Kirchhoff's law.**

absorption tubes (*Chem.*). Tubes filled with solid absorbent for the absorption of moisture and gases.

absorption wave-meter (*Radio*). A tuned circuit with indication of current resonance when either the frequency of the applied electromotive force is varied, or the inductance or capacity of the tuned circuit. By calibration or calculation, the system is generally in use for measuring the frequency or wavelength of radio-frequency currents.

absorptivity, absorptive power (*Phys.*). The fraction of the incident radiation which is absorbed by a surface on which it falls.

abstat- (*Elec. Eng.*). A prefix attached to the practical electrical units to obtain names for the absolute electrostatic units; e.g. *abstatampere*, *abstatfarad*, etc. Used chiefly in America.

abstracting (*Build.*, *Civ. Eng.*). In drawing up a bill of quantities, the process involved in collecting together pieces of work of the same sort in the same part of the contract, each having the same unit price.

abstriction (*Bot.*). A general term for the separation of a spore from its stalk; it includes *abjection* and *abscission*.

Abt rack (*Civ. Eng.*). A multi-plate rack which is sometimes used for mountain railways. It has the teeth on the different rackplates staggered in relation to one another.

abutment (*Eng.*). A point or surface provided to withstand thrust; e.g. the end supports of an arch or bridge.

abutment pier (*Civ. Eng.*). A pier to a wall supporting one end of a bridge. Cf. *standing pier.*

abutting joint (*Carp.*). A joint whose plane is at right-angles to the fibres, the fibres of both jointing pieces being in the same straight line.

abys'sal, abys'mal (*Ocean.*). Relating to the greatest depths of the ocean: relating to the abyssal realm.

abyssal deposits (*Geol.*). The deposits of the deep sea, accumulating in depths of more than 1500 fathoms of water; they comprise the organic oozes, various muds, and the red clay of the deepest regions.

abyssal intrusions (*Geol.*). An alternative name for *plutonic intrusions*.

abyssal realm (*Ocean.*). The waters of the ocean beyond the limits of the continental shelf and below a depth of one hundred fathoms.

Abyssinian pump (*Civ. Eng.*). A pump having a well-tube attached to the suction tube, for use in the *Abyssinian well* (q.v.).

Abyssinian well (*Civ. Eng.*). A tube driven into strata of moderate hardness in order to obtain a supply of water. The tube is pointed at its lower end, with perforations above the point.

abys'soben'thic (*Ocean.*). Relating to that part of the abyssal realm which includes the ocean floor: pertaining to or living on the ocean floor at great depths.

abyssopela'gic (*Ocean.*). Relating to that part of the abyssal realm which excludes the ocean floor: floating in the depths of the ocean.

ac- (*Chem.*). An abbrev. indicating substitution in the alicyclic ring.

a.c., A.C. (*Elec. Eng.*). Abbrevs. for *alternating current* (q.v.).

Ac (*Chem.*). (1) The symbol for *actinium.*—(2) A symbol for the acetate radical, $CH_3{\cdot}COO'$.—(3) A symbol for the acetyl radical, $CH_3{\cdot}CO-$.

a.c. resistance (*Thermionics*). See **differential anode resistance.**

acacia gum (*Chem.*). See **gum arabic.**

Acadian (*Geol.*). A series name applied to the Middle Cambrian strata of the Atlantic Province in N. America (Newfoundland, Nova Scotia to eastern Massachusetts).

Acale'phae (*Zool.*). See **Scyphozoa.**

acana'ceous (*Bot.*). A general term for prickly.

acan'tha (*Bot.*). A prickle or spine. The term occurs in such compounds as *acanthocarpous* (spiny-fruited) and *acanthocladous* (having spiny branches).

acan'thin (*Zool.*). A substance which forms the skeleton of some *Radiolaria*; formerly believed to be of an organic nature, but now known to be strontium sulphate.

acan'thite (*Min.*). An ore of silver, Ag_2S, crystallising in the orthorhombic system.

Acanthobdel'lida (*Zool.*). An order of *Hirudinea* the members of which are exclusively parasitic on fish; distinguished by the possession of numerous setae on the anterior segments of the body.

Acan'thoceph'ala (*Zool.*). A phylum of elongate worms with rounded body and a protrusible proboscis, furnished with recurved hooks; there is no mouth or alimentary canal; the young stages are parasitic in various Arthropods, the adults in fish and aquatic birds and mammals. Thorny-Headed Worms.

acantho'sis ni'gricans (*Med.*). A condition in which warty pigmented growths appear on the surface of the body.

acanthozo'oid (*Zool.*). In *Cestoda*, the proscolex, or head-portion, of a bladder-worm. Cf. *cystozooid.*

acap'nia (*Med.*). Excessive diminution of carbon dioxide in the blood.

acari'asis (*Med.*, *Vet.*). Contagious disease of the skin due to mites (*acari*).

Acari'na (*Zool.*). An order of small *Embolobranchiata* having a globular body with uniform prosoma and opisthosoma; the chelicerae and pedipalpi are small and associated with the mouth-parts, which may be modified for biting, rasping, or piercing and sucking; respiration is by tracheae or cutaneously; the young forms usually have six legs; a vast group, of world-wide distribution, varied habit and great economic importance. Mites and Ticks.

aca'rodoma'tium (*Bot.*). A hollow or other protective structure formed by some plants which harbour mites and appear to live in symbiosis with them.

aca'rophily, aca'rophy'tism (*Bot.*). A symbiotic association between plants and mites.

ac'arus (*Biol.*). A mite; an arachnid of the family

Acaridae. The variety called *Sarcoptes scabiei* causes scabies.

a'cauline, a'caulose (*Bot.*). Stemless or nearly so.

accelerated ageing test (*Cables*). A stability test using twice normal working voltage. It is claimed that this gives quick results that correlate with service records.

accelerated filtration (*Chem.*). The process of increasing the speed of filtration by applying suction to draw the liquid through the filter, or by applying pressure to force it through.

accelerating contactor (*Elec. Eng.*). One of the contactors of an electric-motor control panel which cuts out starting resistance, thereby causing the motor to accelerate.

accelerating electrode (*Thermionics*). An electrode in a thermionic valve or cathode ray tube maintained at a high positive potential with respect to the electronic source. It accelerates the electrons in their flight to the anode but does not collect a high proportion of them. Also called ACCELERATOR.

accelerating potential (*Thermionics*). The potential of an accelerating electrode with respect to the cathode.

accelerating pump (*Automobiles, etc.*). A small cylinder and piston fitted to some types of carburettor, and connected to the throttle so as to provide a momentarily enriched mixture when the engine is accelerated.

acceleration (*Mech.*). The rate of change of velocity, expressed in feet (or centimetres) per second per second. Certain restricted and special applications of the word occur in Astronomy; e.g. *secular acceleration* (q.v.).

acceleration due to gravity (*Mech*). The acceleration with which a body would fall freely under the action of gravity in a vacuum. This varies according to the distance from the earth's centre, but its mean value is 980·6 cm./sec.^{2} or 32·2 ft./sec.^{2} See **Helmert's formula.**

accelerator (*Bot.*). Any substance which increases the efficient action of an enzyme.

accelerator (*Chem.*). A substance which increases the speed of a chemical reaction. See **catalysis.**—(*Civ. Eng., etc.*) Any substance mixed with cement concrete for the purpose of hastening hardening.—(*Photog.*) A chemical used to increase the rate of development; e.g. sodium or potassium carbonate or hydrate.—(*Rubber*) Any substance effecting acceleration of the vulcanisation process of rubber. The principal types are aldehyde derivatives of Schiff's bases,

butyraldehyde-butylidene-aniline,
di-orthotolyl-guanidine,
diphenyl-guanidine,
benzthiazyl disulphide,
tetramethyl-thiuran disulphide,
zinç dimethyl-dithiocarbamate.

accelerator or **accelerator pedal** (*Automobiles, etc.*). A pedal connected to the carburettor throttle valve of a motor vehicle, or to the fuel injection control where oil engines are used.

accelerator (*Heating*). A centrifugal pump located in the return circuit of a central heating system, by means of which it is possible to increase the flow.

accelerator (*Thermionics*). See **accelerating electrode.**

accelerator (*Zool.*). Any muscle or nerve which increases rate of action.

accelerom'eter (*Aero.*). An instrument, specially designed for carrying in aircraft, which measures acceleration in a certain specific direction. There are three types: indicating, maximum reading, and recording. The instrument is sometimes attached to the pilot, as distinct from the aircraft itself.

accent (*Typog.*). An indication of pronunciation. The most common are: (´) acute; (\`) grave; (^) circumflex; (¨) diaeresis or umlaut. Accents made separately and superimposed when setting up the type are called *floating accents.*

accentuation (*Photog.*). High-lights or high contrasts in the composition of a photographic picture.

acceptor (*Chem.*). (1) The reactant in an induced reaction which does not react directly with the inductor.—(2) The atom which contributes no electrons to a semi-polar bond.

access (*Auto Teleph.*). The possibility of getting on to a circuit for testing or for trunk offering.

access eye (*San. Eng.*). A screwed plug provided in soil, waste, and drain pipes at bends and junctions, so that access is possible in order to clear a stoppage.

access selector (*Auto. Teleph.*). A selector which permits connection of a routiner to switches, which are tested in order.

accesso'rius (*Zool.*). A muscle which supplements the action of another muscle: in Vertebrates, the eleventh cranial nerve or spinal accessory.

accessory (*Bot.*). An additional member beyond the normal.

accessory (*Zool.*). The eleventh cranial nerve of higher Vertebrates, supplying certain of the shoulder muscles.

accessory bud (*Bot.*). A bud additional to a normal axillary bud.

accessory cell (*Bot.*). A cell associated with the guard cell of a stoma, differing in structure both from it and from the ordinary cells of the epidermis.

accessory character (*Bot., Zool.*). A non-essential character of a species, sometimes used to distinguish one race from another.

accessory chromosome (*Cyt.*). See **sex-chromosome.**

accessory fructification (*Bot.*). A reproductive structure in lower plants which is not sexual or concerned with sexuality.

accessory glands (*Zool.*). Glands of varied structure and function in connexion with the genitalia, especially of *Arthropoda.*

accessory minerals (*Geol.*). Minerals which occur in small, often minute, amounts in igneous rocks; their presence or absence makes no difference to classification and nomenclature.

accessory multiplication, accessory reproduction (*Bot.*). Any reproductive process which is not sexual.

accessory pulsatory organs (*Zool.*). In insects, sac-like contractile organs, pulsating independently of the heart, and variously situated on the course of the circulatory system.

accessory spore (*Bot.*). (1) A spore of non-sexual origin.—(2) A conidium of a type different from that usual in the species.

accidental errors. Small residual differences from the correct values, due to unavoidable defects in instruments or to inaccuracy of observation. They are equally likely to be positive or negative in sign. Sometimes called COMPENSATING ERRORS. See **systematic errors.**

acclimatisation (*Chem.*). The change produced in a colloidal sol by the addition of a precipitating agent in small quantities, resulting in less complete precipitation for the addition of a given total amount of precipitant.

accommodation (*Bot.*). The capacity possessed by a plant to adjust itself to new conditions of life, provided the changed conditions come gradually into operation.

accommodation (*Physiol.*). The ability of the eye to change its effective focal length in order to see objects distinctly at varying distances. The range of vision for a normal eye is from about ten inches to infinity. Power of accommodation usually diminishes with advancing age.

accordion (*Build.*). A folding door or partition working in a manner similar to the bellows of an accordion.

accoucheur, ak-oo-shėr' (*Med.*). A physician who practises midwifery.

account book paper (*Paper*). A specially tough paper which will stand erasures with a penknife. Usually azure laid.

accouplement, a-kup'le— (*Carp.*). A tie or brace of timber.

accres'cent (*Bot.*). Enlarged and persistent; usually applied to a calyx which increases in size as the fruit ripens.

accretion (*Zool.*). External addition of new matter · growth by such addition.

accroi'des (*Chem.*). A gum obtained from a species of Xanthorrhoea trees; of red colour, soluble in hot alcohol; used for polishes, stains, lacquers, etc.

accumbent (*Bot.*). Said of an embryo in which the edges of the cotyledons lie against the radicle.

accumulated temperature (*Meteor.*). The integrated product of the excess of air temperature above 42° F. and the period in days during which such excess is maintained.

accumulator (*Elec. Eng.*). A voltaic cell which can be charged and discharged. On charge, when an electric current is passed through it, into the positive and out of the negative terminal, according to the conventional direction of flow of current, electrical energy is converted into chemical energy. The process is reversed on discharge, the chemical energy, less losses, both in potential and current, being converted into useful electrical energy. Accumulators therefore form a useful portable supply of electric power, but have the disadvantage of being heavy.

See **alkaline—**
Drumm—
Edison—
lead-acid—
Ni-Fe—
nickel-iron-alkaline—
portable—

accumulator (*Ocean.*). A spring of rubber or steel attached to a trawling warp, to lessen any sudden strain due to the trawl catching.

accumulator box (*Elec. Eng.*). A vessel, usually made of glass, lead-lined wood or celluloid, for containing the plates and electrolyte of an accumulator.

accumulator grid (*Elec. Eng.*). The lead grid which forms one of the plates of a lead-acid accumulator having pasted plates.

accumulator insulator (*Elec. Eng.*). The insulators, usually of glass, upon which the individual cells of an accumulator are stood in order to insulate them from earth.

accumulator switchboard (*Elec. Eng.*). A switchboard upon which are mounted all the necessary switches and instruments for controlling the charging and discharging of a battery of accumulators.

accumulator traction (*Elec. Eng.*). See **battery traction.**

accumulator vehicle (*Elec. Eng.*). An electrically propelled vehicle which derives its energy from an accumulator carried on the vehicle.

accuracy. Accuracy implies exactitude in measurement. The accuracy—strictly, the *inaccuracy*—of a measurement is a matter of degree, indicating how near our estimation, arrived at by means of, e.g., a scaled ruler, time-machine, protractor, or other aid to measurement, comes to the true value, which is always unknown. The degree of inaccuracy is a matter of probability, assuming that the mode of measurement is theoretically correct and the desired quantity is suitably isolated and defined. It is one of the aims of science to eliminate as far as possible such errors as can be recognised, and minimise such random errors as arise from peculiarities of the instrument, the observer, or external conditions. See **error.**

A.C.E. mixture (*Med.*). A common general anaesthetic, containing 1 part of alcohol, 2 parts of chloroform, and 3 parts of ether.

AcEm (*Chem.*). The symbol for *actinium emanation*, or *actinon.*

acen'trous (*Zool.*). Having a persistent notochord with no vertebral centra, as in the *Cyclostomata.*

aceph'alous (*Bot.*). Said of a style which does not terminate in a well-marked stigma.

acephalous (*Zool.*). Showing no appreciable degree of cephalisation: lacking a head-region, as *Pelecypoda.*

acerose, acerous, as'er-ōz, —us (*Bot.*). Needle-shaped.

acer'vuline (*Zool.*). Having the form of an irregular heap, as the shells of some *Foraminifera.*

acervulus (*Bot.*). A dense cushion-like mass of conidiophores and conidia formed by some fungi.—*adj.* **acervulate.**

acervulus cerebri (*Zool.*). See **brain-sand.**

acetab'ular bone (*Zool.*). In Crocodiles, the separate lower end of the ilium: in some Mammals, as *Galeopithecus*, an additional bone lying between the ilium and the pubis and frequently fused with one or the other.

acetab'ulum (*Zool.*). In *Platyhelminthes*, *Hirudinea*, and *Cephalopoda*, a circular muscular sucker: in *Insecta*, a thoracic aperture for the insertion of a leg: in *Vertebrata*, a facet or socket of the pelvic girdle with which articulates the pelvic fin or the head of the femur: in ruminant Mammals, one of the cotyledons of the placenta.

acetal, as'et-al (*Chem.*). $CH_3CH(OC_2H_5)_2$, b.p. 104° C., ethylidene di-ethyl-ether. The term *acetal* is applied to any compound of the type $R\,CH\,(OR')_2$, where R and R′ are organic radicals and R may be hydrogen.

acetals (*Chem.*). The dehydration products of aldehydes, with an excess of alcohols present. Acetals may be termed dialkyl ethers of the dihydrates.

acetal'dehyde (*Chem.*). CH_3CHO, colourless, ethereal, pungent liquid, b.p. 21° C., m.p. −121° C., sp. gr. 0·8, oxidation product of ethyl alcohol; intermediate for production of acetic acid, important raw material for the synthesis of organic compounds.

acet'amide (*Chem.*). $CH_3{\cdot}CO{\cdot}NH_2$, needles, soluble in water and alcohol, m.p. 82° C., b.p. 222° C., a primary amide of acetic acid.

acetan'ilide (*Chem.*). $C_6H_5NH{\cdot}COCH_3$, made from aniline and glacial acetic acid, m.p. 112° C., b.p. 304° C. Used pharmaceutically against fever (*Antifebrin*).

acetates, as'et-āts (*Chem.*). The salts of acetic acid; e.g. sodium acetate. Also the acetylation products of acetic acid; e.g. cellulose acetate.

acetate film (*Cinema.*). Positive or negative film consisting of emulsion carried on a base of cellulose acetate, which is *non-flam* (see **safety film**).

acetate rayon (*Textiles*). Rayon made from cellulose acetate which is produced from cotton linters by treatment with acetic anhydride, acetic acid, and sulphuric acid. See **rayon, cuprammonium rayon, viscose rayon.**

acetate wire (*Elec. Eng.*). Wire with an insulation covering of cellulose tetracetate.

ace'tic acid (*Chem.*). $CH_3{\cdot}COOH$, an important raw material of the chemical industry, synthesised from acetylene; also obtained by the destructive distillation of wood; and by the oxidation of alcohol. Acetic acid has a m.p. 16·6° C., b.p. 118° C., sp. gr. (20° C.) 1·0497.

acetic anhydride (*Chem.*). The anhydride of acetic acid, $(CH_3CO)_2O$, a colourless liquid, b.p. 137° C.

acetic ether (*Chem.*). *Ethyl acetate* (q.v.).

acetic fermentation (*Chem.*). The fermentation of dilute alcohol solutions by oxidation in presence of bacteria, especially *Bacterium aceti*. Acetic acid is formed.

acetin (*Chem.*). Monoacetin, glyceryl monoacetate, $CH_3COO{\cdot}C_3H_5(OH)_2$, b.p. 130° C., sp. gr. 1·22, a colourless hygroscopic liquid, used as intermediate for explosives, solvent for basic dyestuffs, tanning agent.

aceto-acetic ether (*Chem.*). $CH_3CO{\cdot}CH_2COOC_2H_5$, b.p. 94° C. (45 mm), sp. gr. 1·03; a colourless or slightly yellow liquid, of fruity odour, used in organic synthesis and in perfumery.

acetone, as'— (*Chem.*). CH_3COCH_3, b.p. 56 C., of ethereal odour, a very important solvent, basis for organic synthesis. Acetone is the simplest type of a saturated ketone.

acetone oils (*Chem.*). Crude distillates containing acetone and other higher homologues, slightly coloured, syrupy, of pungent odour. Boiling range 75° C. to 125° C., sp. gr. 0·81 to 0·87. Used as solvent for cellulose esters, and for denaturing alcohol.

acetonu'ria (*Med.*). *Ketonuria* (q.v.).

acetophenone' (*Chem.*). $C_6H_5COCH_3$, phenyl methyl ketone, m p. 20° C., b.p. 202° C., sp. gr. 1·03, large colourless crystals or liquid, soluble in most organic solvents, insoluble in water; used for organic synthesis and in perfumery.

acetox'yl group (*Chem*). The group $CH_3{\cdot}CO{\cdot}O-$.

acetyl group, as'— (*Chem.*). The radical of acetic acid, viz. CH_3CO- .

acetylcelluloses (*Chem.*). See **cellulose acetates.**

acetyl chloride (*Chem.*). CH_3COCl, m.p. −112° C., b.p. 51° C., sp. gr. 1·105. Colourless liquid, of pungent acrimonious odour, used for synthesis, in particular for introducing the acetyl group into other compounds.

acetyl value (*Chem.*). A test used chiefly for recognising and determining oils of the castor-oil group. It indicates the hydrogen in the hydroxyl groups replaceable by the acetyl radical (not in the carboxyl group). Basis for the determination of alcohols, glycerides, hydroxy-acids.

acetyl-salicylic acid (*Chem.*). $C_6H_4(O{\cdot}COCH_3)COOH$, m.p. 128° C. Used in medicine. The acid or its salts are identical with *aspirin* or *Aspro*.

acet'ylene (*Chem.*). $HC{:}CH$, a colourless poisonous gas, owing its disagreeable odour to impurities, soluble in alcohol, in acetone (25 times its volume at N.T.P.), and in water. B.p. −84° C., sp. gr. 0·91. Prepared by the action of water on calcium carbide. Used for welding, illuminating, acetic acid synthesis, and for manufacturing derivatives.

achala'sia (*Med.*). Failure to relax.

achalasia of the cardia (*Med.*). Failure to relax on the part of the sphincter round the opening of the oesophagus into the stomach.

Achanarras Band (*Geol.*). A fossiliferous bed, yielding fish-remains, which occurs some 10,000 ft. above the base of the Old Red Sandstone in N.E. Scotland.

achene, achae'nocarp, akene, ak-ēn (*Bot.*). A dry indehiscent, one-seeded fruit, formed from a single carpel, and with the seed distinct from the fruit wall.

Acheson furnace (*Elec. Eng.*). An electric furnace for the production of carborundum. The constituents of the carborundum (coke and sand) are packed round a central core of coke, through which a heavy current is passed.

Achil'lis tendo (*Zool.*). In *Mammalia*, the united tendon of the soleus and gastrocnemius muscles; the hamstring.

achlamyd'eous (*Bot.*). Lacking a perianth.

achlorhy'dria (*Med.*). Absence of hydrochloric acid from the gastric juice.

acholu'ric jaundice (*Med.*). See **spherocytosis.**

achon'drite (*Geol.*). A type of stony meteorite which compares closely with some basic igneous rocks such as eucrite.

achon'dropla'sia (*Med.*). A condition of dwarfism characterised by shortness of the arms and the legs and by a big head.

achondroplas'tic (*Zool.*). Having a normal body with stunted limbs or appendages.

achroglo'bin (*Zool.*). A colourless respiratory pigment occurring in some *Mollusca* and some *Urochorda.*

ach'roite (*Min.*). See **tourmaline.**

achroma'sie (*Cyt.*). The escape of chromatin from the nucleus.

achromatic figure (*Cyt.*). The double set of delicate radiating strands, and, when present, the asters, as seen in preparations of dividing nuclei.

achromatic lens (*Light*). A lens designed to minimise chromatic aberration. The simplest form consists of two component lenses, one convergent, the other divergent, made of glasses having different dispersive powers, the ratio of their focal lengths being equal to the ratio of the dispersive powers.

achromatic spindle (*Cyt.*). In cell-division, a system of apparent fibres joining the poles of the nucleus and diverging towards the equator.

achro'matin (*Cyt.*). That part of the nucleus which does not stain with basic dyes, generally comprising the nuclear sap or ground-substance.—*adj.* **achromatinic.**—Cf. *chromatin.*

achy'lia gastri'ca (*Med.*). Complete absence of ferments and hydrochloric acid from the gastric secretion.

acic'ular (*Bot., Zool.*). Slender, stiff, and pointed, like a pine needle.—(*Min.*) Said of elongated or needle-like crystals.

acic'ulate (*Bot.*). Marked on the surface by fine scratches.

acic'ulum (*Zool.*). A strong needle-shaped chitinous rod in the parapodium of *Polychaeta*, acting as a muscle-attachment.

acid (*Chem.*). (1) A substance which tends to lose a proton.—(2) A substance which dissolves in water with the formation of hydrogen ions.—(3) A substance containing hydrogen which may be replaced by metals with the formation of salts.

acid amides (*Chem.*). A group of compounds derived from an acid by the introduction of the amino group in place of the hydroxyl radical of the carboxyl group.

acid azides (*Chem.*). The acyl derivatives of hydrazoic acid, obtainable from *acid hydrazides* (q.v.) by treatment with nitrous acid. They are very unstable.

acid chlorides (*Chem.*). Compounds derived from acids by the replacement of the hydroxyl group by chlorine.

acid dyes (*Photog.*). Dyes which have their colour associated with the negative ion or radical.

acid esters (*Chem.*). Compounds derived from acids in which part of the replaceable hydrogen has been exchanged for an alkyl radical.

acid fixing (*Photog.*). Acidulated hypo, which ensures rapid cessation of development by the absorbed developer in the emulsion.

acid hydrazides (*Chem.*). Hydrazine derivatives into which an acyl group has been introduced.

acid polishing (*Glass*). A method of polishing cut decorations on glass ware by immersing the article in an acid bath for a few minutes, rinsing in water and brushing out the cut parts.

acid process (*Met.*). A steel-making process, either Bessemer, open-hearth, or electric, in which the furnace is lined with a siliceous refractory, and for which pig iron low in phosphorus is required, as this element is not removed. See **basic process.**

acid radical (*Chem.*). A molecule of an acid minus the replaceable hydrogen.

acid refractory (*Met.*). See **silica.**

acid rocks (*Geol.*). Those igneous rocks which contain more than 66% of silica, and which, therefore, when crystalline, carry free quartz as an essential constituent.

acid salts (*Chem.*). Salts formed by the replacement of part of the replaceable hydrogen of the acid.

acid solution (*Chem.*). An aqueous solution containing more hydrogen ions than hydroxyl ions; one which turns blue litmus red.

acid steel (*Met.*). Steel made by an acid process.

acid value (*Chem.*). The volume (in c.c.) of a N/10 caustic soda or potash solution used to neutralise 1 gram of a vegetable oil, resin, etc.

acids, strengths of (*Chem.*). See **strengths of acids.**

acidaemia (*Med.*). See **acidosis.**

acid'ic (*Chem.*). Said of dyes the colour-base of which is an acid, usually combined with an inorganic base, e.g. acid fuchsin, the sodium salt of a sulphonic acid derived from fuchsin.

acidim'etry (*Chem.*). The determination of acids by titration with a standard solution of alkali as in volumetric analysis. See **titration** and **volumetric analysis.**

acidity (*Chem.*). (1) The extent to which a solution is acid. See **pH-value.**—(2) The number of replaceable hydroxyl groups in a molecule of a base.—(3) The amount of free acid in vegetable oils, resins, etc.

acidol'ysis (*Chem.*). Acid hydrolysis.

acidom'eter (*Elec. Eng.*) A hydrometer for ascertaining the specific gravity of the electrolyte in an accumulator.

acid'ophil (*Zool.*). Said of structures which stain intensely with acid dyes; e.g. *acidophil* leucocytes.

acido'sis (*Med.*). Acidaemia. Concentration of hydrogen ions in the blood beyond normal limits.

acidum ace'ticum aromat'icum (*Chem.*). Acetic acid flavoured with the essential oils of cloves, lavender, orange, bergamot, sometimes thyme, cinnamon or camphor.

acina'ceous (*Bot.*). Full of pips.

acinaciform,—as'i-form (*Bot.*). Scimitar-shaped.

Acineta'ria (*Zool.*). See **Suctoria.**

acin'iform (*Zool.*). Berry-shaped; e.g. in Spiders, the *aciniform* glands producing silk and leading to the median and posterior spinnerets.

acisculis, acis'— (*Masonry*). A small pick having a square flat face and a pointed peen.

Ackerman steering (*Automobiles*). The arrangement of the track-arms on the stub axles, and their connexion by the track-rod, in such a way that the inner axle moves through a greater angle than the outer, so giving approximately true rolling of the wheels in cornering.

ac'me (*Biol.*). The period of maximum vigour of an individual, race, or species: the adult period: the ephebic period: the phyloephebic period.

acme screw-thread (*Eng.*). A thread having a profile angle of 29 degrees and a flat crest, sometimes used for lathe lead screws, etc., for easy engagement by a split nut.

ac'mite (*Geol.*). An important member of the pyroxene group of minerals, consisting essentially of silicate of iron and sodium, $NaFeSi_2O_6$; occurs in certain alkali-rich igneous rocks.

ac'ne (*Med.*). Inflammation of a sebaceous gland. Pimples in adolescents are commonly due to infection with the acne bacillus.

acne rosa'cea (*Med.*). A condition in which there is chronic congestion of the superficial vessels of the nose and central part of the face, associated with dyspepsia.

Acoela, ā-sē'la (*Zool.*). An order of small marine *Turbellaria* in which there is no gut, and the parenchyma is not differentiated into endoderm and mesoderm.

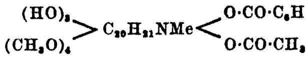
acoe'lomate, acoelom'atous (*Zool.*). Without a true coelom.

acoe'lous (*Zool.*). Lacking a gut-cavity.

acone' (*Zool.*). (In Insects) said of compound eyes in which the ommatidia contain no cone of any kind.

aconit'ic acid (*Chem.*). An unsaturated tribasic acid extracted from *Aconitum napellus*; its formula is $CH_2(COOH)\cdot C(COOH){:}CH(COOH)$.

acon'itine (*Chem.*). $C_{34}H_{45}O_{11}N$ or $C_{34}H_{47}O_{11}N$, an alkaloid of unknown constitution, to which may be ascribed the following extended formula:



$$\left.\begin{matrix}(HO)_3\\(CH_3O)_4\end{matrix}\right> C_{20}H_{21}NMe \left<\begin{matrix}O\cdot CO\cdot C_6H_5\\O\cdot CO\cdot CH_3\end{matrix}\right.$$

It crystallises in rhombic prisms, m.p. 197°-198° C., insoluble in water and petrol, soluble in benzene and chloroform. It is obtained from *Aconitum napellus*. It is highly toxic, affecting the heart and the respiratory organs.

acontia, a-kon'sha (*Zool.*). In *Anthozoa*, free threads, loaded with nematocysts, arising from the mesenteries or the mesenteric filaments, and capable of being discharged via the mouth or via special pores.

acorn (*Aero.*). A small streamline-shaped clip, placed at the intersection of external bracing-wires to avoid chattering and abrasion.

acorn valve (*Thermionics*). The colloquial name for a thermionic valve of very small dimensions, designed for operation at very high frequencies. The electrode capacity and electron-transit time effects are reduced in proportion to the dimensions.

acotyle'donous (*Bot.*). Said of an embryo of a higher plant which has no cotyledons.

acoustex'tile (*Acous.*). A unit of material specially designed for increasing the acoustic absorption of walls.

Acousti-celotex (*Acous.*). Celotex with increased thickness and perforations, particularly adapted for acoustic absorption. Made in standard tiles from sugar-cane fibre.

Acousti-meter (*Acous.*). The same as *noise meter*.

Acousti-tentest (*Acous.*). Acoustic absorbing material of thick tentest mounted on edge; made from maple-wood fibre.

acoustics. The science of sounds. The term includes propagation and conduction of all kinds of material vibration, their generation, perception, measurement, reproduction, and control.

acoustic absorption (*Acous.*). The diminution of energy in a sound-wave during reflection from a surface which is not completely reflecting, mainly because of its lack of hardness.

acoustic absorption factor (or **coefficient**). See **sound absorption factor.**

acoustic absorption unit. See **sabin.**

acoustic concentration (*Acous.*). For a given distance from a radiating source of sound, the ratio of the intensity of the directly radiated sound to the mean spherical intensity. The polar concentration indicates the measure of the directivity of a source of sound.

acoustic construction (*Acous.*). Building construction which aims at the control of transmission of sound, or of mechanical vibration giving rise to sound, particularly unwanted noises. The parts of the structure are separated by air-spaces or acoustic absorbing material and decoupled by the interposing of springs.

acoustic dazzle (*Acous.*). The psychological effect associated with high density of radiation of sound from small sources.

acoustic delay (*Elec. Comm.*). Delay in the transmission of telephonic speech; obtained by conversion into a sound-wave, which is caused to travel a suitable distance along a tube before reconversion into electric currents.

acoustic distortion (*Acous.*). Distortion in sound-reproducing systems, due to alteration in the acoustic ratio of sounds arriving at the listener's ears when compared with the original or with a natural ratio.

acoustic engineering (*Elec. Comm.*). The branch of electrical communication concerned with the reproduction of sound in all its forms, and with assessing the criteria for sound reproduction and the means for measuring it.

acoustic feed-back (*Acous.*). The operation of the microphone in a public-address system by sound generated by the reproducers of the same system. If this is excessive the system builds up a sustained oscillation. See **howler.**

acoustic gramophone (*Acous.*). A reproducer of sound from gramophone records, characterised by a sound-box and a metal or wood horn for sound radiation.

acoustic impedance, —resistance, —reactance, —power factor (*Acous.*). In a propagating sound-wave, those factors which determine the relation between the particle velocity and the sound pressure, in analogy with an electric circuit. The unit is *mechanical ohm per square centimetre*, the latter being perpendicular to the direction of propagation. Beyond approximately a wave-length from the source of radiating sound power the power factor approaches unity, and the particle velocity and the sound pressure come into phase.

acoustic perspective (*Acous.*). The quality of depth and localisation inherent in a pair of ears, which is destroyed in a single channel for sound reproduction. It is transferable with two microphones and two telephone ear-receivers with matched channels, and more adequately realised with three microphones and three radiating receivers with three matched channels.

acoustic plaster (*Acous.*). Rough or flocculent plaster which has good acoustic absorbing properties and which can be used for covering walls. It contains metal, such as fine aluminium, which evolves gas on contact with water and so aerates the mass. These tiny holes lower the acoustic impedance and so reduce the reflection of incident sound-waves.

acoustic power factor (*Acous.*). See under **acoustic impedance.**

acoustic pressure (*Acous.*). See **sound pressure.**

acoustic radiator (*Acous.*). A vibrating area giving off acoustic energy in the form of sound-waves, usually of high audio or supersonic frequency; often used in depth-sounding. The radiator may be a steel plate which is hit with a magnetic plunger, or a resonating mass of quartz crystals. See **loudspeaker.**

acoustic ratio (*Acous.*). The ratio between the directly radiated sound intensity from a source, at the ear of a listener (or a microphone), and the intensity of the reverberant sound in the enclosure. The ratio depends on the distance from the source, the polar distribution of the radiated sound power, and the period of reverberation of the enclosure.

acoustic reactance (*Acous.*). See under **acoustic impedance.**

acoustic recording (*Acous.*). In the manufacture of gramophone discs, the use of the unaided voice for operating the cutting stylus in making the original recording.

acoustic reflection factor (or **coefficient**). See **sound reflection factor.**

acoustic reproduction (*Acous.*). The reproduction of sound from gramophone records by means of a needle attached to a sound-box, with sound radiation from a horn, either of metal or built into a box.

acoustic resistance (*Acous.*). See under **acoustic impedance.**

acoustic resonance (*Acous.*). Enhancement of response to an acoustic pressure for a band of frequencies, the response increasing to a maximum and then decreasing as the frequency is increased through the frequency of resonance. It arises from progressive neutralisation of the reactive component of the acoustic impedance until, at the frequency of resonance, the acoustic impedance becomes entirely resistive. Prominent in organ and other pipes, Helmholtz resonators, and, to a less degree, in shallow cavities.

acoustic saturation (*Acous.*). The aural effectiveness of a source of sound amid other sounds; it is low for a violin, but high for a triangle. The relative saturation of instruments indicates the number required in an auditorium of given acoustic properties.

acoustic shock (*Acous.*). The temporary deafness following a sudden large rush of current in a telephone receiver, e.g. in a telephonist's receiver when connected to a telephone line making contact with a power line.

acoustic transmission factor (or **coefficient**). See **sound transmission factor.**

acou'sticolat'eral system (*Zool.*). In Vertebrates, afferent nerve-fibres related to the neuromast organs and to the ear, receptors in aquatic forms of relatively slow vibrations.

acquired character (*Bot*). An individual peculiarity in the morphology or physiology of a plant, developed during growth.—(*Zool.*) A modification of an organ or organs appearing during the life-time of an individual and due to use or disuse; essentially not a result of mutilation.

acquired variation (*Biol.*). Any departure from normal structure or behaviour which becomes evident as an individual develops.

acran'drous (*Bot.*). Having antheridia at the stem apices, as in some mosses.

Acras'peda (*Zool.*). See **Scyphozoa.**

acras'pedote (*Zool.*). (Of *Coelenterata*) lacking a velum.

acre (*Surv.*). A unit of area, equal to 10 sq. chains (1 chain = 66 ft.) or 4840 sq. yds. The following terms are now obsolete:

Cheshire acre, 10,240 sq. yds.
Cunningham acre, 6250 sq. yds.
Irish acre, 7840 sq. yds.
Scottish acre, 6150·4 sq. yds.

Acree's reaction (*Chem.*). A qualitative test for detecting proteins. It consists in adding to the protein solution an equal volume of a 0·002% formaldehyde solution containing a trace of ferric chloride. When concentrated sulphuric acid is introduced below the mixed solutions, a violet ring is formed.

ac'ridine (*Chem.*). $C_{13}H_9N$, a basic constituent of the crude anthracene fraction of coal-tar. It crystallises in colourless needles and has a very irritating action upon the epidermis. Chemically it may be considered an analogous compound to anthracene, in which one of the CH groups of the middle ring is replaced by N.

acro- (Greek *akros*, topmost, farthest). A prefix used in the construction of compound terms; e.g. *acrocarpous* (q.v.).

acrobatics (*Aero.*). See **aerobatics.**

ac'roblast (*Zool.*). In the spermatid, a complex composed of idioplasm surrounded by Golgi bodies from which the acrosome is formed.

acrocar'pous (*Bot.*). Having fruit at the end of the stem or branch.

acrochor'dal (*Zool.*). In Birds, an unpaired cartilage of the chondrocranium.

acrocor'acoid (*Zool.*). A process of the dorsal end of the coracoid in Birds.

ac'rocyano'sis (*Med.*). A vascular disorder (usually of young women) in which there is persistent blueness of the extremities.

ac'rodont (*Zool.*). Said of teeth which are fused to the bone bearing them.

acrodro'mous (*Bot.*). Said of venation when the main veins, after running parallel along most of the leaf, unite at the leaf apex.

acrodyn'ia (*Med.*). See **erythroedema**.

acrogy'nous (*Bot.*). Having one or more archegonia at the tip of the axis.

acro'lein (*Chem.*). $CH_2{:}CH{\cdot}CHO$, acrylaldehyde, propenal, a colourless liquid, b.p. 52·5° C., of pungent odour, obtained by dehydrating glycerine in the presence of a catalyst.

acromeg'aly (*Med.*). A disease in which, among other things, there are enlargement of the hands and feet, and thickening of the nose, jaw, ears, and brows, due to over-activity of the anterior part of the pituitary gland.

acro'mion (*Zool.*). In higher Vertebrates, a ventral process of the spine of the scapula.—*adj.* **acromial.**

ac'ron (*Zool.*). In Insects, the region in front of the mouth.

ac'roparaesthe'sia, acroparesthesia (*Med.*). Numbness and tingling of the fingers, tending to persist, in middle-aged women.

acrop'etal succession (*Bot.*). The development of lateral members in such order that the youngest is nearest the tip of the axis.

ac'ropleurogenous, —oj'en-us (*Bot.*). Having the spores borne at the tips and along the sides of hyphae.

acropo'dium (*Zool.*). That part of the pentadactyl limb of land Vertebrates which comprises the digits and includes the phalanges.

acroscop'ic (*Bot.*). On the side towards the apex.

ac'rosome (*Zool.*). The structure forming the tip of a mature spermatozoon.—*adj.* **acrosomal.**

ac'rospore (*Bot.*). A spore formed at the tip of a hypha.

acrote'rium (*Build.*). A pedestal on a pediment, for the reception of a figure.—*pl.* **acroteria.**

Ac'rothoracica, —as'ik-a (*Zool.*). An order of minute *Cirripedia* the females of which possess a flask-shaped mantle; the trunk appendages are reduced in number and the posterior pairs are widely separated from the first pair; they live in hollows excavated in the shells of Molluscs; the males, where known, are dwarfs, without an alimentary canal, living attached to the mantle of the female.

acrotro'phic (*Zool.*). (In *Insecta*) said of ovarioles in which nutritive cells occur at the apex.

acrylal'dehyde (*Chem.*). See **acrolein.**

acryl'ic acid (*Chem.*). $CH_2{:}CH{\cdot}COOH$, m.p. 7° C., b.p. 141° C., of similar odour to acetic acid, a very reactive substance, the acid belongs to the series of olefine-monocarboxylic, or oleic, acids.

acrylic resins (*Plastics*). Resins formed by the polymerisation of the monomeric derivatives, generally esters or amides, of acrylic acid or α-methylacrylic acid. They are transparent, water-white, and thermoplastic; resistant to age, light, weak acids, alkalies, alcohols, paraffins, and fatty oils; but attacked by oxidising acids, aromatic hydrocarbons, chlorinated hydrocarbons, ketones, and esters. They are mainly used for optical purposes, as lenses and instrument covers.

actinal, ak-tē'nal (*Zool.*). (In *Echinodermata*) see **ambulacral**: (in *Anthozoa*) pertaining to the crown, including the mouth and tentacles: star-shaped.

actin'ic rays (*Photog.*). Incident electromagnetic rays of wavelengths which can cause a latent image, potentially developable, in a photographic emulsion. Such rays include extensions at both ends of the visible spectrum and X-rays.

actinium (*Chem.*). Symbol, Ac. A radioactive element in the third group of the periodic system. At. no. 89; half-life 20 years.

ac'tinobacillo'sis (*Vet.*). A chronic inflammation of cattle due to infection by *Actinobacillus lignieresi.*

acti'noblast (*Zool.*). In *Porifera*, a spicule-forming cell.

actinodro'mous (*Bot.*). Having the main veins radiating from the tip of the petiole.

acti'noid (*Zool.*). Star-shaped.

actin'olite (*Min.*). A monoclinic amphibole, $CaMg_3(SiO_3)_4$, green in colour, and generally showing an elongated or needle-like habit; occurs in schists and altered basic igneous rocks.

acti'nomere (*Zool.*). A radial segment.

actinom'eter (*Photog.*). An apparatus for determining, under standard conditions, the degree of actinic action in rays of specified wavelength on samples of photographic material.

actinomor'phic (*Bot., Zool.*). Star-shaped; therefore radially symmetrical, and divisible into two similar parts by more than one plane passing through the centre. See **radial symmetry.**

ac'tinomyco'sis (*Vet.*). A chronic inflammation of cattle, and rarely of sheep and swine, due to infection usually of the tongue, jaws, or stomach by the fungus *Actinomyces bovis.* Occasionally transmitted to man.

ac'tinon (*Chem.*). Actinium emanation, an isotope of radon produced by the disintegration of actinium; half-life 3·92 seconds.

ac'tinophyto'sis (*Vet.*). See **streptotricosis.**

acti'nost (*Zool.*). In bony Fish, one of the bones of a fin-ray.

acti'nostome (*Zool.*). In *Asteroidea*, the radially-symmetrical mouth-opening.

ac'tinotrich'ia (*Zool.*). In Fish, horny fibres forming the distal part of the fin-rays.

actinotro'cha (*Zool.*). In *Phoronidea*, the free-swimming pelagic larval form which possess characteristic ciliated lobes, and passes into the adult by a remarkable metamorphosis.

Actinozo'a (*Zool.*). See **Anthozoa.**

actin'ula (*Zool.*). In certain *Hydrozoa* (e.g. in *Tubularia*), an advanced larva, representing a polyp with a short stem.

action (*Acous.*). The mechanism for selecting notes in musical instruments: the hammers, etc. in the piano, and the keyboards and pneumatic controls in the organ.

action (*Auto. Teleph.*). The part of a selector switch that is concerned with an essential function; e.g. finding action, hunting action, impulsing action, etc.

action (*Horol.*). The functioning of the escapement of a watch, clock, or chronometer.

action, delayed (*Elec. Eng., etc.*). See **delayed action.**

activated carbon (*Chem.*). Carbon obtained from vegetable matter by carbonisation in the absence of air, preferably in a vacuum. Activated carbon has the property of absorbing large quantities of gases. Important for gas masks, absorption of solvent vapours, clarifying of liquids, and in medicine.

activated cathode (*Thermionics*). A thermionic cathode which has been activated. See **activation.**

activated filament (*Thermionics*). A form of filament used as electron emitter in thermionic devices. It consists of a basic metal, usually tungsten, alloyed with a small proportion of some other metal such as thorium.

activated sludge (*Sewage*). Sludge through which compressed air has been blown, or which has been aerated by mechanical agitation. It has the property, when added to sewage, of greatly increasing the purification effected by the simple aeration of the sewage.

activation (*Chem.*). (1) The heating process by which the capacity of carbon to absorb vapours is increased.—(2) An increase in the energy of an atom or molecule, rendering it more reactive.

activation (*Sewage*). The process of sewage purification by intimate admixture with air and activated sludge.

activation (*Thermionics*). A process used in the manufacture of thermionic cathodes to enhance their electronic emission.

activation (*Zool.*). The process of stimulating an ovum to cleavage, usually performed by a spermatozoon: the liberation of an active enzyme from a non-active compound, e.g. trypsin from trypsinogen.

activator (*Bot.*). See **accelerator.**

activator or **activating reagent** (*Mining*). A chemical added to the pulp to increase the floatability of a mineral in a froth, or to refloat a depressed (sunk) mineral.

activator (*Zool.*). Any agency bringing about *activation* (q.v.).

activators (*Chem.*). Chemical compounds (like acids, bases, or salts) which convert zymogens, proenzymes, or proferments into the true or active enzymes. See also **kinases.**

active component (*Elec. Eng.*). A term often used to denote the component of the vector representing an alternating quantity which is in phase with some reference vector; e.g. the active component of the current; commonly called the active current. See **active current, active voltage, active volt-amperes.**

active current (*Elec. Eng.*). That component of a vector representing the alternating current in a circuit which is in phase with the voltage of the circuit. The product of this component and the voltage gives power.

active deposit (*Chem.*). The radioactive deposit produced by the disintegration of a radioactive emanation.

active electrode (*Elec. Eng.*). The electrode of an electrical precipitator which is kept at a high potential. Also called the DISCHARGE ELECTRODE.

active hydrogen (*Chem.*). Molecular hydrogen is dissociated by heat into the atomic form or *active hydrogen.* Formed when hydrogen is subjected to a temperature of 2500° C. and under a pressure of 1 mm. Also prepared by activating a stream of ordinary hydrogen under a pressure of about 0·3 mm. with an alternating current of 0·5 amp. at 5000 volts.

active mass (*Chem.*). Molecular concentration, generally expressed as *gram-molecules per litre*; in the case of gases, active masses are measured by partial pressures.

active material (*Elec. Eng.*). The lead oxides, nickel oxides, or other material, which take part in the chemical changes occurring in the cells of an accumulator, and which form the major part of the plates. Also, the iron in the magnetic circuit and the copper in the windings of a machine or transformer, these being the items which take an active part in the energy conversion.

active material (*Thermionics*). The essential material on the cathode of a thermionic valve which provides the emission of electrons when heated: the phosphorescent and fluorescent material forming a phosphor in a cathode ray tube.

active network (*Elec. Comm.*). A network in which there is a source of electromotive force or a modulator.

active nitrogen (*Chem.*). Formed when nitrogen is subjected to a silent electrical discharge. Unstable. Can take part in many chemical reactions which do not occur with the ordinary gas. Active nitrogen forms with hydrocarbons hydrocyanic acid. The after-glow of active nitrogen has been said to account for the brilliant displays of *Aurora Borealis.*

active power (*Elec. Eng.*). The true power, i.e. watts, passing in an electric circuit. It is the product of the voltage by the component of current which is in phase with the voltage. Cf. *reactive volt-amperes*, which may be called *reactive power.*

active transducer (*Elec. Comm.*). Any transducer in which the applied power controls or modulates locally supplied power, which becomes the transmitted signal, as in a modulator, a radio transmitter, or a carbon microphone. Cf. *passive transducer.*

active voltage (*Elec. Eng.*). That component of a vector representing the voltage in an alternating-current circuit which is in phase with the current in the circuit.

active volt-amperes (*Elec. Eng.*). The product of the active voltage and the amperes in a circuit, or of the active current (amperes) and the voltage of the circuit. It is equal to the power in the circuit (watts).

active wire (*Elec. Eng.*). An expression sometimes used in connection with electric machines to denote that part of the armature conductor which actually 'cuts' the magnetic flux.

activity (*Chem.*). (1) See **optical activity.**—(2) The ideal or thermodynamic concentration of a substance the substitution of which for the true concentration permits the application of the law of mass action.

activity coefficient (*Chem.*). The ratio of the *activity* (2, q.v.) to the true concentration of a substance.

actor (*Chem.*). See **donor** (1).

actuality film (*Cinema*). A motion-picture employing the documentary technique in its make-up.

acu'leate (*Bot.*). Bearing prickles, or covered with needle-like outgrowths.

aculei, a-kū'le-ī (*Zool.*). In *Mecoptera* and certain *Diptera*, minute hair-like structures on the wings, lacking basal articulation.

acu'minate (*Bot.*). Having a long point bounded by hollow curves; usually descriptive of a leaf-apex.—*dim.* **acumin'ulate.**

ac'upunct'ure (*Med.*). Puncture of tissues with needles; used as a remedy in sciatica and rheumatism.

acutan'gular (*Bot.*). Said of a stem which has several sharp edges running longitudinally.

acute (*Bot.*). Bearing a sharp and rather abrupt point; said usually of a leaf-tip.

acute (*Med.*). Said of a disease which rapidly develops to a crisis. Cf. *chronic.*

acute bisectrix (*Crystal.*). The line bisecting the acute angle between the optic axes of a biaxial crystal and lying in the plane of the axes.

acy'clic (*Bot.*). Having the parts of the flower arranged in spirals, not in whorls.

acyclic generator (*Elec. Eng.*). See **homopolar generator.**

acyl group (*Chem.*). A general term for an organic acid radical.

A.D. (*Build.*). Abbrev. for *air-dried timber.*

ad. (*Photog.*). Abbrev. for *make up to* in photographic solution recipes; e.g. *ad. one pint.*

adamantine clinkers (*Build.*). Bricks similar to *Dutch clinkers* (q.v.) but harder and denser, and having a pale-pinkish colour and smooth surfaces.

adamant'oblast (*Zool.*). See **ameloblast.**

adambula'cral (*Zool.*). (In *Echinodermata*) adjacent to the ambulacral areas.

adamel'lite (*Geol.*). A type of granite with approximately equal amounts of alkali-feldspar and plagioclase.

Adam's apple (*Zool.*). In Primates, a ridge on the anterior or ventral surface of the neck, caused by the protuberance of the thyroid cartilage of the larynx.

Adams sewage lift (*San. Eng.*). An apparatus employed to force sewage from a low-level sewer into a nearby high-level sewer by using the sewage in the latter from a point that will give the air-pressure necessary to secure the lift of sewage.

Adams-Stokes syndrome (*Med.*). Sudden loss of consciousness, with or without convulsions, in heart-block.

adaptation (*Bot.*). Any morphological or physiological characteristic which may be supposed to help in adjusting the organism to the conditions under which it lives.—(*Zool.*) The process by which an animal becomes fitted to its environment, external or internal, or to changes in that environment: any structure or habit developed as a result of such a process.

adaptation (*Optics*). (Of the eye) the sensitivity adjustment effected after considerable exposure to light (light-adapted), or darkness (dark-adapted).

adaptative branching (*Zool.*). Differences arising within a group of closely related forms whose life habits are in the main similar; e.g. Black and White Rhinoceroses show a different type of lip owing to different feeding habits.

adaptative polymorphism (*Zool.*). The occurrence at different stages of the life-cycle of an animal of widely differing forms, in response to variations in the conditions of life; e.g. some *Protozoa*.

adaptative radiation (*Zool.*). Variation in the fauna of an isolated region, due to adaptation to diverse conditions; particularly modification of limbs, feet, and teeth.

adapter (*Elec. Eng.*). An accessory used in electrical installations for connecting a piece of apparatus fitted with one size or type of terminals to a supply-point fitted with another size or type of terminals.

adapter transformer (*Elec. Eng.*). A transformer for supplying a single electric lamp; it is arranged so that its primary terminals can fit into an ordinary lampholder while its secondary terminals are brought to a lampholder for a low-voltage lamp.

adaptor (*Photog.*). (1) An arrangement for using types of photographic material in a camera different from that for which it was designed; e.g. film-pack in a plate camera, or a smaller plate than normal.—(2) A device for the interchange of lenses in a camera.

adax'ial (*Bot.*). The face of a leaf, petal, etc. which is on the side nearest to the axis.

Adcock antenna (*Radio*). A directional receiving antenna consisting of two spaced vertical dipoles connected by a screened transmission line. It responds only to vertically polarised waves, and is not subject to night error.

Adcock direction-finder (*Radio*). A direction-finding system using either two vertical spaced aerials, which can be rotated (*U-type*), two spaced dipoles elevated above the ground (*H-type*)—the whole system being rotatable in both cases—or a double fixed set of either of the previous, the aerials being connected to a goniometer the setting of which determines the direction of arrival of the received wave.

addice (*Carp.*). Obsolete term for *adze* (q.v.).

addict (*Med.*). One who is unable to resist taking harmful drugs.

Addison's anaemia (*Med.*). See **pernicious anaemia.**

Addison's disease (*Med.*). A disease in which there is progressive destruction of the suprarenal cortex; characterised by extreme weakness, wasting, low blood-pressure, and pigmentation of the skin. Not to be confused with *Addison's anaemia*.

addition agent (*Elec. Eng.*). A substance added to the electrolyte in an electro-deposition process in order to improve the character of the deposit formed. The agent does not take any part in the main electrochemical reaction.

additive compounds (*Chem.*). Compounds formed by additive reactions, in which a double bond is converted into a single bond by the addition of two more atoms or radicals.

additive constant (*Surv.*). A term used in the computation of distance by tacheometric methods. It is that length (usually constant and small) which must be added to the product of staff intercept and multiplying constant in order to give the true distance of the object.

additive process of colour photography (*Photog.*). This involves the colour analysis of the object, and the making of normal black-and-white negatives and positives, using primary colour (red, green, and blue) filters. White light, similarly filtered, synthesises the coloured image on projection.

additive property (*Chem.*). One whose value for a given molecule is equal to the sum of the values for the constituent atoms and linkages.

additive reactions (*Chem.*). See **additive compounds.**

adductor (*Zool.*). A muscle that draws a limb or part inwards, or towards another part; e.g. *adductor mandibulae* in *Amphibia* is a muscle which assists in closing the jaws.

adecid'uate (*Zool.*). See **indeciduate.**

ade'locodon'ic (*Zool.*). (In *Gymnoblastea*) said of certain medusae which are always attached, and which degenerate after discharging the ripe germ-cells.

adelomor'phic (*Zool.*). Of indefinite form.

ad'elphogam'y (*Bot.*). A union between two vegetative cells, one the mother cell, the other one of its daughter cells.

adelphous (*Bot.*). Said of an androecium in which the stamens are partly or wholly united by their filaments.

adendrit'ic (*Zool.*). Without dendrites.

adenine (*Chem.*). 6-Amino-purine, a purine derivative, obtained by the decomposition of nucleic acids.

adeni'tis (*Med.*). Inflammation of a gland.

adenoid (*Bot., Zool.*). Gland-like.—(*Zool.*) In some Mammals, a mass of lymphoid tissue occurring on the dorsal wall of the pharynx, close to the internal nares.

adenoids (*Med.*). Enlargement of glandular tissue in the nasopharynx.

adeno'ma (*Med.*). A tumour with a gland-like structure.

adenomyo'ma (*Med.*). See **endometrioma.**

ade'nophyl'lous (*Bot.*). Having glandular leaves.

adeps lanae (*Chem.*). Lanolin, purified wool fat.

ades'my (*Bot.*). An abnormal condition of a flower, parts which are normally united being separate.—(*Zool.*) Division in an organ usually entire.

ad'etopneu'stic (*Zool.*). (Of some *Echinodermata*) having dermal gills extending beyond the abambulacral surface.

adfron'tal (*Zool.*). (In *Lepidoptera*) said of a pair of narrow oblique sclerites separating the frons from the median epicranial suture.

adhesion (*Bot.*). The union of members of distinct whorls, as when a calyx is grown up with the ovary wall.—*adjs.* **adherent, adhering.**

adhesion (*Elec.*). The mutual force which tends to hold two electrified non-conducting bodies together: the mutual force which arises between two magnetic bodies linked by magnetic flux.

adhesion (*Med.*). Abnormal union of two parts which have been inflamed: a band of fibrous tissue which joins such parts.

adhesive cells (*Zool.*). Glandular cells producing a glutinous secretion for purposes of attachment, as on the pedal disc of *Hydra*, the tentacles of *Ctenophores*, and in the epidermis of *Turbellaria*.

adhesive force (*Eng.*). The frictional grip between two contacting surfaces, e.g. between the driving-wheel of a locomotive and the rail; the product of the weight on the wheel and the friction coefficient between wheel and rail.

adhesive tape (*Elec. Eng.*). See **insulating tape.**

a'diabat'ic (*Bot.*). Not capable of translocation.

adiabatic (*Phys.*). Without loss or gain of heat.

adiabatic change (*Phys.*). A change in the volume and pressure of the contents of an enclosure without exchange of heat between the enclosure and its surroundings.

adiabatic curve (*Phys.*). The curve obtained by plotting P against V in the adiabatic equation.

adiabatic efficiency (*Eng.*). (1) (Of a steam-engine or turbine) the ratio of the work done per pound of steam to the available energy represented by the adiabatic heat drop.—(2) (Of a compressor) the ratio of the work required to compress a gas adiabatically to the work actually done by the compressor piston or impeller.

adiabatic equation (*Phys.*). $PV^{\gamma}=\text{constant}$. An equation expressing the law of variation of pressure (P) with volume (V) of a gas during an adiabatic change, γ being the ratio of the specific heat of the gas at constant pressure to that at constant volume.

adiabatic heat drop (*Eng.*). The heat energy released and theoretically capable of transformation into mechanical work during the adiabatic expansion of unit weight of steam or other vapour.

ad'iactin'ic (*Photog.*). Said of filters which degrade the actinic value of light sources, e.g. the filters for dark-room lamps, which are selected in relation to the type of emulsion in use.

Adie barometer (*Meteor.*). See **Kew-pattern barometer.**

adipose tissue (*Zool.*). A form of connective tissue consisting of vesicular cells filled with fat and collected into lobules.

adipo'sis doloro'sa (*Med.*). A condition characterised by the development of painful masses of fat under the skin and by extreme weakness.

adit (*Civ. Eng.*). An access tunnel (usually nearly horizontal) leading to a main tunnel, and frequently employed (in lieu of a shaft) in the excavation of the latter.—(*Mining*) A level, or nearly level, tunnel driven into a hill-side for exploration or drainage.

adjective dyes (*Chem.*). Dyes which have no direct affinity for the particular fibre but can be affixed to it by the acid of some third substance.

adjustable level (*Surv.*). A form of surveying-level having a 'level' tube on it, the inclination of which can be adjusted so that the bubble is central when the line of sight through the telescope is truly horizontal.

adjustable set-square. See **clinograph.**

adjustable speed motor (*Elec. Eng.*). A term used in America to denote a motor the speed of which can be varied continuously over a specified range but which, when once adjusted, remains almost constant and independent of the load; e.g. a shunt motor with field control.

adjusting rod (*Horol.*). An instrument for testing the pull of the mainspring. It is a rod having at one end an adjustable clamp for attaching to a fusee or barrel arbor, and provided with sliding weights for balancing the pull exerted by the mainspring. Its use is now confined to the adjustment of chronometers and English full-plate watches.

adjusting screw (*Surv.*). An instrument-screw (having usually a very fine thread) provided to give a means of moving one part relatively to another so as to adjust for level, focus, tension, etc.

adjustment (*Surv.*). (1) The operation of putting different parts of an instrument into a desired relative position.—(2) An alteration made to a set of field observations in order to reduce them to values which are consistent within the set and satisfy prescribed equations of condition.

adjustor (*Zool.*). An organ or faculty determining the behaviour of an organism in response to stimuli received: one of the neurones in a reflex arc connecting the receptor neurone with the effector neurone, or with other adjustors.

adj'utage or **aj'utage** (*Hyd.*). A tube or nozzle through which water is discharged.

adj'uvant (*Med.*). A remedy which assists the action of other remedies.

adlac'rimal (*Zool.*). The lacrimal bone of Reptiles, so called to indicate that it is not homologous with the lacrimal bone of *Mammalia* (q.v.).

adminic'ula (*Zool.*). Spines used for locomotion in certain Insect pupae.

Admiralty brass (*Met.*). α-Brass in which some of the zinc is replaced by tin to increase strength and corrosion-resistance. Composition: copper 70%, zinc 29%, and tin 1%.

Admiralty gun-metal (*Met.*). See **gun-metal.**

admission (*Mech.*). The point in the working cycles of a steam or I.C. engine at which the inlet valve allows entry of the working fluid into the cylinder.

admittance (*Elec. Eng.*). The property of an electric circuit by virtue of which a current flows under the action of a potential difference. It is equal to the reciprocal of impedance.

admittance, indicial (*Elec. Comm.*). See **indicial admittance.**

adna'sal (*Zool.*). In certain primitive Fish, e.g. *Polypterus*, a small bone lying in front of the nasal.

adnation (*Bot.*). Attachment of one organ to another by its whole length. Sometimes used as equivalent to *adhesion*.—*adj.* **adnate.**

adnexa (*Anat.*). Appendages; usually refers to ovaries and Fallopian tubes.—(*Zool.*) Adjacent structures.

adnexed (*Bot.*). Just touching, but not attached to; as the gills of some agarics which reach but are not grown up with the stipe.

adobe clay or **adobe**, ad-ō'be (*Geol.*). A name for any kind of mud which when mixed with straw can be sun-dried into bricks.

ado'ral (*Zool.*). Adjacent to the mouth.

adpressed, appressed (*Bot.*). Pressed closely together but not joined.

ad-radius (*Zool.*). In *Coelenterata*, a radius of the third order: one of eight radii each lying between a per-radius and an inter-radius.

adrectal (*Zool.*). Adjacent to the rectum.

adre'nal (*Zool.*). Adjacent to the kidney: pertaining to the adrenal gland.

adrenal gland (*Zool.*). See **suprarenal body.**

adren'aline (*Chem.*). $3,4-(OH)_2C_6H_3{\cdot}CH(OH){\cdot}CH_2{\cdot}NH{\cdot}CH_3$, a crystalline compound obtained from the suprarenal glands. It is a derivative of ethylamine, with a sympathomimetic action, stimulating the sympathetic nervous system to produce a rise in blood pressure.

adsorption (*Chem.*). The taking up of one substance at the surface of another.

adsorption isotherm (*Chem.*). The relation between the amount of a substance adsorbed and its pressure or concentration, at constant temperature.

adspersed, aspersed (*Bot.*). Scattered.

adulares'cence (*Min.*). A milky or bluish sheen in gemstones.

adula'ria (*Min.*). See **glassy feldspar.**

adun'cate (*Bot.*). Hooked

adurol (*Photog.*). A developer used in imbibition printing.

advection (*Meteor.*). The transference of heat by horizontal motion of the air.

ad'vehent (*Zool.*). See **afferent.**

adventitia, —tish'i-a (*Zool.*). Accidental or unessential structures: the superficial layers of the wall of a blood-vessel.—*adj.* **adventitious.**

adventit'ious (*Bot.*). Applied to a plant-part developed out of the usual order or in an unusual position. An *adventitious bud* is any bud except an *axillary bud*; it gives rise to an *adventitious branch*. An *adventitious root* develops from some part of a plant other than a pre-existing root.

adven'tive (*Bot.*). Denotes a plant which has not secured a permanent foothold in a given locality.

adverse (*Bot.*). Facing the main axis.

advertising film (*Cinema.*). A film which exhibits facts regarding manufactures; not generally used in cinemas.

adze (*Carp.*). A cutting tool with an arched blade at right-angles to the handle, used for dressing timber.

adze block (*Carp.*). The part carrying the cutters in a wood-planing machine.

ae'cial (*Bot.*). A term used in America for *aecidial.*

aecid'ial (*Bot.*). Relating to the aecidium.

aecid'iospore (*Bot*). A spore of the rust fungi formed in an aecidium.

aecid'ium (*Bot.*). A spore-producing structure characteristic of many rust fungi. It consists of a cup-shaped peridium of sterile hyphae, containing closely packed chains of aecidiospores.

ae'ciospore (*Bot.*). The American term for *aecidiospore.*

ae'cium (*Bot.*). The American term for *aecidium.*

aedeagus, ē'dē-ā-gus (*Zool.*). In Insects, a finger-like evagination of the ventral body-wall, enclosing the terminal section of the ejaculatory duct and forming an intromittent organ.

ae'girine, ae'girite (*Min.*). A metasilicate of sodium and iron, occurring commonly in the soda-rich igneous rocks.

aegithog'nathous (*Zool*). (Of Birds) having a type of palate in which the maxillopalatines do not meet the vomer or each other, and in which the vomer is broad and truncate anteriorly; the palatines and pterygoids articulate with the basisphenoid rostrum.

aegoph'ony, egophony (*Med.*). The bleating quality of voice heard through the stethoscope when fluid is present in the pleural cavity.

aeloso'mine (*Zool.*). A green respiratory pigment of some *Oligochaeta.*

aeo'lian rocks (*Geol.*). Rocks which have accumulated in a non-marine environment (typically on a desert surface) and consist essentially of wind-blown sand grains.

aeolian tone (*Acous.*). A musical note set up by vortex action on a stretched string when it is placed in stream of air.

Ae'olight (*Cinema.*). The gas-discharge lamp used in Movietone variable-density sound-recording system. The location of the sound-track slides across a slit cut on silver deposited on the glass envelope. Its compactness makes it useful in news-reel sound-film cameras.

aeo'lipile, aeolipyle (*Phys.*). A contrivance designed to illustrate the reaction of the air upon jets of steam issuing from an otherwise closed vessel, and usually arranged so as to produce rotary motion of the vessel about a free axis.

aeolotro'pic (*Phys.*). Having physical properties which vary according to the direction or position in which they are measured.

aerating root (*Bot.*). A type of root produced by many plants which grow in soft mud. It stands up above the mud and water, is of loose construction, and acts as a ventilating organ.

aerating tissue (*Bot.*). Loosely constructed tissue, well provided with intercellular spaces, by means of which air can circulate inside a plant.

aeration (*Illum.*). A term used to denote the mixing of air with gas in a gas burner; defined as the ratio of the volume of air drawn in to the volume of gas.

aerenchy'ma (*Bot.*). (1) The same as *aerating tissue.*—(2) A tissue of thin-walled, somewhat corky cells, present on the stems of some water-plants at about water-level.

aerial (*Radio*). Any exposed wire capable of radiating or receiving the energy to or from an electromagnetic wave. The term is preferably restricted to such, and should not be applied to aerial systems which are designed to have specified characteristics, to which the term *antenna* (q.v.) is applicable.

aerial cable (*Teleph.*). Lead-covered cable, suspended from a wire between normal telegraph-poles, containing pairs of insulated conductors for telephone circuits, the practice being economical until it is worth while to bury a larger cable.

aerial car (*Civ. Eng.*). One designed for travel in the air; usually applied to a car on an elevated railway, or to the basket of a balloon.

aerial image (*Photog.*). An image formed in space and not received on a surface.

aerial perspective (*Photog.*). Qualities in photographs which suggest natural or enhanced distance, atmosphere, or recession of objects. Obtained in black and white photography by adjustment of the lighting.

aerial photograph (*Photog.*). A vertical or oblique photograph made from an aeroplane for surveying or military purposes. The cameras may expose regularly during steady flight, using high-speed film. Pictorial and advertising photography and cinematography from aircraft are also included. See **aerial surveying.**

aerial plant (*Bot.*). See **epiphyte.**

aerial root (*Bot.*). A root, usually adventitious in origin, ordinarily arising from a stem, and commonly serving for climbing; less often it assists in the nutrition of the plant, either by containing chlorophyllous cells capable of photosynthesis or by functioning as a parasitic sucker.

aerial ropeway (*Civ. Eng.*). An apparatus for the overhead transport of materials (e.g. coal from the mines to a nearby ship) in carriers running along an overhead cable or cables supported on towers.

aerial screen (*Photog.*). A transparent screen (used in stage-work) on which images can be projected.

aerial surveying (*Surv.*). A process of surveying by photographs taken from the air, the photographs being of two types: (*a*) those giving a vertical or plan view, (*b*) those giving an oblique or bird's-eye view. See **vertical aerial photograph, oblique aerial photograph.**

aerobatics (*Aero.*). Evolutions performed by an aircraft at the will of the pilot, usually excluding those needed for normal flight. Sometimes called ACROBATICS.

aer'obe, aerobi'ont (*Bot.*). A plant which requires elementary oxygen for respiration.—*adjs.* **aero'bic, aerobiot'ic.**

aerobe (*Biol.*). An organism which can live and grow only in the presence of oxygen: an organism which employs aerobic respiration.

aerobic respiration (*Biol.*). A form of respiration in which elementary oxygen is used for the oxidation of organic compounds with the formation of water and carbon dioxide, and the liberation of energy.

aerobio'sis (*Biol.*). Existence in the presence of oxygen.

aerodrome (*Aero.*). A reserved area of land or water intended to be used for the landing or taking-off of aircraft.—Obsolete uses: Langley (U.S.A.; 1895), a flying machine; Lanchester (1918), a balloon- or airship-shed.

aerodynam'ics (*Aero.*). That part of the mechanics of fluids that deals with the dynamics of gases. Particularly, the study of forces acting upon bodies in motion in air.

aer'odyne (*Aero.*). Any form of aircraft deriving lift in flight principally from aerodynamic forces. Commonly called HEAVIER-THAN-AIR CRAFT; e.g. *aeroplane, glider, kite, Autogiro, helicopter.*

aer'ofoil (*Aero*). A surface shaped so as to produce a large aerodynamic reaction (lift) normal to its direction of motion, for a small resistance (drag) parallel to its direction of motion. A wing, plane, aileron, tail-plane, rudder, elevator.

Aer'ograph (*Paint.*). A spray-gun for paint. The paint passes from an attached container to a small nozzle, where it is blown by compressed air into a fine spray, which can be directed on to the work.—(*Photog.*) A small air-pressure brush for spraying paint on photographs, mainly for colour-reproduction.

aer'olites (*Geol.*). A general name for stony as distinct from iron meteorites.

aerol'ogy (*Aero., Meteor.*). The study of the upper air, that part of the atmosphere removed from the effect of surface conditions. The knowledge of these conditions is distributed to aerodromes for the use of pilots proposing to fly at considerable heights.

aeronautical engineering. That branch of engineering concerned with the design and production of aircraft structures.

aeronautics. The science of all forms of aerial locomotion, and the production of apparatus for its performance.

aeroperception (*Zool.*). The ability to perceive the direction of origin of the oxygen supply, e.g. in Tubificid worms.

aeroph'agy (*Med.*). The swallowing of air, with consequent inflation of the stomach.

aer'ophone (*Acous.*). An early Edison device for amplifying sounds, comprising a diaphragm mechanism operating a valve for releasing air under pressure. See **stentorphone.**

aer'ophyte (*Bot.*). See **epiphyte.**

aeroplane (*Aero.*). Any heavier-than-air power-driven flying-machine with fixed wings. Subdivisions:—land plane, seaplane (float seaplane and flying-boat), and amphibian.

aeroplane effect (*Radio*). Error in direction-finding by radio which arises from the tilt of the transmitting aerial on an aircraft, or from any horizontal component in the emitted wave.

aeroplane engines. See **aircraft engines.**

aeroplane linen (*Textiles*). A light, strong linen fabric, made of the best yarn, which has been boiled to lighten it; used for covering aeroplane wings.

aer'osol (*Chem.*). A colloidal system, such as a mist or a fog, in which the dispersion medium is a gas.

aer'ostat (*Aero.*). Any form of aircraft deriving support in the air principally from its buoyancy. Commonly called LIGHTER-THAN-AIR CRAFT, i.e. a *balloon* or *airship.*

aerostat (*Zool.*). See **air-sacs.**

aerostat'ic (*Zool.*). Pertaining to or containing air-sacs.

aerostation (*Aero.*). The manipulation and flying of such aircraft as are lighter than air, such as balloons and airships.

aerotax'is (*Bot.*). The movement of a whole motile plant, or of a motile gamete, in relation to the concentration of oxygen in the surrounding water.—(*Zool.*) Reaction to oxygen, usually manifested by movement towards or away from it.—*adj.* **aerotactic.**

aerotro'pism (*Bot.*). The curvature by means of one-sided growth of a plant member in relation to oxygen concentration.—(*Zool.*) Reaction towards, or sensitivity to, oxygen.—*adj.* **aerotropic.**

aeru'ginose, aeru'ginous (*Bot.*). Bluish-green, like verdigris.

aes'thacytes (*Zool.*). In *Porifera*, cells alleged to be sensory or nervous.

aes'thatascs (*Zool.*). In *Crustacea*, olfactory hairs occurring on most antennules and on many antennae.

aesthe'sia. Sensibility.

aesthesiom'eter, esthesiom'eter (*Med.*). An instrument for measuring the sensibility of a person to touch.

aes'thetes (*Zool.*). In amphineuran *Mollusca*, sense-organs, some of which are primitive eyes, occurring in canals traversing the shell-plates.

aes'tival (*Bot., Zool*). Occurring in summer, or characteristic of summer.

aestival aspect (*Bot.*). The condition of the vegetation of a plant community in summer.

aestivation (*Bot.*). The arrangement of the parts of a flower in the flower-bud: in particular, the arrangement of the sepals and petals.

aestivation (*Zool.*). Prolonged summer torpor, as in some Insects. Cf. *hibernation.*

aetha'lium (*Bot.*). The fruit body of some *Myxomycetes*, consisting of a number of sporangia more or less confluent and incompletely individualised.

aether. Another spelling of *ether* (q.v.).

aetiol'ogy, etiol'ogy (*Med.*). The medical study of the causation of disease.

A.F., a.f. (*Elec. Comm.*). Abbrev. for *audio frequency* (q.v.).

a.f. amplifier, a.f. transformer (*Elec. Comm.*). See **audio-frequency amplifier, audio-frequency transformer.**

A.F.C. (*Radio*). Abbrev. for *automatic frequency control.*

afeb'rile (*Med.*). Without signs or symptoms of fever.

af'fect (*Psychol.*). The degree of pleasantness-unpleasantness accompanying any emotional state.

af'ferent (*Zool.*). Carrying towards; as blood-vessels carrying blood to an organ or organs, and nerves carrying nervous impulses to the central nervous system. Cf. *efferent.*

afferent arc (*Zool.*). The sensory or receptive part of a reflex arc, including the adjustor neurone or neurones.

affinity (*Bot.*). Likeness, especially in relationship.

affinity (*Chem.*). See **chemical affinity.**

affixed (*Bot.*). Inserted upon.

aflagell'ar (*Zool.*). Lacking flagella.

African glanders (*Vet.*). See **lymphangitis (epizootic).**

afterbirth (*Zool.*). See **decidua.**

after-blow (*Met.*). In basic Bessemer process, continuation of blowing after carbon has been eliminated, to obtain removal of phosphorus.

after-burning (*I.C. Engs.*). In an internal-combustion engine, persistence of the combustion process beyond the period proper to the working cycle, i.e. into the expansion period.

aftercooler (*Mining*). A device used for cooling compressed air before it enters the mains in a shaft, thereby increasing their capacity.

after-damp (*Mining*). The non-inflammable heavy gas, carbon dioxide, left after an explosion in a coal mine. The chief gaseous product produced by the combustion of coal-gas. See **black damp, firedamp, white damp.**

after-flush compartment (*Plumb.*). A chamber at the back of a wash-down closet arranged to receive part of the flushing-water, and to allow it to escape slowly after the flushing has finished, in order that any loss of seal in the trap may be rectified.

afterglow (*Photo-electronics*). The phenomenon, exhibited by certain fluorescent substances, of persistence of luminosity after the removal of the exciting agent, usually cathode rays.

after-image (*Optics*). See **compensatory after-image.**

after-pains (*Med.*). Pains occurring after the birth of a child, due to contraction of the uterus.

after-ripening (*Bot.*). The chemical and physical changes which go on inside a seed or other dormant plant-structure, and lead to the development of conditions when growth can be resumed.

aftershaft (*Zool.*). A second shaft, or a tuft of down, arising from the hollow quill of a feather, just proximally to the superior umbilicus.

Ag (*Chem.*). The symbol for silver (*argentum*)

agalac'tia, agala'cia (*Med.*). Failure of the breast to secrete milk.

agalactia (*Vet.*). A contagious infection of sheep and goats, due to a filterable virus; characterised by inflammation of the mammary gland, eye, and joints.

agalmat'olite (*Min.*). See **pagodite.**

agamandroe'cious (*Bot.*). Having male and neuter flowers in the same inflorescence.

agam'ete (*Zool.*). In *Protozoa*, a young form which develops directly into an adult, without syngamy.

agam'ic (*Bot.*). Said of reproduction without the co-operation of a male gamete

agamo'bium (*Zool.*). In metagenesis, the asexual generation.

agam'ogen'esis (*Bot.*). Asexual reproduction by means of buds, bulbils, and other detachable parts of a plant.—(*Zool*) Asexual reproduction; parthenogenesis.—*adjs.* **agamic, agamous, agamogenetic.**

agamog'ony (*Zool.*). See **schizogony.**

agamogynae'cious (*Bot.*). Having female and neuter flowers in the same inflorescence.

agam'ohermaph'rodite (*Bot.*). Having hermaphrodite and neuter flowers in the same inflorescence.

agam'ont (*Zool.*). See **schizont.**

agamotro'pic (*Bot.*). Said of a flower which does not shut after having once opened.

agar-agar (*Chem.*). A vegetable-gelatin, free from nitrogen, used for bacteriological cultures.

agar'ic (*Bot.*). A general term for mushrooms and toadstools.

agaric mineral (*Min.*). See **rock milk.**

Agarica'les (*Bot.*). A group of *Basidiomycetes* containing many thousand species, and occurring all over the world when conditions permit plant growth. The basidia develop on a hymenium spread over the surface of gills, pores, or less often a smooth surface, and the hymenium is at first enclosed, but freely exposed at maturity. Mushrooms and toadstools are familiar examples.

Agassiz trawl, ag'a-sē (*Ocean.*). A small trawl designed to fish whichever way up the trawl falls on the bottom; useful in deep water.

ag'ate (*Min.*). A cryptocrystalline variety of silica, characterised by parallel, and often curved, bands of colour.

agate mortar (*Chem.*). A bowl-shaped vessel in which hard and brittle materials, principally glass, are ground to powder.

agate ware (*Pot.*). Bodies formed by blending differently coloured clays (known as *solid agate*), or by colouring surfaces with differently coloured slips.

age and area theory (*Zool.*). The area occupied by a group of allied species is a measure of their antiquity in evolution.

age-hardening (*Met.*). See **ageing.**

ageing (*Acous.*). The diminution of effectiveness of a carbon microphone with life, arising from the granules becoming smoother through frictional movement.

ageing (*Elec. Eng.*). A change in the properties of a substance with time. In electrical engineering the term usually denotes a change in the magnetic properties of iron, e.g. increase of hysteresis loss of sheet steel laminations. It is also the name given to a process whereby the sub-permanent magnetism of permanent magnets can be got rid of in the manufacture of permanent magnets; and to the gradual change which takes place in the electrolyte of an electrodeposition cell, causing a change in the nature of the deposit.

ageing (*Met.*). Change in properties (e.g. increase in tensile strength and hardness) that occurs in certain metals at atmospheric temperature after heat treatment (as in Duralumin), or after cold working (as in mild steel).

agene'sia, agen'esis (*Med.*). Imperfect development (or failure to develop) of any part of the body.

agent (*Mining*). The chief official of a coal-mine or group of coal-mines in the same undertaking.

age'otro'pism (*Bot.*). The condition of not reacting to gravity.—*adj.* **ageotropic.**

Agfa, Agfacolor process (*Photog.*). Trade-name of a film-stock and cinematographic colour-system.

agglomerate, agglomerated (*Bot.*). Crowded, or heaped into a cluster.

agglomerate (*Geol.*). An indurated rock built of large angular rock-fragments embedded in an ashy matrix, and resulting from explosive volcanic activity. Occurs typically in volcanic vents.

agglomerate Leclanché cell (*Elec. Eng.*). A form of Leclanché cell designed to have a low resistance; the depolariser is made up in the form of blocks which surround the carbon electrode without a porous pot; the negative electrode is an external zinc cylinder.

agglomeration (*Zool.*). In *Protozoa*, adherence of forms like Trypanosomes by the aflagellar end of the body (apparently by means of a sticky secretion produced by the kinetonucleus) to form large clumps. Agglomeration always occurs in conditions unfavourable to the parasite, and is possibly due to the formation of agglutinins in the blood of the host.

agglutinate (*Bot.*). Cemented together by sticky material.

agglutination (*Chem.*). The coalescing of small suspended particles to form larger masses which are usually precipitated. Specifically:—(*Bot.*) the clumping of bacteria under the influence of sera or other unfavourable circumstances; (*Path.*) the clumping of bacteria or of blood cells; (*Zool.*) the formation of clumps by some *Protozoa* and spermatozoa; also the clumping of red blood corpuscles when the plasma of one individual is added to the blood of another, or when the blood from two individuals of different types is mixed, e.g. bloods of groups A and B (II. and III.).

agglu'tinin (*Chem.*). The antibody substance which causes agglutination of blood corpuscles, bacteria, etc. Specifically:—(*Path.*) a constituent of the blood plasma of one individual which causes agglutination by reacting with a specific receptor in the red corpuscles in the blood of another individual.

agglu'tinogen (*Med.*). The substance in bacteria or in blood cells which stimulates the formation of, and unites with, agglutinin, as in infection and immunisation.

aggregate, aggregated (*Bot.*). Closely packed but not confluent.—(*Zool.*) Massed or clustered; e.g. the aggregate silk glands of Spiders, which are connected with the posterior spinnerets, and produce the spiral thread of orb webs and its viscid coating.

aggregate (*Civ. Eng.*). The sand and broken stone and brick which together form one of the constituents of concrete, the others being cement and water. See **coarse— fine—**

aggregate (*Geol., Min.*). A mass consisting of rock or mineral fragments.

aggregate fruit (*Bot.*). (1) The fruit formed by a flower with several free carpels.—(2) The fruit formed from several flowers growing close together; e.g. a Pineapple.

aggregate ray (*Bot.*). A group of closely placed, narrow vascular rays.

aggregate species (*Bot.*). A group of closely related species denoted by a single name.

aggressive resemblance (*Zool.*). See **anticryptic coloration.**

aggressiveness, aggressivity (*Bot.*). The capacity of a parasite to attack its host.

aging. See **ageing.**

agitator (*Met.*). A tank in which very finely crushed ore is agitated with leaching solution. Usually accomplished by means of a current of compressed air passing up a central pipe and causing circulation of the contents of the tank. Sometimes called a MIXER.

agitator (*Paper*). A device for imparting a rapid jerking or rocking to the fluid paper-pulp on the frame, so causing the suspended wood-fibres to interlace in various directions.

aglos'sate, aglos'sal (*Zool.*). Lacking a tongue.—*n.* **aglossia,** congenital absence of the tongue.

agna'thous, agna'thosto'matous (*Zool.*). Having a mouth without jaws, as in the Lampreys.

agno'sia (*Med.*). Loss of the ability to recognise the nature of an object through the senses of the body.

agon'ic line (*Magn.*). An isogon of zero magnetic declination.

ag'orapho'bia (*Psychol.*). The fear of being alone in an open space.

agran'ulocyto'sis (*Path.*). A pathological state in which there is a marked decrease in the number of granulocytes in the blood.

agraph'ia (*Med.*). Loss of the power to express thought in writing, as a result of a lesion in the brain.

agres'sin (*Zool.*). A poisonous substance, produced by disease-causing organisms, which inhibits the defensive reactions of the host.

agres'tal (*Bot.*). Growing in cultivated ground, but not itself cultivated; e.g. a weed.

agricultural bolt (*Eng.*). A type of bolt, much used in agricultural machines, whose shank is formed externally with helical grooves imparted by a rolling process.

agrostol'ogy (*Bot.*). The study of grasses.

Ag'ua Clar'a Group (*Geol.*). A series of strata of Oligocene (Aquitanian) age occurring in western Venezuela, and including dark-coloured marine shales, gypsum, ferruginous bands and, especially near the base, limestones and sandstones, the latter yielding most of the oil in that country.

ague, ā'gū (*Med.*). See **malaria.**

agy'nous (*Bot.*). Said of an abnormal flower in which the gynaeceum has failed to develop.

a.h.m. (*Elec. Eng.*). See **ampere-hour meter.**

aiguille, āg'wil (*Masonry*). A stone-boring tool.

ailerons (*Aero.*). Flaps at or near each wing-tip, under the control of the pilot, and manipulated by him so as to give a rolling motion to the aircraft on its fore and aft axis.

air. See **atmosphere (composition of, pressure of), saturation of the air.**

air bells (*Photog.*). Minute bubbles which have adhered to emulsions during processing, with consequent black or white spots where the emulsion has been protected from the action of chemicals.

air-bladder (*Zool.*). In Fish, a gas-containing sac developed as a diverticulum of the gut, with which it may retain connexion by the pneumatic duct in later life; usually it has a hydrostatic function, but in some cases it may be respiratory or auditory, or assist in phonation.

air blast (*I.C. Engs.*). See **air injection.**

air-blast switch (or **circuit-breaker**) (*Elec. Eng.*). A form of switch (or circuit-breaker) in which the arc is extinguished by a blast of air.

air-blast transformer (*Elec. Eng.*). An air-cooled transformer in which cooling is carried out by means of forced circulation of air over the windings and core.

air brake (*Eng.*). (1) A mechanical brake operated by air-pressure acting on a piston.—(2) An absorption dynamometer in which the power is dissipated through the rotation of a fan or air-screw.

air-break switch (or **circuit-breaker**) (*Elec. Eng.*). A switch (or circuit-breaker) in which the contacts are in air.

air-brick (*Build.*). A perforated cast-iron or earthenware brick built into a wall across an air-duct admitting air under the floors or into rooms.

air-brush. Any of several types of device for spraying paint by means of compressed air. See **Aerograph.**

air calorimeter test (*Elec. Eng.*). A method of measuring the losses of an enclosed electric machine by measuring the volume and temperature rise of the air passing through it.

air cavity, air space (*Bot.*). (1) A large intercellular space in a leaf into which a stoma opens.—(2) A cavity in the upper surface of the thallus of some liverworts, opening externally by an *air pore* and containing chains of photosynthetic cells.—(3) A large intercellular space in which air is stored in some water-plants.

air-cell (*I.C. Engs.*). A small auxiliary combustion chamber used in certain types of compression-ignition engines, for promoting turbulence and improving combustion.

air-cells (*Zool.*). Thin-walled cavities, filled with air, occurring in the bones of the skull (especially the ethmoid and the mastoid), generally to reduce weight.

air-classifier (*Mining*). An appliance for approximately sizing crushed minerals or ores by means of currents of air. See **air-elutriator.**

air-cleaner (*I.C. Engs.*). A filter placed at the air intake of an internal-combustion engine to remove dust from the air entering the cylinders.

air-compressor (*Eng.*). A machine which draws in air at atmospheric pressure, compresses it, and delivers it at a higher pressure. It may be of the reciprocating, centrifugal, or rotary (vane) type.

air-condenser (*Radio*). A condenser in which the dielectric is nearly all air; the most commonly employed form of tuning-condenser.

air-conditioning (*Build., etc.*). The process whereby atmospheric air is cleaned and brought to a suitable condition of temperature and humidity prior to admission to buildings, factories, cinemas, film laboratories, telephone exchanges, studios, etc. One method of adjustment is by washing the air with water refrigerated to the desired dew-point and then heating it to the required temperature.

air-conduction (*Acous.*). The passing of noise energy along an air path, as contrasted with mechanical conduction of vibrational energy.

air-cooled engine (*I.C. Engs.*). An internal-combustion engine in which the cylinders, finned to increase their surface area, are cooled by an air-stream. See **cowling.**

air-cooled machine, transformer, etc. (*Elec. Eng.*). A machine, transformer, or other piece of apparatus, in which the heat occasioned by the losses is carried away solely by means of air. The flow of air over the heated surfaces may be due to natural convection or may be produced by a fan. See **air-blast transformer.**

air-cooling (*Eng.*). The cooling of hot bodies by means of a stream of cold air, as distinct from water-cooling.

air-core cable (*Elec. Comm.*). See **dry-core cable.**

aircraft engine (*Aero.*). An engine, usually of the internal-combustion type, modified in form and weight so as to be suitable to provide the motive power of an aircraft. Types:—in-line or radial, liquid-, vapour-, or air-cooled.

aircraft noise (*Acous.*). Noise arising from the propeller, the engine, the exhaust, and the surface-friction of aircraft, characterised by unstable low frequencies. Noise from the propeller takes the form of a thrown-off impulse wave.

air-drain (*Build.*). A cavity in the external walls of a building, designed to prevent damp from getting through to the interior.

air-dry (*Timber*). Said of timber the moisture content of which is in approximate equilibrium with local atmospheric conditions.

air-drying (*Paper*). The process of drying slowly by exposure to a uniform temperature A method followed only in the manufacture of hand-made and very good machine-made paper.

air ducts (*Eng.*). Pipes or channels through which air is distributed throughout buildings for heating and ventilation.—(*Elec. Eng.*) See **cooling duct, ventilating duct.**

air-ejector (*Eng.*). A type of air-pump used for maintaining a partial vacuum in a vessel through the agency of a high-velocity steam-jet which entrains the air and exhausts it against atmospheric pressure.

air-elutriator (*Mining*). An appliance for producing, by means of currents of air, a series of sized products from a finely crushed mineral (e.g. for the paint or abrasive industries). See **air-classifier.**

air engine (*Eng.*). (1) An engine in which air is used as the working substance, the heat being supplied from an external source. Impracticable except for very small powers. See **hot air engine.**—(2) A small reciprocating engine driven by compressed air.

air escape (*Plumb.*). A contrivance for discharging excess air from a water-pipe; it consists of a *ball-cock* (q.v.) which opens the discharging air-valve when sufficient air has collected, and closes it in time to prevent loss of water.

air-exhauster (*Eng.*). A suction fan which draws vitiated air from a building, mine, shaft, etc.

air flue (*Build.*). A flue, usually fitted with an *Arnott valve* (q.v.), which is built into a chimney-stack so as to withdraw vitiated air from a room.

airframe (*Aero.*). The complete aeroplane, except the engines.

air-fuel ratio (*Eng.*). The proportion of air to fuel in the working charge of an internal-combustion engine, or in other combustible mixture, expressed by weight for liquid fuels and by volume for gaseous fuels.

air-gap (*Elec. Eng.*). A gap in the magnetic circuit of a piece of electrical apparatus; e.g. the gap between the rotor and stator of an electric machine. See also **section gap.**

air-gap (*Teleph.*). The discontinuity in the iron path of a choke or transformer designed to prevent any direct current in the windings from saturating the magnetic material and reducing its permeability, and hence inductance, for alternating currents.

air-gap torsion-meter (*Eng.*). A device for measuring the twist in a shaft by causing the relative rotation of two sections to alter the air-gap between a pair of electromagnets, the resulting change in the current flowing being indicated by an ammeter.

air-gas (*Chem.*). *Producer gas* (q.v.).

air gate (*Eng.*). A passage from the interior of a mould to allow of the escape of air and other gases as the metal is poured in. See **riser.**

air-grating (*Build.*). A perforated iron grating built into a wall across an air-duct admitting air to a building and allowing of ventilation.

air-hardening steel (*Met.*). Alloy steel which can be hardened by cooling in air instead of in water (which is required for carbon steel); e.g. carbon 0·3%, nickel 4·0%, and chromium 1·5%.

air-heater (*Ind. Heat.*). (1) See Supplement.—(2) Properly *air-preheater*. A system of tubes or passages, heated by flue gas, through which combustion air is passed for pre-heating before admission to the combustion chamber, thus appreciably raising flame temperatures and returning to the combustion chamber some utilisable heat that would otherwise be lost. See also **recuperative air-heater, regenerative air-heater, Supermiser.**

air injection (*Eng.*). The system of injecting the oil fuel into the cylinder of a Diesel engine by means of a blast of high-pressure air. Cf. *airless (solid) injection.*

air insulation (*Elec. Eng.*). At normal pressure air withstands a voltage-gradient of 35-38 kilovolts per cm. Dielectric strength increases with pressure.

air-level (*Surv.*). A *level tube* (q.v.).

air-lift pump (*Hyd.*). An apparatus for raising water from a well by the use of compressed air only; the latter is admitted into the lower end of a pipe immersed in the water to be lifted, setting up alternate plugs of water and air which are forced up the pipe by the superior hydrostatic pressure of the water in the open boring.—(*Mining*) An air-operated displacement pump for elevating or circulating pulp in cyanide plants.

air line (*Elec. Eng.*). (1) A straight line frequently drawn on the magnetisation curve of an electric machine or other piece of apparatus; it represents the magnetising force necessary to maintain the flux across the air-gap of the magnetic circuit.—(2) A transmission line carried on poles.

air-lock (*Civ. Eng.*). A device by which access is obtained to the working chamber (filled with compressed air to prevent entry of water) at the base of a hollow caisson. The workman at the surface enters and is shut in an air-tight chamber filled with air at atmospheric pressure. The pressure within this air-lock is gradually raised to that used in the working chamber, so that the workman can pass out through another door communicating with the working chamber. See **caisson.**

air-lock (*Eng.*). An air-pocket or bubble in a pipe line which obstructs the flow of liquid. See **vapour lock.**

air manometer (*Phys.*). A pressure-gauge in which the changes in volume of a small quantity of air enclosed by mercury in a glass tube indicate changes in the pressure to which it is subjected.

air-meter (*Eng.*). An apparatus used to measure the rate of flow of air or gas.

airplane (*Aero.*). American term for *aeroplane.*

air plant (*Bot.*). See **epiphyte.**

air pore (*Bot.*). See **stoma, air cavity.**

air port (*Aero.*). An aerodrome provided with arrangements for dealing with commercial aircraft, usually serving as a regular station on an air line, and frequently having customs facilities in addition.

air-preheater (*Ind. Heat.*). See **air-heater.**

air-pump (*Eng.*). A reciprocating or centrifugal pump used to remove air, and sometimes the condensate, from the condenser of a steam-plant. See **air-ejector.**—Any device used for transferring air from one place to another. A *compressor* is a pump used for increasing the pressure on the high-pressure side; an *evacuator*, or vacuum pump, is one in which the object of pumping is to reduce the pressure on the low-pressure side. A *blower* is a pump used for obtaining a rapidly moving air-blast.

air-receiver (*Eng.*). A vessel into which compressed air is discharged, to be stored until required.

air route (*Aero.*). In organised flying, a defined route between two aerodromes; usually provided with direction-finding facilities, lighting, emergency-landing grounds, etc.

air-sac mite (*Vet.*). *Cytoleichus nudus*, a mite (*acarus*) infecting the respiratory passages of gallinaceous birds.

air-sacs or **aerostats** (*Zool.*). In *Insecta*, thin-walled distensible dilations of the tracheae, occurring especially in rapid flyers, which increase the oxygen capacity of the respiratory system and otherwise assist the act of flight: in Birds, expansions of the blind ends of certain bronchial tubes, which project into the general body-cavity and assist in respiration, as well as lightening the body.

airscrew (*Aero.*). A power-driven screw producing a thrust by reason of its rotation in the air.—Types: left-hand airscrew; right-hand airscrew; ADJUSTABLE-PITCH AIRSCREW, one with blades capable of being rotated upon their own axes, thus changing the pitch of the airscrew (only when stationary); PUSHER AIRSCREW, one designed to produce a compression in its mounting in the aircraft when rotating in the normal direction; SWIVELLING AIRSCREW, one capable of being turned bodily so as to transmit its thrust in any desired direction; used principally for control purposes in airships; TRACTOR AIRSCREW, one designed to produce a tension in its mounting in the aircraft when rotating in the normal direction; VARIABLE-PITCH AIRSCREW, one with blades capable of being rotated upon their own axes, thus changing the pitch of the airscrew, while in rotation. See also **feathering airscrew.**

airscrew fan (*Eng.*). See **propeller fan.**

airscrew hub (*Aero.*). The detachable metal fitting by which an airscrew is attached to the power-driven shaft.

air-shaft (*Civ. Eng.*). An air-passage, usually vertical or nearly vertical, which provides for the ventilation of a tunnel or mine.

airship (*Aero.*). Any power-driven *aerostat* (q.v.). Types: NON-RIGID AIRSHIP, one with the envelope so designed that the internal pressure maintains its correct form without the aid of a built-in structure; small, and used for naval patrol-work; RIGID AIRSHIP, one having a rigid structure to maintain the designed shape of the hull, and to carry the loads; large, used for commercial transport work; usually carries a number of ballonets or gas-bags inside the frame; SEMI-RIGID AIRSHIP, one having a partial structure, usually a keel only, to distribute the load to, and maintain the designed shape of, the envelope or ballonets; intermediate size, obsolete.

air-slaking (*Build.*). The process of exposing quicklime to the air, as a result of which it will gradually absorb moisture and break down into a powder.

air-space (*Bot.*). See **air cavity.**

air-spaced coil (*Radio*). An inductance coil in which the adjacent turns are spaced out (instead of being wound close together) in order to reduce self-capacity and dielectric losses.

air speed (*Aero.*). Speed measured relative to the air in which the aircraft is moving, as distinct from speed relative to the ground; measured by an *air speed indicator*.

air standard cycle (*I.C. Engs.*). A standard cycle of reference by which the performance of different internal-combustion engines may be compared, and their relative efficiencies calculated.

air standard efficiency (*I.C. Engs.*). The thermal efficiency of an internal-combustion engine working on the appropriate air standard cycle.

air surveying (*Surv.*). See **aerial surveying.**

air thermometer (*Heat*). A means of measuring temperature depending on the application of the gas laws to variations of the pressure and volume of air with temperature. The air is contained in a bulb placed in the enclosure whose temperature is required, and by means of a mercury manometer the pressure required to keep the volume constant, or the volume at constant pressure, may be measured.

air-trap (*San. Eng.*). A trap which, by a water-seal, prevents foul air from rising from sinks, wash-basins, drains, sewers, etc. Sometimes called DRAIN-TRAP, STENCH-TRAP.

air valve (*Civ. Eng.*). A valve located in a pipe-line at a crest of a hill; it serves as a means of letting out air which may have accumulated there, after separating out from the water passing through the pipe.

air-vessel (*Eng.*). An air-containing vessel fitted to the delivery side of a reciprocating water-pump in order to smooth out the pulsating discharge.

airway beacon (*Illum.*). A powerful light located at an air port or along an air route, to assist the pilot in maintaining his correct course when flying at night.

airworthy (*Aero.*). (1) (In Britain) complying with certain regulations laid down by law, which aim at ensuring that aircraft shall be safe to fly.—(2) Possessing a certificate of airworthiness.

airless injection (*Eng.*). The injection of liquid fuel into the cylinder of an oil engine by a high-pressure fuel pump, so dispensing with the compressed air necessary in the early Diesel engines. Also called SOLID INJECTION.

Airy points (*Phys.*). The best points for supporting a bar horizontally so that bending shall be a minimum. The distance apart of the points is equal to $\frac{l}{\sqrt{n^2-1}}$, where l is the length of the bar and n the number of supports.

Airy's integral (*Light*). The factor, 1·22, by which the dimensions of the diffraction pattern produced by a slit must be multiplied in order to obtain the dimensions of the pattern due to a circular aperture.

aisle, il (*Build.*). A division of a church usually parallel to and flanking the nave, choir, or transept, and marked off from the wall by pillars.

aisle roof (*Build.*). See **lean-to roof.**

aitiogen'ic, aitiogen'ous (*Bot.*). Said of a reaction by a plant, induced by some external agent, generally a movement of some kind.

aitionas'tic (*Bot.*). Said of a curvature performed by a plant-member in response to a diffuse stimulus.

ajacine (*Chem.*). $C_{15}H_{21}O_4N+H_2O$, an alkaloid of unknown constitution, obtained from the seeds of the *Delphinium* species. It crystallises in colourless needles, m.p. 142°-148° C.

Ajax-Wyatt furnace (*Elec. Eng.*). A form of electric induction furnace having an iron core and a special shape of container, to ensure circulation of the charge; the furnace operates at 50 cycles.

ajutage (*Hyd.*). See **adjutage.**

akar'yote (*Zool.*). A cell lacking a nucleus, or one in which the nucleoplasm is not aggregated to form a nucleus.

akaryote stage (*Bot.*). A stage in the life-history of some lower plants during which the nuclei are very difficult to stain.

akene (*Bot.*). See **achene.**

akine'sia, akine'sis (*Med.*). Poverty of movement: a disinclination to move, as a result of a lesion in the brain.

ak'inete (*Bot*). A thick-walled cell containing oil and other reserve food materials, formed by some filamentous algae and serving as a means of vegetative multiplication

Akroyd engine (*Eng*) The first compression-ignition (C.I.) oil engine, patented by Akroyd Stuart in 1890. See **compression-ignition engine.**

Al (*Chem.*). The symbol for *aluminium*.

ala, ā'la (*Bot.*). (1) One of the side-petals of the flower of the pea and its relatives.—(2) A membranous outgrowth on a fruit, serving in wind dispersal.—(3) A narrow leafy outgrowth down the stem from a decurrent leaf.—(*Zool.*) Any flat, wing-like process or projection, especially of bone.—*pl.* **alae.**

ala spuria'lis (*Zool.*). See **bastard wing.**

ala tempora'lis (*Zool.*). In the developing chondrocranium, a small cartilage passing laterally from the side of the trabecula; the alisphenoid bone.

alaban'dite (*Min.*). Massive, granular sulphide of manganese occurring in veins in Rumania and elsewhere. Also called MANGAN-BLENDE.

alabaster (*Min.*). A massive form of gypsum, pleasingly blotched and stained. On account of its softness it is easily carved and polished, and is widely used for ornamental purposes. Chemically it is $CaSO_4 \cdot 2H_2O$.—ORIENTAL ALABASTER, onyx marble. A beautifully banded form of stalagmitic calcite occurring in Algeria, Egypt, and elsewhere.

alabastrine process (*Photog.*). The use of mercury and iron for bleaching out wet collodion positives.

al'anine (*Chem.*). α-Aminopropionic acid, $CH_3 \cdot CH(NH_2) \cdot COOH$; it occurs combined in proteins, notably in silk fibroin.

a'lar, a'lary (*Zool.*). Winglike: pertaining to wings: axillary: pertaining to alae.

alarm bell (*Teleph.*). An audible signal to indicate a defect in a circuit or group of circuits, such as a blown fusible cut-out or an earth fault.

alarum, alarum clock (*Horol.*). A clock which rings on a bell, gong, or the case of the clock itself, at a predetermined time.

alaska (*Textiles*). Yarn consisting of mohair or wool and cotton, mixed by carding, or by combing and drawing; used for ladies' dress materials and coatings.

alassoton'ic (*Zool.*). Of or against decreasing force (of muscle contraction).

alas'trim (*Med.*). Variola minor; a mild form of smallpox differing from it in certain features.

alate (*Bot.*). Winged; applied to stems when decurrent leaves are present.—(*Zool.*) Having a broad lip (especially of shells): in *Porifera*, a type of triradiate spicule with unequal angles.

albe'do (*Astron.*). A measure of the light-reflecting power of the surface of a heavenly body not self-luminous.—(*Illum.*) The term is sometimes used in photometry to indicate the degree of reflecting power of a matt surface. An ideal white matt surface absorbing no light would have unit albedo.

Albers-Schonberg disease (*Med.*). See **osteopetrosis.**

albert (*Paper*). A standard size of notepaper, 6×3¾ in.

al'bertite (*Min.*). A pitch-black solid bitumen occurring in veins in oil-bearing strata.

Albertol (*Chem.*). Trade-name for ester-gums.

Albian stage (*Geol.*). A division of the Cretaceous System, comprising the rocks between the Aptian stage below and the Cenomanian stage above; approximately equivalent to the English Gault and Upper Greensand.

al'binism (*Bot.*). An abnormal condition due to the absence of chlorophyll or other pigments.—(*Zool.*) Absence of pigmentation, especially marked in the integument, epidermal outgrowths, and the eyes.—*n.* **albino.**

albino, al-bē'no (*Bot.*). An abnormal plant of whitish colour due to the more or less complete absence of chlorophyll.—*adj.* **albinot'ic.**

albite (*Min.*). The end-member of the plagioclase group of minerals. Ideally consists of silicate of sodium and aluminium; but commonly contains small quantities of potash and lime in addition. Cf. *barbierite*.

albitisation (*Geol.*). In igneous rocks, the process by which a soda-lime feldspar (plagioclase) is replaced by albite (soda-feldspar).

al'bitite (*Geol.*). A rare type of soda-syenite consisting almost entirely of albite, with a small content of coloured silicates.

albu'men (*Bot.*). See **endosperm.**—(*Zool.*) White of egg; the nutritive material which surrounds the yolk in the eggs of higher animals.—*adj.* **albuminous.**

albumins (*Chem.*). The name given to a group of simple proteins which are soluble in pure water, the solutions being coagulated by heat. The particular albumin found in white of egg is sometimes referred to as *egg-albumin*.

albumin process (*Photog.*). An early printing-process using egg albumin as the vehicle for silver nitrate; now generally replaced by gelatine.

albuminates (*Chem.*). The alkali compounds of albumins.

albuminoids (*Chem.*). A synonym for *scleroproteins* (q.v.), a group of simple proteins which are insoluble, contain a large amount of sulphur and form many supporting tissues.

albuminous (*Bot.*). Endospermous.

albuminous cell (*Bot.*). A cell rich in contents, associated with the phloem in the leaves and stems of some Gymnosperms, and probably serving to conduct proteins.

albuminu'ria (*Med.*). Albumin in the urine.

al'bumoses (*Chem.*). A synonym for *proteoses.*

alburnum (*Bot.*). Sapwood.

Alclad (*Met.*). Composite sheets consisting of an alloy of the Duralumin type (to give strength) coated with pure aluminium (to give corrosion resistance).

alcohol (*Chem.*). A general term for hydrocarbon compounds containing a hydrogen atom substituted by the hydroxyl group. The general formula is R·OH, wherein R signifies an aliphatic or an aromatic radical. In particular, the term alcohol is commonly used for *ethyl alcohol* (q.v.).

alcohol fuel (*I.C. Engs.*). Volatile liquid-fuel consisting wholly, or partly, of alcohol, able to withstand high-compression ratios without detonation.

alcoholic fermentation (*Bot.*). The production of alcohol from sugar by yeasts. Production is best when the supply of free oxygen is limited. Carbon dioxide and heat are also produced.

al'coholom'etry (*Chem.*). The quantitative determination of alcohol in aqueous solutions.

al'cosol (*Chem.*). A colloidal solution in alcohol.

alcove (*Build.*). A recess (often arched or vaulted) in a room or wall.

al'dehydes (*Chem.*). A group of compounds containing the CO— radical attached to both a hydrogen atom and a hydrocarbon radical, viz. R·CHO.

aldehyde acids (*Chem.*). Products of the partial oxidation of dihydric alcohols, containing both an aldehyde group and a carboxyl group.

aldehyde-ammonias (*Chem.*). Crystalline compounds formed by the interaction of aldehydes and ammonia. On distillation with dilute sulphuric acid, the pure aldehydes are regenerated.

aldehyde condensations (*Chem.*). Condensations of aldehydes with aldehydes, ketones, acids, etc., by the elimination of water and the linking together of the chains of the reacting compounds.

aldehyde resins (*Plastics*). Highly polymerised resinous condensation products of aldehydes, obtained by treatment of aldehydes with strong caustic soda.

Alden power brake (*Eng.*). A form of brake used for measuring the power of an engine; consists of a disk of cast-iron revolving between two plates of copper, oil being circulated from the circumference to the centre. Water under pressure circulates outside the copper plates, cooling them, as well as maintaining contact pressure on the moving disk.

al'dimines (*Chem.*). Condensation products of phenols with hydrocyanic acid, formed in the presence of gaseous hydrogen chloride.

Al'doform (*Chem.*). Trade-name for *formaldehyde* (q.v.).

al'dohex'oses (*Chem.*). Compounds of the formula OH·CH$_2$(CH·OH)$_4$·CH:O, of which numerous stereo-isomeric forms are possible. The following aldohexoses are known:

d- and *l*-mannose,
d- and *l*-gulose,
d- and *l*-galactose,
d-altrose,
d- and *l*-glucose,
d- and *l*-idose,
d-talose,
d-allose.

aldoke'tenes (*Chem.*). A group comprising ketene, its monoalkyl-substituted derivatives, and carbon suboxide.

aldol (*Chem.*). A condensation product of acetaldehyde, viz. H$_3$C·CH(OH)·CH$_2$·CHO.

aldol condensation (*Chem.*). The condensation of two aldehyde molecules in such a manner that the oxygen of the one molecule reacts with the hydrogen of the other molecule, forming a hydroxyl group, with the simultaneous formation of a new link between the two carbon atoms.

aldoses (*Chem.*). A group of mono-saccharoses with an aldehydic constitution.

aldox'imes (*Chem.*). A group of compounds in which the oxygen of the aldehyde group is substituted by the radical :N·OH, derived from hydroxylamine H$_2$N·OH and an aldehyde by dehydration. The general formula is R·CH:N·OH.

Aldrey (*Elec. Eng.*). An alloy of aluminium and magnesium containing about 0·5% of the latter; used for transmission-line conductors on account of its having a higher tensile strength than pure aluminium.

ale (*Brew.*). One of the classes of beers, including pale ale (bitter) with a distinct hop flavour, and mild ale, sometimes sweetened, and not so strongly hopped. Burton and barley-wine are strong ales.

ale'cithal (*Zool.*). (Of ova) having little or no yolk.

Alec'toromor'phae (*Zool.*). A legion of *Aves* possessing a schizognathous palate; includes the Game-birds, Cranes, Plovers, and Gulls. See **Galliformes, Gruiformes, Charadriiformes.**

Alençon lace, a-lahn^{g}-son^{g} (*Textiles*). A French point lace made by hand with a needle; made in segments and then joined together and stiffened.

Aleppo galls (*Chem.*). A synonym for nut-galls, excrescences on various species of oak, containing gallic and gallitannic acids.

aleth'oscope (*Photog.*). A lens arrangement for obtaining the correct viewing distance of a photographic print and so correcting perspective.

aleur'iospore, aleur'ispore (*Bot.*). A conidium formed laterally on a hypha by some fungi, especially those which cause skin diseases.

aleur'one (*Bot.*). Reserve protein material occurring in granules in the *aleurone layer*, a special layer of cells just below the surface of the grains of various cereals, and in the seeds of other plants.

Alexanderson alternator (*Radio*). A high-frequency alternator of the inductor type. Slots in a rapidly revolving rotor cause fluctuations in the magnetic field, inducing currents in the stator coils.

alexan'drite (*Min.*). A variety of chrysoberyl, the colour varying, with the conditions of lighting, between emerald green and columbine red.

alex'ia (*Med.*). Word-blindness; loss of the ability to interpret written language, due to a lesion in the brain.

Alfol (*Eng.*). Trade-name for thin corrugated aluminium foil in narrow strips, used for heat insulation, for which it is effective by reason of the numerous small air-cells formed when packed.

Algae, al'jē (*Bot.*). A large group of simple organisms, mostly aquatic. They contain chlorophyll and/or other photosynthetic pigments, and have simply organised reproductive organs.

algal layer, algal zone (*Bot.*). A layer of algal cells lying inside the thallus of a heteromerous lichen. Also called GONIDIAL LAYER, GONIMIC LAYER.

Algaroth, powder of (*Chem.*). See **powder of Algaroth.**

algebra (*Maths.*). The abstract investigation of the properties of numbers by means of symbols (x, y, etc.). Typical algebraic problems are the solving of equations, the summation of series, and permutations and combinations.

Algerian onyx (*Min.*). Another name for *oriental alabaster*. See under **alabaster.**

algesim'eter (*Med.*). An instrument for measuring sensitivity to pain.

algod'onite (*Min.*). Arsenide of copper occurring as a white incrustation in the Algodona silver mine, Chile.

algol (*Chem.*). An anthraquinone vat dyestuff. Algol blue K is the *N*-dimethyl derivative of *indanthrene blue* (q.v.).

algol'ogy (*Bot.*). The study of algae.

Algo'man Granites (*Geol.*). Great acid intrusives comprising gneissose syenites and granites yielding gold in Ontario; of post-Timiskaming age and thus younger than the *Laurentian Granites* (q.v.).

algraphy (*Print.*). Printing by an aluminium plate instead of by a lithographic stone.

alhambra (*Textiles*). A cotton fabric having an elaborate pattern in colour produced by an extra warp, the ground cloth being plain; used as a bed quilt.

alicy'clic (*Chem.*). Abridged term for *aliphatic-cyclic.*

alicyclic hydrogenation (*Chem.*). Hydrogenation in the naphthalene series, wherein hydrogenation takes place only in the substituted benzene ring, e.g. in β-naphthylamine hydrogenation occurs in the benzene ring containing the amino group.

al'idade (*Surv.*). An accessory instrument used in plane-table surveying, consisting of a rule fitted with sights at both ends, which gives the direction of objects from the plane-table station. Also called SIGHT RULE.

alien (*Bot.*). A plant introduced by man, and maintaining a foothold under natural conditions.

alien frequencies or **tones** (*Acous.*). In sound reproduction, frequencies which appear in the reproduction but which are not in the original sound. The term is usually restricted to frequencies derived from the original frequencies through amplitude distortion, but is also given to added frequencies introduced by interfering currents.

a'lienist (*Med.*). One practised in the diagnosis and treatment of mental diseases.

alighting (*Aero.*). Colloquially, LANDING. The action of approaching the earth, usually with engine throttled down or completely shut off, losing flying speed, making contact with the ground or water, and finally coming to rest.

alignment (*Civ. Eng.*). (1) A setting in line (usually straight) of, e.g., successive lengths of a railway which is to be constructed.—(2) The plan of a road or earthwork.—(*Eng.*) The setting in a true line of a number of points, e.g. the centres of the bearings supporting an engine crankshaft.

al'ima (*Zool.*). A pelagic larval form of certain stomatopod *Crustacea*, usually distinguished by the possession of a narrow carapace, elongate cephalic region, and the absence of the six posterior thoracic appendages.

alimentary. Pertaining to the nutritive functions or organs.

alimentary canal (*Zool.*). The passage from the mouth to the anus which receives, digests, and assimilates food-stuffs: the digestive tract: the gut.

alimentary system (*Zool.*). All the organs connected with digestion, absorption, and nutrition, comprising the digestive tract and associated glands and masticatory mechanisms.

alimentary tract (*Zool.*). See **alimentary canal.**

aliphatic acids (*Chem.*). Fatty acids or acids derived from aliphatic compounds.

aliphatic alcohols (*Chem.*). Paraffins in which one or more hydrogen atoms are replaced by the hydroxyl group.

aliphatic aldehydes (*Chem.*). Compounds of the aliphatic series containing the aldehyde group —CHO.

aliphatic compounds (*Chem.*). Methane derivatives or fatty compounds, open-chain compounds.

aliquot scaling, aliquot tuning (*Acous.*). In a piano, the provision of extra wires above the normal wires. These are not struck, but are tuned very slightly above the octave of the struck strings below, so that by sympathetic vibration the musical quality of the note is enhanced.

alisphe'noid (*Zool.*). A wing-like cartilage bone of the Vertebrate skull, forming part of the lateral wall of the cranial cavity, just in front of the foramen lacerum: one of a pair of dorsal bars of cartilage in the developing Vertebrate skull, lying in front of the basal plate, parallel to the trabeculae: one of the sphenolateral cartilages.

a'lite (*Chem.*). The ground clinker obtained from sintering mixtures of limestone, clay, and sand in the proportions used in the manufacture of Portland cement.

al'itrunk (*Zool.*). In Insects, the thorax fused with the first somite of the abdomen.

alive or **live** (*Elec. Eng.*). Said of a circuit when it is connected to a source of e.m.f.—(*Elec. Comm.*) Said of a microphone when it is capable of normal functioning.

aliz'arin (*Chem.*). $C_{14}H_6O_2(OH)_2$, 1:2-dihydroxyanthraquinone, one of the most important natural and synthetic dyes, red prisms or needles, m.p. 289° C., soluble in alcohol and ether, very slightly soluble in water, soluble in caustic soda; insoluble stains are formed with the oxides of aluminium, tin, chromium, and iron. Alizarin can be nitrated and forms the basis of a series of other dyestuffs.

alkalae'mia (*Med.*). Diminution, below normal limits, of the hydrogen-ion concentration of the blood.

al'kali (*Chem.*). A substance which dissolves in water to form an alkaline solution, especially the hydroxides of sodium and potassium. Alkalis are often spoken of as *bases*, but the term *base* has wider significance.

alkali-granite (*Geol.*). An acid, coarse-grained (plutonic) rock carrying free quartz and characterised by a large excess of alkali-feldspar over plagioclase. Cf. *adamellite, granodiorite.* In general, the prefix used with a rock name implies a preponderance of soda- or potash-feldspar or feldspathoid over plagioclase, e.g. *alkali-dolerite.*

alkali metals (*Chem.*). The elements lithium, sodium, potassium, rubidium, and caesium, all monovalent metals in the first group of the periodic system.

alkalim'etry (*Chem.*). The determination of alkali by titration with a standard solution of acid as in volumetric analysis. See **titration** and **volumetric analysis.**

alkaline accumulator (*Elec. Eng.*). An accumulator or secondary cell in which an alkaline electrolyte is used. See **Edison accumulator.**

alkaline earth metals (*Chem.*). The elements calcium, strontium, barium, and radium, all divalent metals in the second group of the periodic system.

alkaline solution (*Chem.*). An aqueous solution containing more hydroxyl ions than hydrogen ions; one which turns red litmus blue.

alkalin'ity (*Chem.*). The extent to which a solution is alkaline. See **pH-value.**

al'kaloids (*Chem.*). Natural organic bases found in plants; characterised by their specific physiological action. Alkaloids may be related to various organic bases, the most important ones being pyridine, quinoline, isoquinoline, pyrrole, and other more complicated derivatives. Most alkaloids are crystalline solids, others are volatile liquids and some are gums. They contain nitrogen as part of a ring, and have the general properties of amines.

alkar'sine (*Chem.*). Reaction product (cacodyl and cacodyl oxide) from potassium acetate and arsenious oxide.

alkyd resins (*Plastics*). See **glyptal resins.**

alkyl (*Chem.*). A general term for monovalent aliphatic or aromatic hydrocarbon radicals. The aliphatic radicals in particular are also termed *alphyls* (q.v.), and the aromatic radicals *aryls* (q.v.).

al'kylene (*Chem.*). A general term for divalent hydrocarbon radicals.

all-electric signalling (*Elec. Eng.*). A railway signalling system in which the signals and points are operated electrically by solenoids or motors, and are also controlled electrically. See **electro-pneumatic signalling.**

all-electric house (*Elec. Eng.*). A dwelling-house in which all services (e.g. cooking, space heating, water heating, lighting, and various labour-saving devices) are operated electrically.

all-insulated switch (*Elec. Eng.*). See **shock-proof switch.**

all-or-nothing piece (*Horol.*). A piece of the mechanism of a repeating watch which either allows the striking of the hours and quarters or entirely prevents it. Also called STOP SLIDE.

all-or-nothing response (*Physiol.*). In many irritable protoplasmic systems, response to stimuli is either with full intensity or not at all; e.g. in lower animals, nematocysts; in higher animals, nerve fibres, cardiac and voluntary muscle fibres.

all-pass (*Elec. Comm.*). Said of any network or transducer which theoretically passes currents of frequency from zero to infinity, without attenuation.

all-rowlock wall (*Masonry*). A wall built to have two courses of stretchers on edge alternating with one course of headers on edge.

all-sliming process (*Met.*). A method of cyanidation of gold ores which involves reduction of all the ore to slime and treatment by agitation.

all-up weight (*Aero.*). See **weight.**

All-watt motor (*Elec. Eng.*). A type of induction motor in which a Scherbius type of phase-advancer is incorporated as an integral part, and which therefore operates at almost unity power-factor.

all-wave receiver (*Radio*). A radio receiving-set which is capable of receiving signals over wide ranges of wavelength, particularly short- and ultra-short-waves in broadcast reception.

Allan cell (*Elec. Eng.*). A type of electrolytic cell used in America for the production of hydrogen by the electrolysis of an alkaline solution.

Allan valve (*Eng.*). A steam-engine slide-valve, in which a supplementary passage increases the steam supply to the port during admission in order to reduce wire-drawing. See **trick valve.**

allanite or **orthite** (*Min.*). A cerium-bearing epidote occurring as an occasional accessory mineral in igneous rocks.

allantoic (*Zool.*). See **allantois.**

al′lantoid (*Bot.*). Sausage-shaped.

allan′toin,—tō-in (*Chem.*). The diureide of glyoxylic acid.

allan′tois, —tō-is (*Zool.*). In the embryos of higher Vertebrates, a sac-like diverticulum of the posterior part of the alimentary canal, having respiratory, nutritive, or excretory functions.—*adj.* **allan′toic.**

Al′legheny Series (*Geol.*). The Lower Productive Coal Measures of the eastern parts of the U.S A. Richly fossiliferous marine beds are interbedded with the coal measures to the west, notably in Kansas.

alle′lomorph (*Gen.*). In Mendelian inheritance, one of a pair of contrasted characters, inherited alternatively with its partner, and assumed to depend on genes situated in homologous chromosomes.

allemont′ite (*Min.*). An intergrowth of metallic antimony and arsenic occurring in reniform masses at Allemont (France) and elsewhere.

al′lene (*Chem.*). Propadiene, CH_2:C:CH_2, obtained by the electrolysis of itaconic acid.

Allen's law (*Zool.*). An evolutionary generalisation stating that feet, ears, and tails of Mammals tend to be shorter in colder climates, when closely allied forms are compared.

Allen's loop test (*Elec. Eng.*). A modification of the Varley loop test for localising a fault in an electric cable; it is particularly suitable for high-resistance faults in short lengths of cable.

al′lergen (*Med.*). A substance, usually a protein, which, introduced into the body, makes it sensitive to that substance.

aller′gy (*Med.*). A state in which the cells of the body are supersensitive to substances (*allergens*, q.v.), usually proteins, introduced into it: the reaction of the body to a substance to which it has become sensitive, characterised by oedema, inflammation, and destruction of tissue.

allette (*Build.*). (1) A wing of a building.—(2) A buttress or pilaster.

alliance (*Bot.*). A sub-class, consisting of a number of related families of plants.

alligator wrench (*Plumb.*). A tool with fixed serrated jaws, used for twisting and screwing pipes into position.

alligatoring (*Dec.*). See **crocodiling.**

alloa (*Textiles*). A thick woollen yarn, generally produced in threefold yarns for hand knitting; originally made in Alloa (Scotland).

allocar′py (*Bot.*). Fruiting after cross-fertilisation.

alloch′thonous (*Ecol.*). (In an aquatic community) said of food material reaching the community from outside: more generally, extraneous, exotic, acquired; e.g. *allochthonous* species, *allochthonous* characteristics.

allog′amy (*Bot.*). See **cross-fertilisation.**

alloi′obiogen′esis (*Zool.*). See **alternation of generations.**

alloisomerism, al′ō-ĭ-som′— (*Chem.*). See **stereoisomerism.**

allom′eric (*Chem.*). Having the same crystalline form but a different chemical composition.

allomor′phous (*Chem*). Having the same chemical composition but a different crystalline form.

allopela′gic (*Zool.*). (Of marine organisms) occurring at any depth, and apparently uninfluenced by change of temperature.

al′lophores (*Zool.*). Cells bearing a red pigment insoluble in alcohol, occurring in the skin of certain Fishes, Reptiles, and Amphibians.

al′loplasm (*Zool.*). That differentiated portion of the cell-protoplasm which does not form independent organelles.—*adjs.* **alloplasmic, alloplasmatic.**

al′loplast (*Zool.*). A morphological unit, consisting of more than one kind of tissue.

allo-polyploid (*Bot.*). A polyploid possessing unlike sets of chromosomes, these usually in pairs.

allose (*Chem.*). An aldohexose, a stereoisomer of glucose.

alloso′mal inheritance (*Gen.*). The inheritance of characters carried in an *allosome.*

allosome (*Cyt.*). Any chromosome other than a typical one, e.g. sex-chromosome. Cf. *autosome.*

allosto′ses (*Zool.*). See **membrane bone.**

allothrausmat′ic (*Geol.*). See under **homeothrausmatic.**

Allot′riognathi, —nā′thō (*Zool.*). An order of *Neopterygii* characterised by the possession of a peculiar protractile mouth; includes the Oar-fish, the Ribbon-fish, and the Moon-fish.

allotriomor′phic (*Geol.*). A textural term implying lack of crystal form.

allotro′pous flower (*Bot.*). A flower in which the nectar is readily accessible to all kinds of insect visitors.

allot′ropy (*Chem.*). The existence of an element in two or more solid, liquid, or gaseous forms, called *allotropes.*

allotter (*Teleph.*). Any arrangement for distributing channels; e.g. the loading of operators in semi-automatic working.

al′lotype (*Zool.*). An additional type-specimen of the opposite sex to the original type-specimen.

allowance (*Eng.*). A difference in dimensions prescribed in order to allow of various qualities of fit between mating pieces.

allox′an (*Physiol.*). An unstable compound playing an important part in cell-respiration; formed together with urea by oxidation of uric acid; readily reduced to dialuric acid which has an extraordinary affinity for atmospheric oxygen and is readily oxidised back to alloxan.

alloy (*Chem.*). Any metal other than a pure metallic element.—(*Met.*) Metal prepared by adding other metals or non-metals to a basic metal to secure desirable properties.

alloy cast-iron (*Met.*). Cast-iron containing alloying elements. Usually some combination of nickel, chromium, copper, and molybdenum. These elements may be added to increase the strength of ordinary irons, to facilitate heat treatment, or to obtain martensitic, austenitic, or ferritic irons.

alloy, non-ferrous (*Met.*). Any alloy based on metals other than iron, i.e. usually on copper, aluminium, lead, zinc, tin, nickel, or magnesium.

alloy (or special) steel (*Met.*). A steel to which elements not present in carbon steel have been added, or in which the content of manganese or silicon is increased above that in carbon steels. See **nickel steel, stainless steel, high speed steel,** etc.

alloy system (*Met.*). All the alloys that can be made by mixing two metals form a binary alloy system; three metals form a ternary alloy system, and so on. The limits of temperature and composition within which the constituents in a system are stable are represented by the *constitutional diagram.*

alloying (*Met.*). The addition to a metal of one or more different elements, in order to form an alloy.

alluring coloration (*Zool.*). Resemblance of an animal to some non-living object, plant, or other animal, for the purpose of attracting its prey.

alluvial clay (*Geol.*). Sediment of the clay grade which has been transported by rivers from the place of its origin, as distinct from that which has originated *in situ.*

alluvial deposits (*Geol., etc.*). Earth, sand, gravel, and other material which has been carried in suspension by river or floods, and is deposited at places where for some reason the velocity of flow is insufficient to maintain the materials in suspension. Such sediment of geologically recent age, in the process of deposition by existing rivers, is known as *alluvium.*

alluvial mining (*Mining*). The winning of ore at a placer deposit (see **placers**).

alluvium (*Geol., etc.*). See **alluvial deposits.**

allyl alcohol (*Chem.*). $H_2C{:}CH{\cdot}CH_2OH$, an unsaturated primary alcohol, present in wood spirit, made from glycerine and oxalic acid. M.p. −20° C., b.p. 96° C., sp. gr. 0·85, of very pungent odour; an intermediate for organic synthesis.

allyl group (*Chem.*). The unsaturated monovalent aliphatic group $H_2C\ CH{\cdot}CH_2{-}$.

allylene (*Chem.*). Propine, $CH_3{\cdot}C{.}CH$.

Al′magest (*Astron.*). The Arabic form of the title of Claudius Ptolemy's great astronomical treatise, 'The Mathematical Syntaxis,' written in Greek about A.D. 140.

Almalec (*Elec. Eng.*). An aluminium alloy having a higher tensile strength than pure aluminium; used for overhead transmission-line conductors.

al′mandine or **al′mandite** (*Min.*). Iron-aluminium garnet, occurring in mica-schists and other metamorphic rocks. Many precious garnets are of this type.

almandine spinel (*Min*). See **ruby spinel.**

Almen-Nylander test (*Chem.*). A test for the presence of sugar, consisting in the reduction of a bismuth salt solution to metallic bismuth.

almond oil (*Chem.*). Used for fruit essences, in perfumery and soap making; two grades are known: *bitter almond oil* and *sweet almond oil. Bitter almond oil*: m.p. 13° C., b.p. 180° C., sp. gr. 1·05, saponification no. 189-200, iodine no. 93-104, acid no. 1·5.

almucan′tar (*Astron.*). A small circle of the celestial sphere parallel to the horizontal plane. The term is also applied to an instrument for measuring altitudes and azimuths.

aloin test, al′ō-in (*Chem.*). A test for the detection of blood in the faeces, consisting in adding an alcoholic aloin solution to an ether extract of faeces and treating the mixture with hydrogen peroxide or ozonised turpentine. The presence of blood will create a cherry-red colour in the ether layer.

alope′cia (*Med.*). Baldness.

alopecia areata, ā-re-a′ta (*Med.*). A condition in which the hair falls out in patches, leaving smooth, shiny, bald areas.

aloxite (*Min.*). See **alundum.**

alpac′a (*Textiles*). (1) A long, silky, hair fibre obtained from a cameloid ruminant animal of the high mountainous regions of western South America.—(2) Dress goods and linings, made from alpaca weft with a cotton warp.

Alpax (*Met.*). Aluminium-silicon alloy, containing about 13% of silicon. Used mainly for castings. Has good casting properties and corrosion resistance, low specific gravity (2·66) and satisfactory mechanical properties. Tensile strength 10-12 tons per sq. in.; elongation 5-8%. Also called SILUMIN.

alpha-beta brass (*Met.*). Copper-zinc alloy containing 38-46% (usually 40%) of zinc. It consists of a mixture of the α constituent (see **alpha brass**) and the β constituent (see **beta brass**).

alpha brass (*Met.*). A copper-zinc alloy containing up to 38% of zinc. Consists constitutionally of a solid solution of zinc in copper. Commercial alpha brasses of several compositions are made. The most widely used contain 30-37%; others contain 5-20% of zinc. All are used mainly for cold-working.

alpha bronze (*Met.*). A copper-tin alloy consisting of the alpha solid solution of tin in copper. Commercial forms contain 4 or 5% of tin. This alloy, which differs from gun metal and phosphor bronze in that it can be worked, is used for coinage, springs, turbine blades, etc.

alpha female (*Zool.*). Among Ants (*Formicoidea*), the normal female if it co-exists with the *β female* (q.v.).

alpha iron (*Met.*). The polymorphic form of iron, stable below 906° C. Has a body-centred cubic lattice, and is magnetic up to 768° C.

alpha particle (*Phys.*). One of the products of the spontaneous disintegration of radioactive substances such as radium, uranium, and thorium. Alpha particles are ejected from such substances with velocities ranging from 1·4 to $2{\cdot}0 \times 10^9$ cm. per sec., causing considerable ionisation in the air along their path. They have been identified as the nuclei of helium atoms which are positively charged on account of each having lost two electrons.

alpha-rays (*Phys.*). Streams of *alpha particles* (q.v.).

alphyls (*Chem.*). A term for aliphatic monovalent hydrocarbon radicals.

Alpine revolution (*Geol.*). That period of earth movement in Tertiary (mainly Miocene) time when the Alps and other existing mountain chains came into existence.

alstonite (*Min.*). See **witherite.**

altar (*Civ. Eng.*). One of the steps in the stepped face of a dry dock wall; used to hold the ends of the supports which prop the vessel in its upright position.

altar tomb (*Build.*). A raised tomb or monument usually standing detached or in a position against a wall, and sometimes supporting an effigy. In appearance it resembles a solid altar, but it is never used as one.

altaz′imuth (*Surv.*). An instrument similar to the *theodolite* (q.v.), but generally larger and capable of more precise work.

alterative (*Med.*). Tending to alter favourably the processes of nutrition: a medicine which does this.

alternate (*Bot.*). Said of leaves and branches which are neither opposite nor in whorls, but placed singly on the parent axis.

alternating cleavage (*Zool.*). See **spiral cleavage.**

alternating stress (*Mech.*). The stress induced in a material by a force which acts alternately in opposite directions.

alternating current (*Elec. Eng.*). An electric current the direction of flow of which alternates in direction; the time of flow in one direction is known as a half-period, and the length of all half-periods is the same. Generally abbreviated to **a.c.**

alternating-current balancer (*Elec. Eng.*). An arrangement of transformers or reactors used to equalise the voltages between the wires of a multiple-wire a.c. or d.c. system; when used on a d.c. system (3-wire system), the ends of the balancer are connected to slip rings on the d.c. generator or on the convertor. Also called a STATIC BALANCER.

alternating-current commutator motor (*Elec. Eng.*). An alternating-current motor which embodies a commutator as an essential part of its construction. See **alternating-current series motor, repulsion motor, compensated induction motor, Schrage motor.**

alternating-current electromagnet (*Elec. Eng.*). An electromagnet excited by alternating current and having, therefore, a laminated magnetic circuit.

alternating-current exciter (*Elec. Eng.*). A term used to denote a commutator machine connected in the rotor circuit of an induction motor in order to effect power factor improvement.

alternating-current generator (*Elec. Eng.*). An electromagnetic generator for producing alternating e.m.f.'s and delivering alternating currents to an outside circuit. See **synchronous generator, induction generator.**

alternating-current motor (*Elec. Eng.*). An electric motor which operates from a single or polyphase alternating-current supply. See **alternating-current commutator motor, induction motor, synchronous motor, capacitor motor.**

alternating-current pick-up (*Elec. Comm.*). Interfering currents in a channel due to induction, either electrostatic or electromagnetic, from alternating-current power lines.

alternating-current series motor (*Elec. Eng.*). A series motor designed for operation from an a.c. supply; it is characterised by a laminated field structure and usually a compensating winding.

alternating-current transformer (*Elec. Eng.*). See **transformer.**

alternation of generations (*Bot.*). The regular alternation in the life-history of two types of plants, differing in their nuclear constitution, and often in their morphology. See **antithetic alternation of generations, homologous alternation of generations.**—(*Zool.*) The occurrence, in the typical life-cycle of a species, of two or more different forms, produced in a different manner, generally an alternation of a sexually-produced form with an asexually-produced form; as in the Hydrozoan genus *Obelia*.

alternative inheritance (*Gen.*). The kind of inheritance in which one or both of any pair of contrasted characters is/are present in the hybrid, and may be obtained unchanged in offspring from the hybrid.

alternator (*Elec. Eng.*). See **synchronous generator.**

alterne (*Bot.*). A sudden change in the nature of the plant-covering of a district, in relation to an abrupt change in soil or other environmental conditions.

altim'eter (*Aero., Phys., etc.*). An aneroid barometer used for measuring altitude by the decrease in atmospheric pressure with height. The dial of the instrument is graduated to read the altitude directly in feet or metres; the zero being set at ground-level.

altitude (*Astron.*). The angular distance of a heavenly body measured on that great circle which passes, perpendicular to the plane of the horizon, through the body and through the zenith. It is measured positively from the horizon to the zenith, from 0° to 90°.

altitude (*Aero.*). The height in feet or metres above sea-level. For precision, in determining the performance of an aircraft, this must be corrected for the deviation of the meteorological conditions from that of a standardised atmosphere.

altitude (*Surv.*). (1) The angle of elevation of a point above the plane of the horizon.—(2) The height of a point above some datum plane, usually mean sea-level.

altitude level (*Surv.*). A level, fixed to the vernier arm of the vertical circle of a theodolite, which provides a horizontal datum from which altitudes may be measured accurately even if the vertical axis of the instrument is not truly vertical.

altitude valve (*Aero.*). A manually- or automatically-operated valve fitted to the carburettor of an aero-engine for correcting the mixture-strength as it becomes richer with altitude.

alto-cumulus cloud (*Meteor.*). Rounded masses of cloud arranged in groups or lines, occurring at heights between 10,000 and 25,000 ft.

alto-stratus cloud (*Meteor.*). A dense sheet of cloud of a grey or bluish colour, sometimes forming a compact mass of dull-grey colour and fibrous structure; occurs at heights between 10,000 and 25,000 ft.

altom'eter (*Surv.*). Another name for the *theodolite* (q.v.).

altri'ces (*Zool.*) Birds whose young are hatched in a very immature condition, generally blind, naked or with down feathers only, unable to leave the nest, fed by the parents; e.g. the Perching Birds, *Passeriformes*.

altrose (*Chem.*). An aldohexose, a stereoisomer of glucose.

al'udels (*Chem.*). Pear-shaped vessels connected in long rows for the condensation of the mercury vapour liberated from the roasting of cinnabar, i.e. mercury sulphide.

Al'udur (*Elec. Eng.*). An aluminium alloy (containing magnesium) which is used for overhead transmission-line conductors on account of its having a higher tensile strength than aluminium.

al'ula (*Zool.*). In Birds, the bastard wing, a group of small feathers attached to the thumb: in *Diptera*, a free lobe on the posterior margin of the wing near the base.

alums (*Chem.*). A large number of isomorphous compounds whose general formula is:

$$R'_2SO_4{\cdot}R_2'''(SO_4)_3{\cdot}24H_2O; \text{ or,}$$
$$R'R'''(SO_4)_2{\cdot}12H_2O,$$

where R′ represents an atom of a univalent metal or radical—potassium, sodium, ammonium, rubidium, caesium, silver, thallium; and R‴ represents an atom of a tervalent metal—aluminium, iron, chromium, manganese, thallium. See also **pseudo-alums.**

alum leather (*Leather*). Light skins tanned white with alum and salt, or with aluminium salts, flour and yolk of egg; used for gloves and clothing. This process is known as *tawing*.

alum shale (*Geol.*). Occurs in the Upper Lias of Yorkshire, where it has been exploited in the manufacture of alum.

alumstone (*Min.*). See **alunite.**

alu'mina (*Min.*). The trioxide of aluminium, occurring as the mineral corundum. When the compositions of silicate-minerals are stated in terms of the component oxides, alumina is found to be important in such groups as the feldspars, feldspathoids and micas, while augite and hornblende are aluminous, i.e. they contain alumina, probably in solid solution.

alumin'ium or alu'minum (*Met.*). Light ductile metal with high electrical conductivity and good resistance to corrosion. Obtained from bauxite, it has numerous uses and is basis of light alloys. Chem. symbol, Al; at. wt. 26·97; at. no. 13; sp. gr. at 20° C. 2·705; specific electrical resistivity at 20° C., 2·825 microhms per $cm.^3$; mass conductivity 212·9% of standard annealed copper; m.p. 660·2° C.

aluminium (or **aluminum**) **alloys** (*Met.*). A general term for numerous alloys in which aluminium is the basis (i e. predominant) metal; e.g. aluminium-copper and aluminium-silicon alloys, Duralumin, *y*-alloy, etc. Also called LIGHT ALLOYS.

aluminium-anode cell (*Elec. Eng.*). An electrolytic cell with an aluminium anode immersed in an electrolyte which does not attack aluminium. The cathode may also be of aluminium or some other metal, e.g. lead. Such cells are used as rectifiers or as high-capacity low-voltage condensers. See **electrolytic condenser.**

aluminium arrester (*Elec. Eng.*). A lightning arrester made up of a number of aluminium trays containing electrolyte and arranged to form a number of electrolytic cells in series. An insulating layer is formed on each tray under normal voltage conditions, but this punctures and allows current to pass if the voltage exceeds a certain value. Also called ELECTROLYTIC ARRESTER.

aluminium brass (*Met*). Brass to which aluminium has been added, to increase its resistance to corrosion. Used for condenser tubes. Contains 1-6% Al, 24-42% Zn, 55-71% Cu.

aluminium bronze (*Met.*). Copper-aluminium alloys containing 4-11% aluminium. These alloys have high tensile strength (up to 40 tons per sq. in.), are capable of being cast or cold-worked, and are resistant to corrosion.

aluminium-steel cable (*Elec. Eng.*). See **steel-cored aluminium.**

aluminother'mic process (*Chem.*). The reduction of metallic oxides by the use of finely divided aluminium powder. An intimate mixture of the oxide to be reduced and aluminium powder is placed in a refractory crucible; a mixture of aluminium powder and sodium peroxide is placed over this and the mass fired by means of a fuse or magnesium ribbon. The aluminium is almost instantaneously oxidised, at the same time reducing the metallic oxide to metal. See also Supplement.

aluminous cement (*Civ. Eng*). A cement containing 30-50% of lime, 30-50% of alumina, and not more than 30-50% of silica, iron oxide, etc. The aluminous cements are less susceptible than ordinary Portland cements to low temperature during setting, and to the action of seawater and acids; and they possess rapid-hardening qualities which make them specially suitable for certain purposes.

aluminum (*Met.*). See **aluminium.**

Alundum (*Chem.*). Fused bauxite or fused alumina used in the manufacture of abrasive and refractory materials.

al'unite or **alumstone** (*Min.*). A hydrous sulphate of aluminium and potassium, resulting from the alteration of acid igneous rocks by solfataric action; used in the manufacture of alum.

alu'nogen (*Min.*). Hydrous sulphate of aluminium, occurring as a white incrustation or efflorescence formed in two different ways: either by volcanic action; or by the decomposition of pyrite (iron-sulphide) in carbonaceous or alum shales.

alveo'la. See **alveolus.**

alveo'lar, alveo'late (*Bot., Zool.*). Having pits over the surface, and resembling honeycomb.

alveolar layer (*Zool.*). In ciliate *Protozoa*, a layer of ectoplasm composed of minute regular vacuoles lying immediately beneath the pellicle.

alveolar theory (*Zool.*). The theory that protoplasm is composed of bubbles of a more viscid constituent containing the more fluid constituents.

alveolate (*Zool.*). Said of sessile pedicellariae in which the jaws are inserted into an *alveolus*, or depression, in the basal plate.

alveo'lus (*Bot.*). A pit in the surface of a plant member.

alveolus, alveola (*Zool.*). A small pit or depression on the surface of an organ: the cavity of a gland: a small cavity of the lungs: in higher Vertebrates, the tooth-socket in the jaw bone: in *Echinodermata*, part of Aristotle's lantern, one of five pairs of grooved ossicles which grasp the teeth: in *Gastropoda*, the glandular end-portion of the tubules of the digestive gland, secreting digestive ferments: the bubbles of the more viscid constituents of protoplasm, containing the more fluid constituents.

al'veus (*Zool.*) A thin layer of white fibres on the surface of the hippocampus.

alvine (*Med.*). Pertaining to the abdomen or the abdominal contents.

Am (*Chem.*) A symbol for (1) the ammonium radical NH_4— ; (2) the amyl radical C_5H_{11}— .

amal'gam (*Chem.*). The solution of a metal in mercury.—(*Mining*) The pasty amalgam of gold and mercury, about one-third gold by weight, obtained from the plates in a mill treating gold ores.

amalgam retort (or **still**) (*Met.*). The vessel in which the mercury is distilled off from the gold or silver amalgam obtained in amalgamation.

amalgamating table (*Met.*). A sloping wooden table covered with a copper plate on which the mercury is spread in order to amalgamate with the precious-metal particles.

amalgamation pan (*Met.*). A circular cast-iron pan in which gold or silver ore is ground and in which the precious-metal particles are amalgamated with mercury added to the pan.

amalgamation processes (*Met.*). Used in the extraction of gold and silver from their ores. The finely ground ore is carried by a stream of water over the amalgamating table, and the metallic particles are caught by the mercury.

amateur film (*Cinema.*). A motion-picture, generally using sub-standard stock, made by an individual or a group without the view to private profit.

amauro'sis (*Med.*). Blindness due to a lesion of the retina, optic nerve, or optic tracts, or to hysteria.

ama'zia (*Med.*). Non-development of the mammary glands in the female.

amazon (*Textiles*). Dress material manufactured from a fine Botany warp and a Saxony woollen weft.

amazons (*Zool.*). Among Ants (*Formicoidea*), obligatory slavemakers, entirely dependent on the workers of the subjugated species. See also **dulosis.**

amazonstone, amazonite (*Min.*). A green variety of microcline, sometimes cut and polished as a gemstone.

amber (*Min.*). A fossil resin, found on the shores of the Baltic Sea, containing succinic acid in addition to resin acid and volatile oils. Amber is used, *inter alia*, as a base for photographic varnishes. See **succinite.**

amber, pressed (*Min.*). See **ambroid.**

am'bergris, —grēs (*Zool.*) A greyish-white fatty substance with a strong but agreeable odour, obtained from the intestines of diseased sperm whales (*Physeter macrocephalus*); sometimes found floating on the surface of the sea. It is used in perfumery as a fixative; on suitable treatment it yields ambreic acid.

amberoid (*Min.*). See **ambroid.**

am'biens (*Zool.*). In certain Birds, a muscle arising from the pectineal process of the pelvis, and passing along the inner surface of the thigh to the head of the flexor muscle of the second and third toes; its action causes the toes to grasp the perch.

am'bient (*Biol.*). Environmental: surrounding.

ambient temperature (*Elec. Eng.*). A term used in connection with the testing of electrical machinery and apparatus to denote the temperature of the surrounding air.

am'bipar'ous bud (*Bot.*). A bud containing young vegetative leaves and young flowers.

am'bital (*Zool.*). In *Asteroidea*, pertaining to that part of the skeleton consisting of the inter-ambulacral and antambulacral plates: in *Ophiuroidea*, pertaining to the outer skeleton of the arm.

am'bitus (*Zool.*). Margin, outer edge: in *Echinoidea*, the outline of the shell viewed from the apical pole.

ambiva'lence (*Psychol*). The co-existence, in one person, of opposing emotional attitudes (e.g. love and hate) towards the same object.

amblyg'onite (*Min.*). Fluophosphate of aluminium and lithium, a rare white or greenish mineral, crystallising in the triclinic system.

amblyo'pia (*Med.*). Dimness of vision, from the action of noxious agents on the optic nerve or retina, or from hysteria.

ambroid (*Min.*). A synthetic amber formed by heating and compressing pieces of natural amber too small to be of value in themselves. Also known as AMBEROID and PRESSED AMBER.

ambroin (*Diel.*). A moulded insulating material prepared from copal and silicates.

ambrosia (*Zool.*). Certain Fungi which are cultivated for food by some Beetles (members of the family *Scolytidae*, Ambrosia Beetles): the pollen of flowers collected by social Bees and used in the feeding of the larvae.

ambrotype (*Photog.*). The use of a negative on glass, backed with black varnish, so that by reflected light it appears to be a positive. See **alabastrine process.**

ambula'cra (*Zool.*). In *Echinodermata*, the radial bands of locomotor tube-feet.—*adj.* **ambula'cral.**

ambulacra'lia (*Zool.*). In *Echinodermata*, the plates of the ambulacral skeleton, through which the locomotor tube-feet protrude.

ambulator (*Surv.*). See **perambulator.**

ambula'tory (*Zool.*). Having the power of walking. used for walking.

a'meio'sis (*Cyt.*). Non-pairing of the chromosomes in synapsis.

amelification (*Zool.*). The formation of enamel.

amel'oblast (*Zool.*). A columnar cell forming one of a layer immediately covering the surface of the dentine, and secreting the enamel prisms in the teeth of higher *Vertebrata.*

amenorrhoe'a, amenorrhe'a (*Med.*). Absence or suppression of menstruation.

a'ment (*Med.*). One suffering from *amentia*; a mentally deficient person.

amenta'ceous (*Bot.*). Bearing catkins.

amentia (*Med.*). Mental deficiency: failure of the mind to develop normally, whether due to inborn defect or to injury or disease.

amen'tiform (*Bot.*). Catkin-like.

amentum (*Bot.*). A *catkin* (q.v.).

American bond (*Masonry*). A form of bond in which every fifth or sixth course consists of headers, the other courses being stretchers. Very much used because it can be quickly laid.

American caisson (*Civ. Eng.*). See **stranded caisson.**

American cloth, American leather. See **enamelled cloth.**

American cotton (*Textiles*). Cotton from the U.S.A. It forms the bulk of the world's supply of medium quality material.

American standard wire gauge. See **Brown and Sharpe wire gauge.**

American transit (*Surv.*). A form of transit theodolite much used in America; it differs in certain details from the British model.

American water turbine (*Eng.*). See **mixed-flow water turbine.**

ameristic (*Bot.*). Unable to develop completely, owing to poor nourishment.

ametabol'ic (*Zool.*). (Of *Insecta*) having no obvious metamorphosis.

amethyst (*Min.*). A mauve-coloured form of quartz, used as a semi-precious gemstone.—ORIENTAL AMETHYST, a rare form of crystalline corundum, having the colour of amethyst, but the composition of sapphire.

amian'thus (*Min.*). A fine, silky variety of asbestos.

ami'cron (*Chem.*). A particle whose diameter is less than 5×10^{-7} cm., i.e. than one two-millionth of a centimetre; it is invisible under the ultra-microscope.

am'ides (*Chem.*). A group of compounds in which the hydroxyl of the carboxyl group of acids has been replaced by the amido group $-NH_2$. They may be regarded as ammonia derivatives in which the hydrogen has been replaced by an acyl group. In primary amides one, in secondary amides two, and in tertiary amides three, hydrogens have been replaced by acyl groups.

amide plant (*Bot.*). A plant which forms asparagine or glutamine from amino acids.

am'idines (*Chem*). Compounds derived from amides $R{\cdot}CO{\cdot}NH_2$, $R{\cdot}CO{\cdot}NHR'$, and $R\,CO{\cdot}NR'_2$, in which the oxygen has been replaced by the bivalent imido residue NH or NR. The amidines are crystalline bases forming stable salts, but readily hydrolysed.

ami'do group (*Chem.*). The $-NH_2$ group when replacing the hydroxyl in a carboxyl group.

ami'dogen (*Chem.*). A synonym for the amino group $-NH_2$.

am'idol (*Chem.*). Trade name for 1, 2, 4-diaminophenol, used in photography as a developer.

am'ines (*Chem.*). Organic derivatives of ammonia NH_3 in which one or more hydrogen atoms are replaced by organic radicals. According to the extent of substitution, amines are classified as primary amines or amino-bases, secondary amines or imino-bases, tertiary amines or nitrile-bases.

am'ino acids (*Chem.*). A group of fatty acids in which a hydrogen atom of the hydrocarbon radical is exchanged for the amino group.

aminoace'tic acid (*Chem*). NH_2CH_2COOH (glycocoll, glycine), m.p. 230° C., colourless crystals, sweet flavour, soluble in water, slightly soluble in alcohol; used in photography, pharmacy, varnish-making.

amino-aldehydic resins (*Plastics*). See **urea resins.**

amino-benzene-sulphonic acid (*Chem.*). A synonym for *sulphanilic acid* (q.v.).

amito'sis, amitot'ic division (*Cyt.*). Direct division of the nucleus by constriction, without the formation of a spindle and chromosomes; direct nuclear division. Cf. *mitosis, meiosis.*

am'meter (*Elec. Eng.*). An indicating instrument for measuring the current in an electric circuit.

ammeter shunt (*Elec. Eng.*). A shunt placed in parallel with an ammeter, thereby increasing its range.

am'mines (*Chem.*). Name for complex inorganic compounds which result from the addition of one or more ammonia molecules to a molecule of a salt or similar compound.

am'modyte (*Bot.*). A plant living in sandy places.

ammo'nia (*Chem.*). NH_3. A colourless, pungent gas, b.p. −33·5° C., extremely soluble in water and very soluble in alcohol. Formed by bacterial decomposition of protein, purines, and urea. Obtained on a large scale from nitrogen obtained from the atmosphere and from the ammoniacal liquor in gas manufacture. Forms salts with most acids, and nitrides with metals. The liquefied gas is used in ice-making plant.

ammonia alum (*Chem.*). See **alums.**

ammonia plant (*Bot.*). A plant which forms ammonia and organic acids from amino acids.

ammonia-soda process (*Chem.*). See **Solvay's ammonia-soda process.**

ammonisation (*Bacteriol., Bot.*). The conversion of complex organic compounds (e.g. albuminoids) into ammonium salts by the action of bacteria, being the first stage in nitrification in the soil.

am'monite (*Geol.*). An extinct fossil cephalopod found in rocks of Mesozoic age particularly characteristic of the Lias. Frequently coiled in a plane, or nearly plane, spiral.

ammo'nium (*Chem.*). The radical NH_4, which behaves in numerous respects like an atom of a monovalent alkali metal.

ammonium chloride (*Chem.*). See **sal ammoniac.**

ammonium hydroxide (*Chem.*) NH_4OH. A solution of ammonia in water.

ammonol'ysis (*Chem.*). Lyolysis in liquid ammonia solution.

ammono-system (*Chem.*). An ionic system in liquid ammonia.

amne'sia (*Med.*). Loss of memory. Common in dissociation states of hysteria. In a concussed patient *retrograde amnesia* is loss of memory of events immediately preceding the concussion.

am'nion (*Zool.*). In *Nemertinea*, the outer walls of the coalesced amniotic invaginations: in *Insecta*, the inner cell-envelope covering and arising from the edge of the germ-band: in higher *Vertebrata*, one of the embryonic membranes, the inner fold of blastoderm covering the embryo, formed of ectoderm internally and somatic mesoderm externally: in *Echinodermata*, the roof of the amniotic invagination.

Amnio'ta (*Zool.*). Those higher Vertebrates which possess an amnion during development—i.e. *Reptilia*, *Aves*, and *Mammalia*.—*adj.* **am'niote.**

amniot'ic cavity (*Zool.*). In *Amniota*, the space between the embryo and the amnion.

amniotic fluid (*Zool.*). The liquid filling the amniotic cavity.

amniotic folds (*Zool.*). Protrusions round the periphery of the blastoderm which will give rise to the amnion and the chorion.

amniotic invagination (*Zool.*). In the pilidium larva of *Nemertinea*, four ciliated invaginations of ectoderm on the flattened surface: in *Echinoplutei*, an invagination of ectoderm between the postero-dorsal and postoral arms, just above the left hydrocoele.

amniotic isthmus (*Zool.*). See **sero-amniotic connexion.**

amoe'ba (*Zool.*). A form of primitive *Protozoon*, of indeterminate shape, which moves by the protrusion of blunt, thick pseudopodia.

Amoe'bina (*Zool.*). An order of *Sarcodina* the members of which extrude lobose pseudopodia and generally lack a skeleton, or have only a simple shell; their ectoplasm is never vacuolated. Also called LOBOSA.

amoe'bocyte (*Zool.*). A metazoon cell having some of the characteristics of an amoeba, especially as regards form and locomotion: in *Porifera*, a wandering cell of varied function: in *Echinodermata*, a wandering coelomic cell of excretory function: a leucocyte.

amoe'boid (*Bot., Zool.*). Resembling an amoeba—having no fixed form, creeping, and putting out pseudopodia.

amoe'bula (*Zool.*). In *Protozoa*, an amoeboid swarm-spore moving by pseudopodia.

amor'phous (*Crystal.*). Non-crystalline.

amorphous metal (*Met.*). Metal in which the regular arrangement of atoms characteristic of the crystalline state has been destroyed. It has been shown to be produced on the surface by polishing, but does not exist at crystal boundaries nor on slip planes.

amorphous sulphur (*Chem.*). Formed when sulphur vapour is cooled quickly. If the product so formed is treated with carbon disulphide and filtered, the amorphous sulphur is left on the filter as a white substance.

amortisseur, a-mor-tis-sėr' (*Elec. Eng.*). See **damper.**

A'mosite (*Min.*). A monoclinic amphibole form of asbestos, the name embodying the initials of the company exploiting this material in the Transvaal, viz. the 'Asbestos Mines of South Africa.'

amp (*Elec. Eng.*). Abbrev. for *ampere.*

amperage (*Elec. Eng.*). A term sometimes used to denote, in amperes, the current flowing in a circuit.

ampere (*Elec. Eng.*). The most frequently used unit of current, named after the French physicist Ampère; commonly abbreviated to **amp.** See **international ampere, absolute ampere.**

ampere-balance (*Elec. Eng.*). A laboratory instrument for measuring current; in it the force between two coils carrying the current to be measured is balanced by the force of gravity on a weight sliding along a beam. Also called KELVIN BALANCE.

ampere-conductors (*Elec. Eng.*). A unit of magnetomotive force occasionally used by machine designers; it is the product of the number of conductors in a slot or on a pole by the current in each. Also called AMPERE-WIRES.

ampere-hour (*Elec. Eng.*) A practical unit of quantity of electricity; it is the quantity represented by a flow of 1 ampere for a period of 1 hour (or an equivalent quantity, e.g. 2 amperes for ½ hour). Cf. *coulomb.*

ampere-hour capacity (*Elec. Eng.*). The capacity of an accumulator battery measured in ampere-hours; it is usually specified at a certain definite rate of discharge.

ampere-hour efficiency (*Elec. Eng.*). A term used in connexion with accumulators to express the ratio of the ampere-hours output during discharge to the ampere-hours input during charge.

ampere-hour meter (*Elec. Eng.*). A meter which records the ampere-hours flowing in a circuit. If the voltage is assumed constant the meter can be calibrated in kilowatt hours: this is frequently done when measuring energy in d.c. supplies. Commonly abbreviated to **a.h.m.**

ampere-meter (*Elec. Eng.*). An obsolescent term for an *ammeter.*

ampere-turn (*Elec. Eng.*). A unit of magnetomotive force. The m.m.f., in ampere-turns, of a coil or winding is equal to the number of turns in the coil multiplied by the current flowing in each of them.

ampere-wires (*Elec. Eng.*). See **ampere-conductors.**

Ampère's rule (*Elec. Eng.*). A simple rule for remembering the direction of the magnetic field due to a current. If a man is imagined to be swimming with the current and is facing a magnet needle, the north-seeking pole of the magnet will be deflected towards his left hand.

Ampère's table (*Elec. Eng.*). An old-fashioned piece of apparatus used for demonstrating the effect of a current on a pivoted magnet.

Ampère's theory of magnetisation (*Elec. Eng.*). A theory based on the assumption that the magnetic property of a magnet is due to currents circulating in the molecules of the magnet.

am'persand (*Typog.*). The sign &, a combination of the letters *e t* (Latin *et*, and). Usually used in names of companies: Smith & Co. The word *ampersand* is a corruption of the phrase *and per se and*=and by itself makes and.

am'phi (Greek *amphi*, on both sides, around). A prefix used in the construction of compound terms; e.g. *amphitriaene*, a double triaene.

amphi- (*Chem.*). Containing a condensed double aromatic nucleus substituted in the 2.6 positions.

am'phiarthro'sis (*Zool.*). A slightly movable articulation.

amphias'ter (*Cyt.*). During cell-division by meiosis or mitosis, the two asters and the spindle connecting them.

amphias'tral figure (*Cyt.*). The achromatic figure with asters.

amphib'ian (*Aero.*). A heavier-than-air craft, such as a float seaplane or flying-boat, provided with a retractable undercarriage, so that the aircraft can rise from and alight on either land or water.

amphib'ious (*Zool.*). Adapted for life on land or in the water: resembling or pertaining to *Amphibia.*

amphiblas'tic (*Zool.*). (Of ova) showing complete but unequal segmentation.

amphiblas'tula (*Zool.*). In *Porifera*, a larval form with an anterior flagellate zone, a posterior non-flagellate zone, and a central cavity partially occluded by archaeocytes.

am'phiboles, —bōlz (*Min.*). An important group of dark-coloured, rock-forming silicates, including hornblende, the commonest.

amphibol'ic (*Zool.*). Capable of being turned backwards or forwards, as the fourth toe of Owls.

amphib'olite (*Geol.*). A crystalline, coarse-grained rock, containing amphibole as an essential constituent, together with feldspar and frequently garnet; like hornblende-schist, formed by regional metamorphism of basic igneous rocks, but not foliated.

amphicar'pic (*Bot.*). Having two kinds of fruits.

amphicli'nous progeny, amphiclinous hybrids (*Bot.*). A family, resulting from a cross, in which some of the hybrids resemble one parent and some the other parent.

amphicoelous, —sē'lus (*Zool.*). Having both ends concave, as in certain types of vertebral centrum.

amphicondyl'ous, amphicondyl'ar (*Zool.*). Having two occipital condyles.

amphicri'bal bundle (*Bot.*). A vascular bundle in which a central strand of xylem is surrounded by phloem.

amphidip'loid hybrid (*Gen.*). A hybrid which is tetraploid, and contains a diploid chromosome set derived from each of its parents.

am'phidisc (*Zool.*). In *Porifera*, a form of spicule consisting of a rod bearing at its distal extremities disc-like expansions curved towards the centre and prolonged into tooth-like protuberances; occurs especially in the gemmules of fresh-water Sponges.

amphigas'trium (*Bot.*). One of the members of the ventral row of small leaves present in some liverworts.

amphige'nous (*Bot.*). Growing all round; as when a parasitic fungus grows on both sides of a leaf.

amphig'ony (*Zool.*). Reproduction by fertilisation. Cf. *parthenogenesis.*

amphikar'yon (*Cyt.*). A nucleus with two haploid sets of chromosomes, as after normal fertilisation: an amphinucleus.—*adj.* **amphikaryot'ic.**

amphilep'sis (*Gen.*). Inheritance such that the offspring has characters derived from both parents.

amphimix'is (*Bot.*). The fusion of two distinct gametes to form a new individual.—(*Zool.*) The mingling of different hereditary tendencies in the same individual, brought about by the union of male and female pronuclei in fertilisation.

Amphineu'ra (*Zool.*). A class of bilaterally symmetrical *Mollusca* in which the foot, if present, is broad and flat, the mantle is undivided, and the shell is absent or composed of eight valves. Coat-of-Mail Shells, etc.

am'phinucleo'lus (*Zool.*). A nucleolus comprising both oxyphil and basiphil components.

amphinu'cleus (*Zool.*). A nucleus with a large karyosome; in the theory of binuclearity, representing the kinetic nucleus encapsuled by the trophic nucleus.

am'phiont (*Zool.*). See **zygote.**

amphiphlo'ic solenostele (*Bot.*). A tubular stele with a cylinder of xylem coated externally and internally by phloem.

amphiplat'yan (*Zool.*). Having both ends flat, as in certain types of vertebral centrum.

amphipneustic, —pnū'stik (*Zool.*). Possessing both gills and lungs: in dipterous larvae, having the prothoracic and posterior abdominal spiracles only functional.

Amphip'oda (*Zool.*). An order of *Peracarida* in which the carapace is absent, the eyes are sessile, and the uropods styliform; the body is compressed. They show great variety of habitat, being found on the shore, in the surface waters of the sea, in fresh water, and in the soil of tropical forests, while some are parasitic. Whale Lice, Sandhoppers, Skeleton Shrimps, etc.

amphip'odous (*Zool.*). Having both ambulatory and natatory appendages.

amphipro'tic (*Chem.*). Having both protophilic and protogenic properties.

amphirhi'nal (*Zool.*). Having two external nares.

am'phispore (*Bot.*). A thick-walled uredospore produced under dry conditions by some *Uredinales.*

amphis'tomous (*Zool.*). Having a sucker at each end of the body; as Leeches.

amphis'tyly (*Zool.*). A type of jaw suspension found in the *Heterodontidae* or Bull-headed Sharks, in which the upper jaw fits into a groove in the cranium anteriorly but is still suspended posteriorly by the hyomandibular cartilage.—*adj.* **amphistylic.**

am'phitene (*Cyt.*). The stage of meiosis in which the spireme threads are uniting in pairs.

amphitheatre (*Build.*). An oval or circular building in which the spectators' seats surround the arena or open space in which the spectacle is presented, the seats rising away from the arena.

amphito'ky (*Zool.*). Parthenogenetic reproduction by both males and females.—*adj.* **amphito'kic.**

amphitrich'ous (*Bot., Zool.*). Having a flagellum at each end of the cell.

amphitro'cha (*Zool.*). In marine *Annelida*, a free-swimming pelagic larval type, having two bands of cilia.

am'phitype (*Photog.*). A slow photographic process, originated by Herschel, in which iron, mercury, or lead compounds are impregnated into paper, which is subsequently bleached and reversed with a hot iron.

amphiva'sal bundle (*Bot.*). A vascular bundle in which a central strand of phloem is surrounded by xylem.

am'pholyte (*Chem.*). An amphoteric electrolyte.

am'pholytoid (*Chem.*). An amphoteric colloid.

amphor'ic (*Med.*). Like the sound made by blowing across a narrow-necked vase.

amphoric breathing (*Med.*). Breathing having an amphoric quality; characteristic of an air-containing cavity in the chest.

amphoter'ic (*Chem.*). Having both acidic and basic properties.

amplex'icaul (*Bot.*). Said of a sessile leaf with its base clasping the stem horizontally.

amplexus (*Zool.*). See **copulation.**

am'pliate (*Zool.*). (Of Insects) having the outer edge of the wing prominent.

amplification, contrast (*Acous.*). See **contrast amplification.**

amplification factor (*Thermionics*). The number of volts by which the potential of the anode of a thermionic tube must be changed to counteract the effect upon the anode current of a change in the grid potential of one volt. Strictly termed *voltage amplification factor*. Usually designated by the symbol μ.

amplified A.V.C. (*Radio*). A system of automatic gain control in which the biasing voltage for the variable gain stages is derived from a d.c. amplifier, controlled by the rectified output voltage from the final demodulator.

amplifier (*Elec. Comm.*). Generally an arrangement of thermionic valves for increasing, in a specified manner with respect to frequency, the power-level of the electric currents in a communication channel.

See **A-—**
B-—
C-—
audio-frequency—
Black—
bridging—
broadcasting—
buffer—
bullet—
class-A—
class-AB—
class-B—
class-C—
condenser-transmitter—
d.c.—
degenerative—
gain—
intermediate frequency—
line—
loaded push-pull—
low-frequency—
low-loading—
microphone—
monitoring—
paraphase—
P.E.C.—
power—
pre-—
push-pull—
quiescent push-pull—
radio-frequency—
recording—
television—
trap—
wide-band—

amplifier (*Photog.*). An additional or supplementary lens for altering the focal-length of a lens in a camera.

amplitude (*Phys., etc.*). The maximum value of a periodically varying quantity during a cycle; e.g. the maximum displacement from its position of rest of a vibrating particle, or the maximum value of an alternating current (see **peak value**). See also **double amplitude.**

amplitude, modulus, or tensor (*Elec. Eng.*). The magnitude of a vector, as contrasted with its *argument*, which defines its direction with reference to some standard direction.

amplitude distortion (*Elec. Comm.*). Distortion of wave-form arising from the non-linear static or dynamic response of a part of a communication system, the output amplitude of the signal at any instant not having a constant proportionality with the corresponding input signal.

amplitude factor (*Elec. Eng.*). See **peak factor.**

amplitude filter (*Television*). The valve circuit in a television receiver which separates the synchronising impulses from the video-signal, the impulses being below the datum black-level in the signal, and the video-signal above the black-level in positive modulation.

amplitude modulation (*Radio*). The system of modulation in which the amplitude of the transmitted carrier-wave is varied in accordance with the impressed signal, the frequency and phase remaining unchanged.

ampoule, ampulla (*Med.*). A small, sealed, glass capsule for holding measured quantities of vaccines, drugs, serums, etc., ready for use.

ampoule tubing (*Glass*). Tubing of special composition suited to the manufacture of ampoules. It must work well in the blowpipe flame, and must resist the action of the materials stored in the ampoule.

ampul'la (*Med.*). See **ampoule.**

ampulla (*Zool*). Any small membranous vesicle: in Vertebrates, the dilation housing the sensory epithelium at one end of a semicircular canal of the ear: in *Mammalia*, part of a dilated tubule in the mammary gland: in Fish, the terminal vesicle of a neuromast organ: in *Echinodermata*, the internal expansion of a tube-foot, the expansion of the axial sinus below the madreporite: in *Hydrocorallinae*, a pit of the skeleton lodging a medusoid: in *Ctenophora*, one of a pair of small sacs forming part of the aboral sense-organ.—*adj.* **am'pullary.**

ampulla'ceal, ampulla'ceous (*Bot., Zool.*). Flask-shaped; e.g. the *ampullaceal* silk glands of certain Spiders, which are connected with the anterior spinnerets and produce long threads.

ampullaceal sensillae (*Zool.*). In Insects, sensory organs consisting of a narrow canal swollen at the extremity into an ampulla which encloses a hair-like process.

amy'elinate (*Zool.*). (Of nerve-fibres) non-medullated, lacking a myelin sheath.

amyg'dala (*Zool.*). A lobe of the cerebellum: one of the palatal tonsils.

amyg'dale, amyg'dule (*Geol.*). An almond-shaped infilling (by secondary minerals such as agate, zeolites, calcite, etc.) of elongated steam cavities in igneous rocks.

amyg'dalin (*Chem.*). $C_{20}H_{27}O_{11}N$, colourless prisms, m.p. 200° C., a glucoside found in bitter almonds, in peach and cherry kernels.

amyg'daloid (*Bot.*). Almond-like.

amygdaloid (*Geol.*). An obsolete term connoting an amygdaloidal basalt.

am'yl group (*Chem.*). The monovalent aliphatic radical $C_5H_{11}-$.

amyl acetate (*Chem.*). $CH_3{\cdot}CO{\cdot}O{\cdot}C_5H_{11}$, colourless liquid, of ethereal pear-like odour, b.p. 138° C. *iso*Amyl acetate is also known under the name of *pear oil*. It is used for fruit essences and is an important solvent for nitrocellulose. Used as a standard light in photometry when burnt in a special lamp.

amyl alcohol (*Chem.*). $C_5H_{11}OH$, the fraction of fusel oil that distils about 131° C. There are 8 isomers possible and known, viz. four primary, three secondary, one tertiary amyl alcohol. The important isomers are:—

*iso*amyl alcohol,
d-amyl alcohol,
tertiary amyl alcohol (amylene hydrate).

amyl nitrite (*Chem.*). $C_5H_{11}{\cdot}O{\cdot}NO$, the nitrous acid ester of *iso*amyl alcohol, a yellowish liquid, b.p. 98° C., of pleasant odour. Intermediate for the preparation of nitroso- and of diazo-compounds. Also used in medicine (*amylis nitris*).

amyla'ceous (*Bot.*). Starchy.

am'ylases (*Chem.*). Enzymes capable of hydrolysing starch and similar substances.

am'ylene (*Chem.*). A synonym for pentene, C_5H_{10}, a higher olefine homologue. Four isomers are known, all low-boiling liquids.

amylene hydrate (*Chem.*). A synonym for *tertiary* amyl alcohol.

am'ylo fermentation process (*Chem.*). The use of certain moulds secreting diastase and fermentation enzymes for obtaining alcohol from starchy materials without the use of malt.

amyloclast'ic (*Bot.*). Able to break down starch.

amylogen'esis (*Bot.*). The building of starch inside the cell of a plant.

am'yloid (*Chem.*). A starch-like cellulose compound, produced by treatment of cellulose with concentrated sulphuric acid for a short period.

amyloid (*Path.*). A waxy substance formed in the body in certain diseases and composed of a protein and chondroitin sulphuric acid, which is a normal constituent of cartilage.

amyloid bodies (*Zool.*). In *Mammalia*, starch-like concretions found in the alveoli of the prostate gland of the adult.

amyloid degeneration (*Med.*). The formation of amyloid in the small arteries, capillaries, and tissues of the body, as a result of chronic infection.

amylolyt'ic (*Zool.*). Starch-digesting.

amylop'sin (*Chem.*, *Zool.*). An enzyme, produced by intestinal glands, which induces complete hydrolysis of starchy matter in the intestinal tract.

am'yloses (*Chem.*, *etc.*). Depolymerisation products of starch, crystalline substances of the sugar series. In *Botany*, amylose is a general term for starch, inulin, and related carbohydrates.

am'ylostat'olith (*Bot.*). A starch grain which acts as a statolith.

am'ylum (*Chem.*). A synonym for ***starch***.

amyot'rophy (*Med.*). Wasting or atrophy of muscle.

amyotroph'ic lateral sclerosis (*Med.*). A nervous disease in which atrophy of muscle follows degenerative changes in the motor cells of the spinal cord and brain.

an- (Greek *an*, not). A prefix used in the construction of compound terms; e.g. *anaxial*, without a distinct axis.

An (*Chem.*). The symbol for *actinon*.

ana- (Greek *ana*, up, anew). A prefix used in the construction of compound terms; e.g. *anakinetic*, restoring energy.

ana- (*Chem.*). Containing a condensed double aromatic nucleus substituted in the 1.5 positions.

anabat'ic (*Meteor.*). A term applied to winds caused by the upward convection of heated air.

anabi'on (*Biol.*). An organism in which anabolic processes predominate over katabolic processes; e.g. plants.

anabio'sis (*Zool.*). The power of returning to life after apparent death, as in certain *Tardigrada*.

anab'olism (*Biol.*). The chemical changes proceeding in living organisms with the formation of complex substances from simpler ones, together with the storage of chemical energy.

Anacan'thii (*Zool.*). An order of *Neopterygii* with flexible jointed finrays; the true caudal fin is absent or reduced, while the pelvic fins are placed far forward on the body; the duct connecting the air-bladder and the gullet is lacking. Cod, Whiting, Hake, Haddock, Ling, Pollack, Burbot, Grenadiers.

anacromyoi'dean (*Zool.*). Having the syringeal muscles attached to the dorsal ends of the bronchial cartilages.

anad'romous (*Zool.*). Having the habit of migrating from more dense to less dense water to breed, generally from oceanic to coastal waters, or from salt water to fresh water; as the Salmon.

anae'mia, ane'mia (*Med.*). Diminution of the amount of haemoglobin in the blood, from lowering of the quantity or the quality of the red blood cells.

anaemia, infectious (*Vet.*). A septicaemia of horses due to a filterable virus.

anae'robe, anaerobi'ont (*Biol.*). Names applied to an organism for whose life processes a complete or (in some cases) nearly complete absence of oxygen is essential. Facultative anaerobes can utilise free oxygen; obligate anaerobes are poisoned by it.—*adjs.* **anaerobic, anaerobiotic.**

anaero'bic decomposition (*Bot.*). The incomplete breakdown of organic material by bacteria in the absence of free oxygen.

anaerobic respiration (*Biol.*). A form of respiration in which the organism obtains its energy by reactions in which elementary oxygen is not directly involved, and carbon dioxide, together with such products as ethyl alcohol (in yeasts) or valerianic acid (in intestinal worms), is formed.

anaerobio'sis (*Bot.*, *Zool.*, *etc.*). Existence in the absence of oxygen.

anaesthe'sia, anesthe'sia (*Med.*). Loss of sensibility to touch (loosely, also to pain and temperature): the science and art of administering anaesthetics.

anaesthet'ic, anesthet'ic (*Med.*). Insensible to touch (loosely, also to pain and temperature): a drug which produces insensibility to touch, pain, and temperature, with or without loss of consciousness.—*v.* **anaes'thetise, anes'thetise.** To make anaesthetic.—*n.* **anaesthetist.** One skilled in the administration of an anaesthetic drug.

an'aglyph (*Photog.*). The use of two images of two colours, red and green, viewed with red and green spectacles (one for each eye) to obtain an approximation to stereoscopy. Used for both still and motion pictures.

anakinet'ic (*Biol.*). Leading to the restoration of energy and the formation of reactive, energy-rich substances.

anakinet'omeres (*Biol.*). Reactive, energy-rich molecules.

a'nal (*Zool.*). See **anus.**

anal cerci, —ser'si (*Zool.*). In *Insecta*, appendages of one of the posterior abdominal somites, generally the eleventh, retained throughout life.

anal cone (*Zool.*). In larvae of entoproct *Polyzoa*, a projection of the ventral surface carrying the proctodaeum.

anal-erotic individual (*Psycho-an.*). A person who is still at a pre-genital stage of development, in which physical gratification is aroused and satisfied by stimulation of the anus. The term is used in a general way to denote certain characteristics common to the anal phase of development, e.g. obstinacy, parsimony, meanness, and also tidiness, excess of which is seen specially in *obsessional neurosis* (q.v.).

anal field (*Zool.*). In Echinoderm and Tornaria larvae, an area surrounded by the posterior loop of the longitudinal ciliated band.

anal-gland disease (*Vet.*). Inflammation of the sebaceous gland on each lateral wall of the interior of the anus of dogs.

anal loop (*Zool.*). In Echinoderm and Tornaria larvae, the posterior loop of the longitudinal ciliated band.

anal papilla (*Zool.*). In Cephalopod larvae and adult Crinoidea, a small papilla at the apex of which the anus is developed.

anal-sadistic (*Psycho-an.*). Characteristic of destructiveness and aggression, common to the early anal phase of development.

anal suture (*Zool.*). In the posterior wings of some Insects, a line of folding, separating a posterior anal area of the wing from the main area.

anal'cime, anal'cite (*Min.*). An important hydrated silicate of aluminium and sodium, closely related to albite but containing less silica.

analep'tic (*Med.*). Having restorative or strengthening properties: a drug or medicine that strengthens.

analge'sia (*Med.*). Loss of sensibility to pain.—*adj.* **analge'sic.** Insensible to pain: alleviating pain: a drug which relieves pain.

anallat'ic lens (*Surv.*). The special lens which, when correctly placed between the object glass and the eye-piece lens of a tacheometric telescope, optically reduces the additive constant for the tacheometer to zero.

analiatic telescope (*Surv.*). A telescope which, when used for tacheometric purposes, has a zero additive constant.

anallatism, centre of (*Surv.*). In a distance-measuring telescope, the point from which the distance to an observed staff is proportional to the staff intercept as seen between the upper and lower stadia lines of the diaphragm.

analogous organs (*Bot.*). Organs which are similar in appearance or function, but are not equivalent morphologically.

analogy (*Bot.*, *Zool.*). Likeness in function but not in origin—e g. tendrils, which may be modified leaves, branches, inflorescences; the wings of Birds and of Insects.—*adj.* **analogous**

analyser (*Chem.*). The second Nicol prism in a polarimeter.

analyses (*Chem.*). The expression of the results obtained by chemical analysis. See **chemical analysis.**

analysis (*Struct.*). The process of reducing a problem to its primary parts, e g. the finding of the forces and moments in the members of a loaded structure, either mathematically or experimentally.

analysis, chemical (*Chem.*). See **chemical analysis.**

analysis meter (*Auto. Teleph*) A registering meter used to determine the loading of groups of circuits with calls, particularly for determining the correctness or otherwise of grading.

analyst (*Chem.*). See **analytical chemist.**

analytical chemist (*Chem.*). A person who carries out the process of analysis by chemical methods. See **chemical analysis.**

analytical psychology. The school of psychology founded by Jung of Zurich. It deviates from the Freudian school mainly in the method of dream interpretation, the theory of the causation of a neurosis in the present situation instead of the past, by the use of the term *libido* for all instinctual life, not exclusively sexual, by the postulation of a racial or collective unconscious in addition to a personal unconscious, and by an emphasis on spiritual values and a human soul or psyche.

analytical reactions (*Chem.*). The forming of two or more different substances from one substance; e.g. mercuric oxide decomposes into mercury and oxygen.

analytical reagent (*Chem.*). See **A.R.**

anamne'sis (*Med.*). The recollection of past things: the past history of all matters relating to a patient's health.

anamniot'ic (*Zool.*). Lacking an amnion during development.—*adj.* **anam'niote.**

anamor'pha (*Zool.*). Larvae which do not possess the full number of segments at the time of hatching.

anamor'phoscope (*Photog.*). A camera or viewing apparatus in which the image is registered as radial slits in unnatural order on a rotating disc.

anamor'phote lens (*Photog.*). A lens containing a cylindrical lens for special distorting effects.

anan'gian (*Zool.*). Lacking a vascular system.

anaphase (*Cyt.*). The stage in mitotic or meiotic nuclear division when the chromosomes or half-chromosomes move away from the equatorial plate: more rarely, all stages of mitosis leading up to the formation of the chromosomes.

anaphore'sis (*Chem.*). The migration of suspended particles towards the anode under the influence of an electric field.

anaphylac'tic (*Med.*). Being in a state of anaphylaxis: pertaining to anaphylaxis.

anaphylactic shock (*Med.*). The immediate reaction which takes place in the smooth muscle of the body after the injection of a protein to which a person is anaphylactic.

anaphylax'is (*Med.*). Specific supersensitiveness of the smooth or involuntary muscles of the body to a protein previously introduced into it.

anapla'sia (*Med.*, *Path.*). Loss of the distinctive character of a cell associated with proliferative activity; as in cancer.

anaplasmo'sis (*Vet*). A febrile infection of the red blood corpuscles of cattle due to protozoa of the genus *Anaplasma.*

anapoph'ysis (*Zool.*). In higher Vertebrates, a small process just below the postzygapophysis which strengthens the articulation of the lumbar vertebrae.

anap'sid (*Zool.*). Having the skull completely roofed over, i.e. having no dorsal foramina other than the nares, the orbits, and the parietal foramen.

anar'throus (*Zool.*). Without distinct joints.

anasar'ca (*Med.*). Excessive accumulation of fluid (dropsy) in the skin and subcutaneous tissues.

anaschis'tic (*Cyt.*). In meiosis, said of tetrads which divide twice longitudinally.

Anaspida'cea (*Zool.*). The only order of the division *Syncarida*, possessing the characteristics of the division; many fossil forms are known, but there are only some half-dozen living species, occurring in rocky pools of Tasmanian mountain-streams, and in wells and cave waters in various parts of Europe and the Malay Peninsula. Mountain Shrimps.

anastomo'sis (*Bot.*). Communication by cross-connexions to form a network.—(*Med.*) A communication between two blood-vessels: an artificial communication, made by operation, between any two parts of the alimentary canal.—(*Zool.*) The formation of a meshwork of blood-vessels or nerves: the union of blood-vessels or nerves arising by the splitting of a common trunk.

anas'tral (*Cyt.*). Without asters; said of a type of mitosis.

an'atase (*Min.*). One of the three naturally occurring forms of crystalline titanium dioxide, of tabular or bipyramidal habit. See also **octahedrite.**

anatomy (*Bot.*, *Zool.*, *etc.*). (1) The study of the form and structure of animals and plants; it includes the study of minute structures, and thus includes *histology.*—(2) Dissection of an organised body in order to display its physical structure and economy. The technical term for animal anatomy is *zootomy*; for vegetable anatomy, *phytotomy*; for human anatomy, *anthropotomy.*

anatox'in (*Bacteriol.*). The toxin of diphtheria detoxicated by formalin or by heat.

anatro'pous (*Bot.*). Said of an ovule in which the body is curved so that the micropyle lies close to the insertion of the funicle.

anax'ial (*Zool.*). Asymmetrical.

anchor (*Elec. Eng.*). See **anchor clamp, anchor tower, conductor-rail anchor.**

anchor (*Ships*). A heavy metal implement consisting of a shank carrying two arms at one end, and, in ordinary anchors, a stock at the other end. Used for holding a ship to the bottom by means of a connecting cable.

See **bower—** **sheet—**
kedge— **stockless—**
sea— **stream—**

anchor (*Zool.*). A type of spicule found in the integument of Holothurians.

anchor and collar (*Civ. Eng.*). A type of hinge used to support lock-gates, consisting of an *anchor* built into the masonry coping, with a *collar* attached like a clevis to the anchor, the collar forming a socket into which fits the pintle of the heel-post of the gate.

anchor bolt (*Build.*). A bolt used to secure frameworks, stanchion bases, etc. to piers or foundations, and having usually a large plate washer built into the latter as anchorage.

anchor clamp (*Elec. Eng.*). A fitting which attaches the conductor of an overhead-transmission line to a strain insulator or support.

anchor ear (*Elec. Eng.*). A fitting attached to the overhead contact wire of a tramway or railway to support the wire, and also to take the longitudinal tension and prevent movement of the wire in a direction parallel to the track.

anchor escapement (*Horol.*). See **recoil escapement.**

anchor-gate (*Civ. Eng.*). A heavy gate, such as a canal lock-gate, which is supported at its upper bearing by an anchorage in the masonry such as an *anchor and collar* (q v.).

anchor pole (*Elec. Eng.*). See **anchor tower.**

anchor tower (*Build*). A part of the staging for the support of a *derrick tower gantry* (q v.) used for shifting building materials on site, two timber anchor towers serve to anchor the gantry braces and withstand the overturning forces acting on the loaded gantry.

anchor tower (*Elec. Eng.*). A type of tower placed at intervals along an overhead-transmission line; designed to give longitudinal rigidity. Called an *anchor pole* when the line is supported on wooden poles.

anchoring (*Typog*). A method of fastening plates to metal or wood mounts when the usual flange is not available; a thin bolt is passed through the mount and secured with a nut.

anchylo'sis (*Med.*). See **ankylosis.**

ancient lights (*Build.*). The legal right, possessed by certain windows, to receive in perpetuity a reasonable amount of daylight. The right is acquired usually by enjoyment of the flow of light for nineteen years and a day before any legal action is brought about the light.

ancillary shoring (*Build.*). The auxiliary shoring which is necessary in the process of underpinning before any walling is removed, its purpose being to relieve the wall to be underpinned of as much load as possible. It consists of floor, roof, and window strutting, and perhaps raking shoring.

ancillary working (*Telcg., Teleph.*). An arrangement for increasing the effectiveness of an operator, particularly when one operator takes over the circuits of another during light loading.

an'con (*Arch.*). A console built on each side of a door-opening to carry a cornice.—*pl.* **anco'nes.**

anconeal, an-kō'ne-al (*Zool.*). Pertaining to, or situated near, the elbow.

anco'neus (*Zool.*). An extensor muscle of the arm attached in the region of the elbow.

andalu'site (*Min.*). One of several crystalline forms of aluminium silicate; a characteristic product of the contact metamorphism of argillaceous rocks.

Anderson's bridge (*Elec. Eng.*). A bridge method of measuring inductance which is a modification of the Maxwell bridge; balance is obtained by variation of resistance only.

an'desine (*Min.*). A member of the plagioclase group of minerals, with a small excess of soda over lime; typical of the intermediate igneous rocks.

an'desite (*Geol.*). A fine-grained igneous rock (usually a lava), of intermediate composition, having plagioclase as the dominant feldspar.

andiron (*Build.*). A metal support for wood in an open fire. Also called a FIREDOG.

an'dradite (*Min.*). Common calcium-iron garnet. Includes melanite (black garnet), though all andradite is not black. Also called ESSONITE.

an'drase (*Zool.*). An enzyme or hormone tending to produce maleness.

androco'nia (*Zool.*). In certain male *Lepidoptera*, scent scales serving to disseminate the secretion of the odoriferous glands situated at their bases; believed to serve the purpose of sexual attraction.

an'drocyte (*Bot.*). A sperm mother-cell.

androdioecious, —di-ē'si-us (*Bot.*). Said of a species in which some of the plants bear staminate flowers, others hermaphrodite flowers.

androecium, —drē'si-um (*Bot.*). (1) The whole of the stamens in one flower.—(2) The group of male organs in mosses.—*adj.* **androe'cial.**

androgen'esis (*Bot., Zool.*). Development from a male cell.

androgonid'ia (*Zool.*). In certain *Protozoa* (as *Volvox*), male gametes occurring after a period of asexual reproduction.

androgy'nous (*Bot.*). Bearing the male and female organs in distinct parts of the same inflorescence: having the male and female organs on or in the same branch of the thallus.

androl'ogy (*Med.*). That branch of medical science which deals with the functions and diseases peculiar to the male sex.

andromonoecious, —ē'si-us (*Bot.*). Said of a plant which has staminate and hermaphrodite flowers, but no pistillate flowers.

an'drophore (*Bot.*). An elongation of the receptacle of the flower between the corolla and the stamens. —(*Zool.*) In *Siphonophora*, a stalk bearing male gonophores.

androsporan'gium (*Bot.*). A sporangium in which one or more spores able to give rise to male plants are developed. Such spores are termed *androspores.*

anelec'tric (*Elec.*). An old-fashioned term used to denote a body which does not become electrified by friction.

anemia, anesthesia, etc. (*Med.*). See **anaemia, anaesthesia,** etc.

ane'mocho'rous (*Bot.*). Said of plants whose seeds are dispersed by wind, and particularly plants which retain their seeds through the winter, liberating them for wind-dispersal in the spring.

anemom'eter (*Meteor.*). An instrument for measuring the velocity of the wind. A common type consists of four hemispherical cups carried at the ends of four radial arms pivoted so as to be capable of rotation in a horizontal plane, the speed of rotation being indicated on a dial calibrated to read wind velocity directly. An *anemograph* records the velocity, and sometimes the direction.—(*Eng.*) An instrument for measuring the rate of flow of a gas, either by mechanical or electrical methods.

ane'mophi'ly (*Bot.*). Pollination by means of the wind.—*adj.* **anemophilous.**

an'emotro'pism (*Biol.*). Active response to the stimulus of an air current.

anenceph'aly (*Med.*). Developmental defect of the skull and absence of the brain.—*adj.* **anenceph'alous.**

anen'teron (*Zool.*). A malformed blastula, having an evaginated archenteron which later disappears entirely; usually produced by exposure to a supranormal temperature.

anen'terous, anenter'ic (*Zool.*). Without a gut.

an'er (*Zool.*). A male ant.

aneroid barometer (*Meteor., Surv.*). A portable instrument for the recording of changes in atmospheric pressure and for the approximate determination of altitude. It consists of a thin hermetically-sealed cylindrical metal box, exhausted of air so that the ends of the box tend to approach or recede from each other with change in the pressure of the atmosphere. A train of levers within the box magnifies this movement, and records it by an index-arm moving over a scale graduated to give barometric pressure in feet and inches of mercury, and sometimes to give altitudes directly, the principle of the surveyor's instrument depending upon the decrease of barometric pressure with increase of altitude.

aneuploidy, an'ū-ploi'de (*Bot.*). The condition of a nucleus, tissue, individual, or race having a chromosome number which is not an exact multiple of the haploid number.

an'eurysm (*Med.*). Pathological dilatation, fusiform or saccular, of an artery.—CARDIAC ANEURYSM, local dilatation of the heart from weakening of the wall.

angel beam (*Carp.*). A horizontal member of a mediaeval roof truss, usually decorated with angels carved on the member.

angi'na pec'toris (*Med.*). A condition characterised by the sudden onset of pain in the chest and inner side of the left arm after exertion; due to disease of the coronary arteries.—ANGINA INNOCENS. See **pseudoangina.**

angio- (Greek *angeion*, a case, vessel). A prefix used in the construction of compound terms; e.g. *angioblast* (q.v.).

an'gioblast (*Zool.*). In development, a mesodermal cell forming part of a syncytial accumulation which gives rise to blood-vessels and early blood cells.

angiocar'pic, angiocar'pous (*Bot.*). Applied to the fruit body of a fungus in which the hymenium develops, at any rate at first, within a closed envelope.

angio'ma (*Med.*). See **haemangioma.**

an'gioneurot'ic oedema (*Med.*). A disorder in which rounded oedematous swellings suddenly appear in the skin or the mucous membranes, Quinke's disease.

Angiosper'mae (*Bot.*). A major group of flowering plants, probably including over 200,000 species, in which the seeds develop and ripen inside a closed ovary. It includes all the ordinary flowering plants and most other plants of economic importance, except pines and their relatives.

angiosto'matous (*Zool.*). Having a narrow or non-distensible mouth, as certain *Mollusca*, certain *Ophidia.*

angle. The inclination of one line to another, measured in degrees (of which there are 360 to one complete revolution), or in radians (of which there are 2π to one complete revolution). ($\pi = 3{\cdot}14159\ldots$) See **dihedral—, solid—***

angle, angle bar, angle iron, angle steel (*Eng.*). Mild steel bar rolled to the cross-section of the letter L, much used for light structural work.

angle (*Textiles*). In lace manufacture, this term signifies the angles of the warp threads with regard to the horizontal perforated steel bars.

angle bar (*Carp.*). The vertical bar between two faces of a polygonal or bow window.

angle-bead (*Build.*). A small round moulding placed at an external angle formed by plastered surfaces in order to preserve the corner from accidental fracture.

angle bearing (*Eng.*). A shaft-bearing in which the joint between base and cap is not perpendicular to the direction of the load, but is set at an angle.

angle block (*Carp.*). A small wooden block used in woodwork to make joints, especially right-angle joints, more rigid.

angle-board (*Carp.*). One used as a gauge by which to plane boards to a required angle between two faces.

angle brace (*Carp.*). (1) Any bar fixed across the inside of an angle in a framework in order to render the latter more rigid (also called ANGLE TIE).—(2) A special tool for drilling in corners where there is not room to use the cranked handle of the ordinary brace.

angle bracket (*Carp.*). A bracket projecting from the corner of a building beneath the eaves, and not at right-angles to the face of the wall.

angle bracket (*Eng.*). A bracket consisting of two sides set at right-angles, often stiffened by a gusset.

angle cleat (*Build.*). A small bracket formed of angle iron, used to support or locate a member in a structural framework.

angle-closer (*Build.*). A portion of a whole brick, used to close up the bond of brickwork at corners.

angle, critical (*Light*). See **critical angle.**

angle float (*Plast.*). A plasterer's trowel, specially shaped to fit into the angle between adjacent walls of a room.

angle gauge (*Build.*). A tool which is used to set off and test angles in carpenter's, bricklayer's, and mason's work.

angle iron (*Eng.*). See **angle.**

angle of advance (*Eng.*). The angle in excess of 90° by which the eccentric throw of a steam-engine valve gear is in advance of the crank.

angle of attack (*Aero.*). See **angle of incidence.**

angle of contact (*Eng.*). The angle subtended at the centre of a pulley by that part of the rim in contact with the driving belt.

angle of contact (*Phys.*). The angle made by the surface separating two fluids (one of them generally air) with the wall of the containing vessel or with any other solid surface cutting the fluid surface. For liquid-air surfaces, the angle of contact is measured in the liquid.

angle of current flow (*Radio, Thermionics*). The fraction of the cycle of alternating grid voltage, expressed in degrees, during which anode current flows.

angle of cut-off (*Illum.*). The largest angle below the horizontal at which a reflector allows the light-source to be visible when viewed from a point outside the reflector.

angle of depression (*Surv.*). The vertical angle measured below the horizontal from the surveyor's instrument to the point observed.

angle of deviation (*Light*). The angle which the incident ray makes with the emergent ray when light passes through a prism or any other optical device.

angle of dip (*Geol.*). See **dip.**

angle of elevation (*Surv.*). The vertical angle measured above the horizontal, from the surveyor's instrument to the point observed.

angle of friction (*Eng., etc.*). The angle between the normal to the contact surfaces of two bodies, and the direction of the resultant reaction between them, when a force is just tending to cause relative sliding.

angle of heel (*Hyd., Ships*). The angle through which a floating vessel or pontoon tilts owing to eccentric placing of loads, etc.: the angle of inclination of a ship due to 'rolling,' or to a 'list.' It is the angle formed between the transverse centre line of the ship when on 'even keel' and when inclined.

angle of incidence, angle of reflection (*Acous.*). Respectively, the angle with which a beam of sound arrives at a surface, and the angle with which it leaves after reflection, the angle being measured with respect to the normal at the point of incidence.

angle of incidence, rigging (*Aero.*). The angle between the chord line of the main plane and the datum horizontal line. Shown on the rigging diagram, and used for erecting and aligning the main planes. Not to be confused with TRUE ANGLE OF INCIDENCE (*colloq.* ANGLE

OF ATTACK), i.e. the angle between the chord line of an aerofoil and the relative wind, which is normally the immediate flight path of the aircraft.

angle of incidence (*Light*). The angle which a ray makes with the normal to a surface on which it is incident.

angle of lag, angle of lead (*Elec. Eng.*). A term used in a.c. circuit theory to denote the phase angle by which the current lags behind, or leads ahead of, the voltage.

angle of lead (*Elec. Eng.*). The angle by which the brushes of a d.c. machine without compoles have to be moved forward in order to ensure sparkless commutation.

angle of lens (*Photog.*). The angular coverage of a lens when exposing a sensitised surface in a camera.

angle of minimum deviation (*Light*). The minimum value of the angle of deviation for a ray of light passing through a prism. By measuring this angle (θ) and also the angle of the prism (α), the refractive index of the prism may be calculated by means of the expression :

$$\mu=\frac{\sin\frac{1}{2}(\alpha+\theta)}{\sin\frac{1}{2}\alpha}.$$

angle of obliquity (*Eng.*). The deviation of the direction of the force between two gear teeth in contact, from that of their common tangent.

angle of pitch (*Aero.*). See **pitch.**

angle of polarisation (*Light*). That value of the angle of incidence of a ray of light on a reflecting surface for which the plane polarisation of the reflected ray is a maximum. See **Brewster's law.**

angle of reflection (*Light*). The angle which a ray, reflected from a surface, makes with the normal to the surface. The angle of reflection is equal to the angle of incidence.—(*Acous.*) See under **angle of incidence.**

angle of refraction (*Light*). The angle which is made by a ray refracted at a surface separating two media with the normal to the surface. See **Snell's law, index of refraction.**

angle of relief (*Eng.*). The angle between the back face of a cutting tool and the surface of the material being cut.

angle of repose (*Civ. Eng.*). The greatest angle to the horizontal which can be made by the inclined surface of a heap of loose material or embankment.

angle of twist (*Eng.*). The angle through which one section of a shaft is twisted relative to another section when a torque is applied.

angle of yaw (*Hyd.*). The angle between the direction of flow of a fluid stream and the direction of pointing of a velocity measuring instrument (such as a pitot tube) immersed in the flow.

angle plane (*Carp.*). A plane whose cutting-iron shapes an internal angle.

angle plate (*Eng.*). A bracket used to support work on a lathe faceplate or other machine-tool.

angle rafter (*Carp.*). The rafter at the hip of a roof. It receives the jack-rafters. Also called ANGLE RIDGE, HIP RAFTER.

angle-shaft (*Build.*). An angle-bead which is enriched with, e.g., a capital base.

angle shot, angle view (*Cinema.*). Any cinematographic shot taken with the camera axis inclined to the horizontal.

angle-staff (*Build.*). A strip of wood placed at an external angle formed by plastered surfaces to protect the corner from damage. A round staff is called an *angle-bead* (q.v.).

angle steel (*Eng.*). See **angle.**

angle-stone (*Civ. Eng.*). A *quoin* (q.v.).

angle support (*Elec. Eng.*). A transmission-line tower or pole placed at a point where the line changes its direction. Such a tower or pole differs from a normal tower or pole in that it has to withstand a force tending to overturn it (due to the resultant pull of the conductors).

angle tie (*Carp.*). See **angle brace.**

angled draft (*Woollen*). An arrangement of the warp threads in the mails of the healds so that the twill components will produce a 'herring-bone' pattern.

anglesite, an'gle-sit (*Min.*). Orthorhombic sulphate of lead—a common lead ore; named after the original locality, Anglesey.

Angola yarn (*Textiles*). A yarn consisting of wool or shoddy and cotton, coarsely carded and spun on the woollen system; used for medium and low woollens and for union fabrics.

Ångström unit, ang'strom; *Swed. pron.* ong'strum (*Phys.*). Named from the Swedish physicist, A. V. Ångström (1814-74). The unit employed for expressing wavelengths of light, ultra-violet radiations and X-rays. It equals 10^{-8} cm.; e.g. the wavelength of yellow light is approximately 5600 *Ångström units*. Frequently abbreviated to *angstrom*. Symbol Å., Å.U., or A.U. See **international Ångström.**

angular acceleration (*Phys., etc.*). The rate of change of angular velocity; usually expressed in radians per second per second.

angular aperture (*Photog.*). The ratio of the working diameter to the focal-length of a lens, i.e. reciprocal of the *f*-number.

angular diameter (*Astron.*). The angle which the apparent diameter of a heavenly body subtends at the observer's eye.

angular displacement (*Phys.*). The angle turned through by a body about a given axis, or the angle turned through by a line joining a moving point to a given fixed point.

angular distance of stars (*Astron.*). The apparent distance on the celestial sphere between two stars, measured as an arc of a great circle which passes through them and of which the observer is the centre.

angular divergence (*Bot.*). The angle between the lines of insertion of two adjacent leaves.

angular frequency (*Elec. Comm.*). The frequency of a steady recurring phenomenon expressed in radians per second, i.e. frequency in cycles per second multiplied by 2π.

angular momentum (*Mech.*). See **momentum.**

angular spacing (*Radio*). The spacing of aerials for direction-finding or broadcasting radiation, stated in terms of 360° per wavelength.

angular thread (*Eng.*). See **vee thread.**

angular velocity (*Phys., etc.*). The rate of change of angular displacement, usually expressed in radians per second.

angula're (*Zool.*). In *Vertebrata*, a membrane bone on the lower margin of the lower jaw, extending up on either side almost to the angle of the jaw.

an'gulosple'nial (*Zool.*). In *Amphibia*, a bone forming most of the inner and lower part of the lower jaw.

Angus-Smith process (*San. Eng.*). An anti-corrosion process applied to sanitary ironwork; this is heated to about 600° F. immediately after casting, and then plunged into a solution of four parts coal-tar or pitch, three parts prepared oil, and one part paranaphthaline heated to about 300° F. See **Bower-Barffing.**

angus'tifo'liate (*Bot.*). Having narrow leaves.

angus'tiros'trate (*Zool.*). Having a narrow beak, snout, or rostrum.

anhidro'sis (*Med.*). Diminution of the secretion of sweat.

anhydrae'mia, anhydre'mia (*Med.*). Loss of water from the blood.

anhy'drides (*Chem.*). Substances, including organic compounds and inorganic oxides, which either combine with water to form acids, or which may be obtained from the latter by the elimination of water.

anhy'drite (*Min.*). Anhydrous calcium sulphate; alters readily into gypsum.

anhy'drous (*Chem.*). A term applied to oxides, salts, etc., to emphasise that they do not contain water of crystallisation or water of combination, etc.

anhydrous lime (*Build.*). *Quicklime* (q.v.).

an'ilides (*Chem.*). A group of compounds in which the hydrogen of the amino group in aniline is substituted by organic acid radicals. The most important compound of this class is *acetanilide* (q.v.), also known as ANTIFEBRIN.

aniline (*Chem.*). $C_6H_5NH_2$, phenylamine, a colourless oily liquid, m.p. −8° C., b.p. 189° C., sp. gr. 1·024, slightly soluble in water; manufactured by reducing nitrobenzene with iron shavings and hydrochloric acid at 100° C. Basis for the manufacture of dyestuffs, pharmaceutical and numerous other compounds.

aniline black (*Chem.*). An azine dye, produced by the oxidation of aniline on the fabric.

aniline dyes (*Chem.*). A general term for all synthetic dyes having aniline as their base.

aniline oil (*Chem.*). A coal-tar fraction consisting chiefly of crude aniline.

aniline point (*Chem.*). The lowest temperature at which an oil is miscible with an equal volume of aniline.

aniline salt (*Chem.*). Aniline hydrochloride, $C_6H_5NH_2{\cdot}HCl$, m.p. 198° C., b.p. 245° C., sp. gr. 1·22, white crystals, soluble in most organic solvents and water.

an'ima (*Analytical Psychol.*). Term used in Jungian psychology to denote the unconscious feminine component of a male personality.

animal charcoal (*Chem.*). The carbon residue obtained from the carbonisation of organic matter such as blood, flesh, etc.

animal electricity. A term used to denote the power possessed by certain animals (e.g. electric eel) of giving powerful electric shocks.

animal field (*Zool.*). In developing blastulae, a region distinguished by the character of the contained yolk granules, and representing the first rudiment of the germ-band.

animal pole (*Zool.*). In the developing ovum, the upper hemisphere, which contains little or no yolk, and in which segmentation is more rapid: the apex of this hemisphere.

animal-sized (*Paper*). Paper which has been hardened by passing the sheet through a bath of gelatine. More costly than engine-sized.

animal starch (*Chem.*). *Glycogen* (q.v.).

animated cartoon (*Cinema.*). A cinematograph film made from black-and-white or coloured drawings, photographed one at a time: the term is applied, by extension, to step-by-step cinematography of model work.

animation (*Cinema.*). The process of preparing drawings for sequential photography in motion cartoon making.

animat'ograph (*Cinema.*). Obsolete name for the *cinematograph.*

animator (*Cinema.*). The artist who, in the making of a motion cartoon, draws the consecutive drawings between the key drawings.

Anim'ikie Series (*Geol.*). An important member of the Pre-Cambrian of the Canadian Shield, extending northwards into the Arctic regions. Perhaps 14,000 ft. in thickness, it includes important iron ores, carbonaceous slate, jaspers, and boulder conglomerates. These succeed the Huronian.

an'imus (*Analytical Psychol.*). A Jungian term denoting the unconscious masculine component of a female personality.

anion, an'i-on (*Elec., etc.*). In an electrolyte, the ion which carries the negative charge and which migrates towards the anode under the influence of an applied potential difference. Anions also exist in gaseous discharges.

anirid'ia (*Med.*). See **irideremia.**

anis'idines (*Chem.*). Amino-anisoles, methoxy-anilines, $CH_3O{\cdot}C_6H_4{\cdot}NH_2$, bases similar to aniline. Intermediates for dyestuffs.

ani'so- (Greek *an*, not; *isos*, equal). A prefix used in the construction of compound terms; e.g. *anisogamete* (q.v.).

anisocercal, —sér'kal (*Zool.*). Having the lobes of the tail-fin unequal.

anisoche'la (*Zool.*). A chela having opposable parts of unequal size.

anisoco'ria (*Med.*). Inequality in the diameter of the pupils.

anisocot'yly (*Bot.*). Inequality in the sizes of the cotyledons in a seedling.

anisodac'tylous (*Zool.*). (Of Birds) having three toes turned forward and one turned backward when perching, as in the *Passeriformes.*

anisogamete, —ga'mēt (*Zool.*). A gamete differing from the other conjugant in form or size.—*adj.* **anisogamous.**

anisogam'y (*Bot., Zool.*). Union of *anisogametes* (q.v.). See **heterogamy.**

anisogen'omat'ic (*Bot.*). Said of a chromosome complement made up of unlike sets of chromosomes.

anisole (*Chem.*). Phenyl methyl ether, $C_6H_5{\cdot}O{\cdot}CH_3$, a colourless liquid, b.p. 155° C.

anisomer'ic (*Chem.*). Not isomeric.

anisomer'y (*Bot.*). The condition of a flower in which the successive whorls do not all contain the same number of members.

anisophyl'ly (*Bot.*). See **heterophylly.**

anisopleu'ral (*Zool.*). Bilaterally asymmetrical.

anisopogo'nous (*Zool.*). Having the barbs of unequal length on opposite sides of the axis, as in some kinds of feather.

ani'sospores (*Zool.*). In *Radiolaria*, spores of two kinds found at the same time in the same species, and alleged to be gametes.

anisoton'ic (*Chem.*). Not isotonic.

anisotro'pic (*Zool.*). (Of ova) having a definite polarity, in relation to the primary axis passing from the animal pole to the vegetable pole.—*n.* **ani'sotropy.**

anisotropic coma (*Television*). Coma distortion in a television image arising from inclination of the immersion objective, which is the first electric lens adjacent to the electron-emitting cathode.

anisotropic conductivity (*Elec. Eng.*). A body which has a different conductivity for different directions of current flow through it is said to have *anisotropic conductivity.*

anisotropic liquids (*Chem.*). See **liquid crystals.**

ankerite (*Min.*). A carbonate of calcium, magnesium, and iron. Frequently associated with iron ores.

ankylo'sis, anchylo'sis (*Med.*). Fixation of a joint by fibrous bands within it, or by pathological union of the bones forming the joint.—(*Zool.*) The fusion of two or more skeletal parts, especially bones.

anlage, an'la-ge (*Zool.*). See **primordium.**

an'nabergite (*Min.*). Hydrous nickel arsenate, apple-green monoclinic crystals, rare, usually massive. Associated with other ores of nickel. Also called NICKEL BLOOM.

annealing. General term denoting heating followed by slow cooling.—(*Met.*) Annealing is used to eliminate effects of cold-working, to remove internal stress, or to improve electrical, magnetic, or other properties.—(*Glass*) See **lehr**.

Annel'ida (*Zool.*). A phylum of metameric *Metazoa*, in which the perivisceral cavity is coelomic, and there is only one somite in front of the mouth; typically there is a definite cuticle and chitinous setae arising from pits of the skin; the central nervous system consists of a pair of preoral ganglia connected by commissures to a postoral ventral ganglionated chain; if a larva occurs it is a trochophore. Ringed Worms.

annoyance (*Acous.*). The psychological effect arising from excessive noise. There is no absolute measure, but the annoyances caused by specified classes of noise can be correlated.

annual (*Bot.*). A plant which, in the same season that it develops from a seed, flowers, fruits, and dies.

annual equation (*Astron.*). One of the four principal periodic terms in the mathematical expression of the moon's orbital motion. Its period is a year, and it is caused by the varying distance between the earth and the sun.

annual load factor (*Elec. Eng.*). The load factor of a generating station, supply-undertaking, or consumer, taken over a whole year.

annual (or **heliocentric) parallax** (*Astron.*). The apparent change in the position of a star due to the earth's annual motion round the sun and hence a measure of the star's distance, a star of parallax 0″·5 being at such a distance that the mean distance of the earth from the sun would subtend half a second of arc as seen from the star.

annual ring (*Bot.*). One of the approximately circular bands seen when a branch or trunk is cut across; the band is a section of the cylinder of secondary wood added in one season of growth.

annual variation of compass (*Surv.*). The yearly change in the magnetic variation of a compass at a given place.

annular (*Bot.*). Having the form of a ring.

annular bit (*Carp.*). A bit which cuts an annular (ring-shaped) channel and leaves intact a central cylindrical plug.

annular borer (*Civ. Eng.*). A rock-boring tool which does the work of an *annular bit* (q.v.), and provides a means of obtaining a core showing a section of the strata.

annular cell, annular vessel (*Bot.*). A tracheide or a vessel of the protoxylem, bearing rings of thickening material on its walls.

annular eclipse (*Astron.*). A central eclipse of the sun, in which the moon's disc does not completely cover the sun's disc at the moment of greatest eclipse but leaves a ring of the solar surface visible.

annular gear (*Eng.*). An annular ring on which gear teeth are cut.

annular vault (*Build.*). See **barrel vault.**

annulate (*Bot.*). (1) Shaped like a ring.—(2) Having a membranous ring on the stipe.

annulated column (*Build.*). A column formed of slender shafts clustered together, or sometimes around a central column, and secured by stone or metal bands.

an'nulus (*Bot.*). (1) A membranous frill present on the stipe of some agarics.—(2) A patch or a crest of cells with thickened walls occurring in the wall of the sporangium of ferns, and bringing about dehiscence by setting up a strain as they dry.—(3) A zone of cells beneath the operculum of the sporangium of a moss, which break down and assist in the liberation of the operculum.

annulus (*Zool.*). Any ring-shaped structure: the fourth digit of a pentadactyl fore-limb: in *Arthropoda*, subdivision of a joint forming joint-lets; in *Hirudinea*, a transverse ring subdividing a somite externally.—*adj.* **annulate.**

annunciator (*Elec.*). An arrangement of indicators, tripped by relays, for indicating which of a number of circuits has operated a bell.*

ano'dal, anodic (*Bot.*). In the upward direction on the genetic spiral.

anode (*Elec.*). The electrode through which a current enters an electrolytic cell, or an electric discharge in a gas. When current is passing the anode will be at a positive potential to the cathode and will therefore collect electrons or negative ions.—(*Thermionics*) Any electrode in a thermionic tube which acts as a collector of electrons. Usually applied to the most highly positive electrode in the tube. Also called PLATE.

anode AC conductance (*Thermionics*). Another name for *differential anode conductance* (q.v.).

anode AC resistance (*Thermionics*). Another name for *differential anode resistance* (q.v.).

anode battery (*Elec. Comm.*). See **B-battery.**

anode bend (*Thermionics*). The more or less abrupt curve in the anode-current versus grid-voltage characteristic of a triode, which occurs at small values of anode current. Also called BOTTOM BEND.

anode bend rectification (*Radio*). Rectification dependent on the curvature of the anode-current versus grid-voltage characteristic.

anode circuit (*Thermionics*). The closed circuit formed by the anode cathode path of a thermionic tube, the B-battery, and the coupling impedances or transformers.

anode conductance (*Thermionics*). The anode current divided by the anode potential. Frequently, though incorrectly, used for the slope of the anode-current versus anode-voltage characteristic.

anode converter (*Radio*). A rotary converter or motor generator used for supplying the high voltage required for the anode circuits from a low-voltage source, such as the filament supply-battery.

anode current (*Thermionics*). The current flowing to the anode of a multi-electrode thermionic tube.

anode current characteristic (*Thermionics*). A curve relating the anode current of a multi-electrode tube to the potential of one of the electrodes; e.g. anode-current versus grid-voltage characteristic.

anode current surface (*Thermionics*). A surface geometrically relating the anode current to the potential of two electrodes, usually the anode and grid, of a multi-electrode tube. The z, or vertical co-ordinate, represents the anode current, whilst the x and y co-ordinates represent the grid and anode voltages.

anode dissipation (*Thermionics*). Generally, the energy produced at the anode of a thermionic tube and wasted as heat owing to the bombardment by electrons: specifically, the maximum permissible power which may be dissipated at the anode.

anode drop (*Thermionics*). The component of the anode-to-cathode potential difference in a gas-filled discharge tube which is independent of the anode current.

anode effect (*Elec. Eng.*). A term used in electrolysis to denote the sudden drop in current due to the formation of a film of gas on the surface of the anode.

anode impedance (*Thermionics*). A term frequently misapplied to differential anode resistance. Strictly, it is the complex AC impedance between anode and cathode of a thermionic tube, including the interelectrode capacitance paths and the effects of electronic inertia.

anode modulation (*Radio*). A system of modulation wherein the amplitude of the alternating component of anode current is varied in accordance with the anode-circuit supply-voltage.

anode mud (*Met.*). See **anode slime.**

anode rectification (*Radio, Thermionics*). Another name for *anode bend rectification* (q.v.).

anode resistance (*Thermionics*). The anode potential divided by the anode current: frequently, though incorrectly, applied to *differential anode resistance.*

anode slime, anode mud (*Met.*). The insoluble residue left on the anode in electrolytic refining. In copper refining, this slime contains the precious metals which are recovered from it.

anode slope conductance (*Thermionics*). Another name for *differential anode conductance* (q.v.)

anode slope resistance (*Thermionics*). Another name for *differential anode resistance* (q.v.)

anode tap (*Radio*). A tapping point on the inductance coil of a tuned-anode circuit, to which the anode is connected. The position of the tap is adjusted so that the tube operates into the optimum impedance.

anodic etching (*Elec. Eng.*). A method of preparing metals for electrodeposition by making them the anode in a suitable electrolyte and at a suitable current-density.

anodic oxidation (*Elec. Eng., Met.*). A process whereby a hard, non-corroding oxide film is deposited on aluminium or light alloys. The aluminium is made the anode in an electrolytic cell containing chromic or sulphuric acid. Also called ANODISING OR ANODIC TREATMENT.

anodon'tia. Absence of teeth.

anoestrus, —ēs'trus (*Zool.*). In Mammals, a resting stage of the oestrus cycle occurring between successive heat periods.

an'olyte (*Elec. Eng.*). That portion of the electrolyte of an electrolytic cell which is in the immediate neighbourhood of the anode.

anomalis'tic month (*Astron.*). The interval (amounting to 27·55455 days) between two successive passages of the moon in her orbit through perigee.

anomalistic year (*Astron.*). The interval (equal to 365·25964 mean solar days) between two successive passages of the sun, in its apparent motion, through perigee.

anomalous dispersion (*Light*). The type of dispersion given by a medium having a strong absorption band, the value of the refractive index being abnormally high on the longer wave side of the band, and abnormally low on the other side. In the spectrum produced by a prism made of such a substance the colours are, therefore, not in their normal order.

anomalous magnetisation (*Elec. Eng.*). An irregular distribution of magnetisation in which consequent poles exist as well as two main poles.

anomaly. Any departure from the strict characteristics of the type.

anomaly (*Astron.*). The name originally used for any periodic inequality in orbital motion, but now restricted to mean the angle between the radius vector and the apse line in elliptic orbits.

anom'eris'tic (*Zool.*). (Of metameric animals) having an indefinite number of somites.

an'omite (*Min.*). A form of biotite, identical with the latter in all characters but optical orientation.

ano'motagmo'sis (*Zool.*). In metameric animals, the formation of definite regions (*tagmata*) by the differentiation of an indefinite number of somites.

Anoplu'ra (*Zool.*). An order of small parasitic *Exopterygota* without wings; eyes are reduced or absent; the antennae are short, as are also the legs, which have one or two jointed tarsi adapted for clinging to the host; anal cerci are lacking; the mouthparts are adapted either for biting, or for piercing and sucking; all are ectoparasites of Birds and Mammals. Biting Lice, Bird Lice, Sucking Lice.

anorex'ia (*Med.*). Loss of appetite.

anorexia nervo'sa (*Med.*). A condition in which loss of appetite from emotional disturbance leads to marked wasting.

anor'thic system (*Crystal.*). A style of crystal architecture now commonly termed *triclinic system* (q.v.).

anor'thite (*Min.*). The lime-rich end-member of the plagioclase group of minerals; silicate of calcium and aluminium, occurring in some basic igneous rocks, typically in those produced by the contact metamorphism of impure calcareous sediments. Also called INDIANITE.

anor'thoclase (*Min.*). A cryptoperthitic soda-potash feldspar, characterised by a blue play of colour in the hand specimen; occurs typically in the soda-syenite, laurvigite, from S. Norway, which is largely used for facing buildings in this country and elsewhere.

anor'thosite (*Geol.*). A coarse-grained rock, derived from gabbroic magma, consisting almost exclusively of plagioclase, near labradorite in composition. Rare in Britain; but important in certain areas of Pre-Cambrian rocks, e.g. the Canadian Shield.

anosmat'ic (*Zool.*). Lacking the sense of smell.

anos'mia (*Med.*). Loss of the sense of smell.

Anos'traca (*Zool*). An order of mainly fresh-water *Branchiopoda* with an elongate body; the carapace is absent, the paired eyes are stalked, and the second antennae are prehensile in the male and reduced in the female; there are numerous pairs of trunk limbs; long unjointed caudal furca. Fairy Shrimps, Brine Shrimps.

anox'ia, anoxae'mia, anoxe'mia (*Med., Zool.*). Deficiency of oxygen in the blood: any condition of insufficient oxygen supply to the tissues: any condition which retards oxidation processes in the tissues.

anox'ybio'sis (*Zool.*). Starvation in the absence of oxygen.

Anser'iifor'mes (*Zool.*). An order of *Pelargomorphae* having a desmognathous palate and webbed feet. The members of this order are unusual in the possession of an evaginable penis; they are all aquatic forms, living on the animals found living in the mud at the bottom of shallow waters and in marshes; some are powerful fliers. Geese, Ducks, Screamers, Swans.

answer print (*Cinema.*). The first print from the edited negative, shown to the producers of the sound-film for final approval before release.

answering jack (*Teleph.*). The jack into which an A-operator inserts the answering cord of a cord circuit, to ascertain the requirements of a calling subscriber.

anta (*Build.*). A square pilaster placed at either side of a doorway or the corner of a flank wall.—*pl.* **antae.**

anta-cap (*Build.*). The capital or top of an anta.—*pl.* **antae-caps.**

antagonising screws (*Surv.*). See **clip screws.**

antagonism (*Bot.*). (1) The interactions of micro-organisms, checking the development of parasites in higher plants.—(2) The power of one toxic salt to diminish or eliminate the toxic effect of another.

antagonist (*Physiol.*). A muscle which opposes the action of another muscle.

antagonistic symbiosis (*Bot.*). The parasitism of one lichen upon another.

antambula'cral (*Zool.*). See **abambulacral.**

antapex, solar (*Astron.*). See **solar antapex.**

Antarctic Circle. The parallel of latitude 66° 33′ S. bounding the region of the earth surrounding the south terrestrial pole, this parallel being the locus of points where the sun touches the horizon but does not set at the winter solstice.

Antarctic Ocean. The ocean surrounding the South Pole, within the Antarctic Circle.

antarticular'e (*Zool.*). In *Vertebrata*, a membrane bone of the lower jaw lying inside and below the angulare, with which it usually fuses. Also DERMATICULARE, GONIALE.

ante- (Latin *ante*, before). A prefix used in the construction of compound terms; e.g. *antebrachium* (q.v.).

antebra'chium (*Zool.*). The region between the brachium and the carpus in land Vertebrates; the fore-arm.

antecedent genom (*Bot.*). The condition of the genom when it plays the principal part in determining inheritance.

antechamber (*Eng.*). A small auxiliary combustion-chamber, used in some oil-engines, in which partial combustion of the fuel is used to force the burning mixture into the cylinder, so promoting more perfect combustion. See **pre-combustion chamber.**

anteclyp'eus (*Zool.*). In *Insecta* which have the clypeus divided by a transverse suture, the anterior portion.

antecox'al piece (*Zool.*). In *Insecta*, a sclerite lying between the trochantin and the precoxal bridge, or between the trochantin and the episternum: a sclerite differentiated laterally from that portion of the clypeus which carries the process articulating with the mandible of its side.

antecu'bital (*Zool.*). In front of the elbow.

antedor'sal (*Zool.*). (In Fish) situated in front of the dorsal fin.

antefix'ae (*Build.*). Ornaments placed at the eaves and cornices of ancient buildings to hide the ends of the roof tiles; sometimes perforated to convey water away from the roof.

an'tefrons (*Zool.*). In certain *Insecta*, that part of the frons anterior to a line joining the bases of the antennae.

antenna (*Radio*). An elevated and/or extended system of conductors used for the transmission and/or reception of electromagnetic waves.—*pl.* **antennae.** Also called AERIAL (q.v.).

See **Adcock—**
anti-static—
aperiodic—
artificial—
balancing—
beam—
Bellini-Tosi—
Beverage—
buried—
cage—
coil—
counterpoise—
diamond—
dipole—
directional—
diversity—
dummy—
doublet—
fan—
flat-top—
frame—
Franklin—
half-wave—
harmonic—
inverted-L—
inverted-V—
loaded—
loop—
mains—
multiple-tuned—
multiwire—
omnidirectional—
phantom—
quarter-wave—
quiescent—
rhombic—
sausage—
screened—
spaced—
'T'—
umbrella—
unidirectional—
unloaded—
untuned—
voltage-fed—
wave—
zepp—
See also Supplement.

antenna (*Zool.*). In *Arthropoda*, one of a pair of anterior appendages, normally many-jointed and of sensory function: in certain Fish of the order *Pediculati*, the elongate first dorsal fin-ray, which bears terminally a skinny flap, used by the fish to attract prey.—*pl.* **antennae.**—*adjs.* **antennary, antennal.**

antenna array (*Radio*). A group of two or more antennae spatially arranged to have particular directional radiating and/or receiving properties.

antenna changeover switch (*Radio*). A switch used for transferring an antenna from the transmitting to the receiving equipment, and vice versa.

antenna downlead (*Radio*). A wire running from the elevated horizontal roof of an antenna down to the transmitting or receiving equipment.

antenna earthing switch (*Radio*). A switch used for disconnecting the antenna from the transmitting or receiving apparatus and connecting it directly to earth, as a protection against lightning.

antenna effect (*Radio*). The action of a loop antenna in picking up signals from directions in which it is not normally responsive, due to asymmetrical distribution of capacitance to earth.

antenna shortening condenser (*Radio*). A condenser connected in series with an antenna operated at a frequency higher than its first natural frequency, so as to lower the impedance between the base of the antenna and earth.

antenna system (*Radio*). The whole of the equipment of a radio transmitter or receiver associated with the antenna-to-earth circuit.

anten'nule (*Zool.*). A small antenna: in some *Arthropoda* (as the *Crustacea*) which possess two pairs of antennae, one of the first pair.

antepet'alous, antipet'alous (*Bot.*). Inserted opposite to the petals.

anteposition (*Bot.*). Situation opposite, and not alternate to, another plant member.

anterior (*Bot.*). (1) The side of a flower next to the bract, or facing the bract.—(2) That end of a motile organism which goes first during locomotion.

anterior (*Zool.*). In animals in which cephalisation has occurred, nearer the front or cephalad end of the longitudinal axis: in human anatomy, ventral.

antero- (Latin *anterior*, former). A prefix used in the construction of compound terms; e.g. *antero-lateral*, in front at the side.

antesep'alous, antisep'alous (*Bot.*). Inserted opposite to the sepals.

ante-sola'rium (*Build.*). A balcony which faces the sun.

ante-venna (*Build.*). An awning to provide shade.

anthelion, ant-hē'li-on (*Meteor.*). A mock sun appearing at a point in the sky opposite to and at the same altitude as the sun. It is probable that the phenomenon is caused by the reflection of sunlight by ice crystals.

anthelmin'thic, anthelmin'tic (*Med.*). Destructive to intestinal worms: a drug used against intestinal worms.

anther (*Bot.*). The fertile part of a stamen, usually containing four sporangia, and producing pollen.

antherid'iophore, antherid'ial receptacle (*Bot.*). A special branch bearing one or more antheridia.

antherid'ium (*Bot.*). The gametangium which produces the male gametes in lower plants.—(*Zool.*) In certain flagellate *Protozoa*, a cluster of microgametes.—*pl.* **antheridia.**—*adj.* **antheridial.**

antherozoid, —zō'id (*Bot.*). A motile male gamete, spermatozoid, or sperm.—(*Zool.*) A microgamete occurring in an *antheridium* (q.v.).

anthe'sis (*Bot.*). The opening of a flower bud: by extension, the duration of life of any one flower, from the opening of the bud to the setting of fruit.

an'thocarp (*Bot.*). A fruit consisting of the ripened ovary and its seeds, together with the persistent perianth or other parts of the flower.

anthocaul'is (*Zool.*). In certain *Anthozoa*, such as *Fungia*, the pedicle formed by the rest of the trophozooid after the specialisation of the anthocyathus.

Anthocerotales, —ser-ō-tā'lēz (*Bot.*). A small alliance of *Hepaticae* with a disc-shaped thallus, endogenously formed antheridia, and sporogonia which grow for some time, ripen spores in succession, and have stomata in their walls.

anthocy'anins (*Bot., Chem.*). The water-soluble colouring matters of many plants and flowers, of glucoside structure.

anthocya'thus (*Zool.*). In certain *Anthozoa*, such as *Fungia*, the free discoid adult, formed by the expansion of the upper part of the calycle of the trophozooid.

anthogen'esis (*Zool.*). A form of parthenogenesis in which both males and females are produced by asexual forms, as in some *Aphidae*.

anthoid (*Bot.*). Looking like a flower.

Anthomedu'sae (*Zool.*). The medusoid persons of the members of the order *Gymnoblastea* (q.v.), which lack otocysts, but may possess ocelli, and in which the gonads are situated on the manubrium.

anthoph'ilous (*Zool.*). Flower-loving: feeding on flowers.

an'thophore (*Bot.*). An elongation of the floral receptacle between the calyx and corolla.

anthophyl'lite (*Min.*). An orthorhombic amphibole of grey-brown colour, usually massive, and normally occurring in metamorphic rocks; a metasilicate of magnesium and iron.

Anthophy'ta (*Bot.*). See **Phanerogamae.**

anthoxanthin, —zan'thin (*Bot.*). Yellow pigment in flowers.

Anthozo'a (*Zool.*). A class of *Cnidaria* in which alternation of generations does not occur, the medusoid phase being entirely suppressed; the polyps possess gastral ridges and filaments and a stomodaeal tube, and may be solitary or colonial; the gonads are of endodermal origin.

anth'racene (*Chem.*). $C_{14}H_{10}$, colourless, blue-fluorescent crystals, m.p. 213° C., b.p. 351° C., a valuable raw material for dyestuffs obtained from the fraction of coal-tar boiling above 270° C. Anthracene is representative of a group of polycyclic compounds having a series of three benzene rings condensed together.

anthracene oil (*Chem.*). A coal-tar fraction boiling above 270° C., consisting of anthracene, phenanthrene, chrysene, carbazole, and other hydrocarbon oils.

an'thraci'ny (*Bot.*). The breakdown of organic material by fungi, and the further transformation of the results by passage through the alimentary canals of insects and worms, giving a dark-coloured soil.

anthracite coals (*Fuels*). These are slow-burning, yield very little ash, moisture, and volatiles; generally used in closed stoves, calorific value per pound, about 14,900 B.Th.U.

anthracite stove (*Build.*). A stove (for domestic heating purposes) which is specially made for the combustion of anthracite. Such stoves are usually of the closed-in type and have the advantage of being economical in use, and of keeping their fires 'in' for long periods with very little attention.

anthraco'sis (*Med.*). 'Coal-miners' lung,' produced by inhalation of coal dust.

anthrafla'vine (*Chem.*). An anthraquinone vat dyestuff, which dyes cotton greenish-yellow, obtained by heating β-methylanthraquinone with alcoholic potash at 150° C.

an'thranil (*Chem.*). The intramolecular anhydride of anthranilic acid (*o*-amino-benzoic acid), intermediate in the synthesis of indigo.

anthranil'ic acid (*Chem.*). $C_6H_4(COOH)\cdot NH_2$, *o*-amino-benzoic acid, obtained from phthalimide by the Hofmann reaction, an oxidation product of indigo.

an'thranol (*Chem.*). γ-Hydroxy-anthracene.

an'thraquinone' (*Chem.*). $C_6H_4(CO)_2C_6H_4$, yellow needles or prisms, which sublime easily, m.p. 285° C., b.p. 382° C. Synonym: diphenylene diketone, which name also signifies its closer relation to diketones than to quinones. Obtained by the oxidation of anthracene with sulphuric acid and chromic acid. Parent substance of an important group of dyes, including alizarin.

anthrax (*Med.*). An acute infective disease caused by the anthrax bacillus, communicable from animals to man. See also **woolsorter's disease.**

an'thropogen'ic climax (*Bot.*). A climax of vegetation produced under the influence of human activity.

an'thropoid (*Zool.*). Resembling Man: pertaining to, or having the characteristics of, the *Anthropoidea*.

an'thropophyte (*Bot.*). A plant introduced incidentally in the course of cultivation.

anthropot'omy. See **anatomy.**

anti- (Greek *anti*, against). A prefix used in the construction of compound terms; e.g. *antitrochanter, antiperistaltic* (qq.v.).

***anti*-albumoses** (*Chem.*). Decomposition products of albuminous matter produced by the action of the enzyme pepsin.

***anti*-aldoximes** (*Chem.*). The stereoisomeric form of aldoximes in which the H and the OH groups are far removed from each other.

an'tiae (*Zool.*). In some Birds, feathers at the base of the bill-ridge.

antibody (*Bot.*). A substance produced in a living cell in response to the attack of a parasite, and acting as a deterrent to the parasite.—(*Med.*) Any substance which, formed in the body and liberated into the blood, is antagonistic to invading organisms or their products. See **antigen.**

an'tical (*Bot.*). The upper surface of a thallus, stem, or leaf.

anti-capacity switch (*Radio*). A switch designed to have very little capacitance between the terminals when in the open condition.

anti-catalyst (*Chem.*). See **catalytic poison.**

anticathode (*Phys., Radiol.*). The anode target of an X-ray tube on which the cathode rays are focused, and from which the X-rays are emitted.

ant'icer (*Aero.*). Any means, whether fluid, paste, or a mechanical or pneumatic device, which prevents the formation of ice on aircraft surfaces, especially leading wing edges, or which dislodges ice when formed; in the latter case more properly termed a *de-icer*.

anticli'nal (*Zool.*). In *Primates*, pertaining to one of the thoracic vertebrae, which has an upright spine towards which the others incline, and which is situated at the centre of motion of the vertebral column.

anticlinal wall (*Bot.*). A wall perpendicular to the surface of a growing point.

anticline (*Geol.*). A type of fold, comparable with an arch, the strata dipping outwards, away from the fold-axis.

anticoagulin, —kō-ag'ū-lin (*Zool.*). Any substance which causes drawn blood to remain liquid instead of coagulating.

anti-coherer (*Radio*). See **decoherer.**

an'ticous (*Bot.*). Placed on the anterior side of an organ.

anticryp'tic coloration (*Zool.*). Resemblance to surroundings, in order to facilitate attack.

anticy'clone (*Meteor.*). A distribution of atmospheric pressure in which the pressure increases towards the centre. Winds in such a system circulate in a clockwise direction in the northern hemisphere and in a counterclockwise direction in the southern hemisphere. Anticyclones give rise to fine, calm weather conditions, although in winter fog is likely to develop.

anti-dazzle device (*Automobiles*). A means of preventing headlamps from dazzling oncoming traffic; e.g, the use of flat-topped beams, special lenses, or momentary dipping of lamp or reflector.

***anti*-diazo compounds** (*Chem.*). The stereoisomeric form of diazo compounds in which the groups attached to the nitrogen atoms are far removed from each other.

an'tidro'my (*Bot.*). Left- and right-hand twining in the same species of plant.

anti-enzymes (*Chem.*). The antibodies of enzymes, which neutralise the action of an enzyme; e.g. the autodigestion of the stomach is prevented by the presence of antiproteases in the walls of the stomach.

Antifebrin (*Chem.*). *Acetanilide* (q.v.), used in therapeutics against fever.

anti-flood and tidal valve (*San. Eng.*). A valve consisting of a cast-iron box containing a floating ball, fitted near a drain outlet in order to prevent back flow.

anti-fouling composition (*Civ. Eng., etc.*). A substance applied in paint form to ships' bottoms and structures subject to the action of sea water, in order to discourage marine growths.

anti-friction bearing (*Eng.*). A bearing in which special means (such as the use of narrow wheels or rollers to support the shaft) are adopted to reduce frictional drag.

anti-friction metal (*Met.*). See **white metal.**

an'tigen (*Med.*). Any toxin, bacterium, or other animal or vegetable substance which, introduced into the body, gives rise to an antibody.

antigeny, —tij'en-i (*Zool.*). Sexual dimorphism: secondary sexual differences.—*adj.* **antigen'ic.**

antig'orite (*Min.*). A bladed form of the mineral serpentine, the type locality being the Antigorio Valley, Piedmont.

anti-halation (*Photog.*). The use of backing to reduce halation in plates or films.

anti-incrustator (*Eng.*). A substance used to prevent the formation of scale on the internal surfaces of steam boilers.

anti-knock substances (*I.C. Engs.*). Substances added to petrol in order to lessen its tendency to detonate, or 'knock,' in an engine; e.g. lead tetra-ethyl.

anti-knock value (*I.C. Engs.*). The relative immunity of a volatile liquid fuel from detonation, or 'knocking,' in a petrol engine, as compared with some standard fuel. See **octane number, knock-rating.**

antimere (*Zool.*). See **actinomere.**

antimers (*Chem.*). Optical isomers.

anti-microphonic holder (*Radio*). A thermionic valve holder or base in which the tube is supported on springs or resilient material to reduce the effects of mechanical shock.

antimonial lead (*Min.*). Native lead containing small amounts of antimony and crystallising in the cubic system.

antimo'niates (*Chem.*). The antimonic acids give antimoniates with aqueous solutions of potassium hydroxide.

an'timonite (*Min.*). (1) Stibnite.—(2) Several minerals are antimonites in the chemical sense (e.g. romeite, which is antimonite of calcium).

an'timony (*Met.*). A white metallic element with a bluish tinge; symbol Sb; at. wt. 121·76; at. no. 51; sp. gr. at 20° C., 6·62; m.p. 630° C.; b.p. 1440° C. Specific electrical resistivity, 39 microhms per cm. cub. The native metal occurs either in rhombohedral crystals, or in shapeless masses. Not used in pure condition, but is a constituent of several alloys. See **antimony alloys.**

antimony alloys (*Met.*). Antimony is not used as the basis of important alloys, but it is an essential constituent in type metals, bearing metals (which contain 8-20%), in lead for shrapnel (10%), storage battery plates (4-12%), roofing, gutters, and tank linings (6-12%), cable sheaths, etc.

antimony black. Finely powdered antimony, used to give plaster casts a metallic appearance.

antimony glance (*Min.*). An obsolete name for *stibnite.*

antimony halides (*Chem.*). Antimony trifluoride SbF_3, and pentafluoride SbF_5. Trichloride $SbCl_3$, and pentachloride $SbCl_5$. Tribromide and triodide.

antimony hydrides (*Chem.*). Two hydrides, stibine SbH_3, and the solid dihydride Sb_2H_2. See also **stibine.**

an'timonyl (*Chem.*). The monovalent radical SbO—.

antinode (*Acous.*). In interference between waves of equal frequencies, the location where the resulting disturbance is a maximum, but not necessarily the greatest.—(*Phys.*) A point of maximum amplitude in a system of stationary waves. The antinodes are half a wavelength apart, and are midway between the nodes.—(*Radio*) A maximal point on a spacial distribution curve; e.g. a current *antinode* on an antenna is the point at which the current is a maximum, the voltage being generally a minimum. Strictly, *antinodal point.* Also called LOOP.

an'tinous release (*Photog.*). A flexible camera release-cable in which the action is transmitted by a steel wire passing through steel beads contained in a fabric tube.

anti-parallax (*Photog.*). An arrangement for minimising parallax in beam-splitting cameras by means of inclined glass plates.

antipep'sin (*Chem., Zool.*). An anti-enzyme preventing digestion by the proteases of the digestive juices.

antiperistal'tic (*Zool.*). Said of waves of contraction passing from anus to mouth, along the alimentary canal; cf. *peristaltic.*—*n.* **antiperistal'sis.**

antipleion (*Meteor.*). See under **pleion.**

antipo'dal cells (*Bot.*). Three cells, consisting each of a nucleus and cytoplasm, but unwalled, lying in the embryo sac at the end remote from the micropyle.

anti-polarising winding (*Elec. Comm.*). The winding on a transformer or choke to carry a direct current to neutralise the magnetising effect of another direct current (e.g. the anode current in a valve) in another winding.

anti-priming pipe (*Eng.*). A pipe placed in the steam space of a boiler, so as to collect the steam while excluding entrained water. See **priming** (1).

antiprothrom'bin (*Chem.*). An inhibitor against the activation of prothrombin to thrombin.

Antipyr (*Photog.*). Trade-name of formalin solution, used for hardening gelatines.

antipyret'ic (*Med.*). Counteracting fever: a remedy for fever.

Antipyrine,—pī'rēn (*Chem.*). 1-Phenyl-2,3-dimethylpyrazolone. Colourless crystals, m.p. 113° C. Used in medicine as a febrifuge.

antiquarian (*Paper*). A standard size of drawing paper, 53 x 31 in.

antique (*Paper*). Originally applied to machine-made papers made in imitation of hand-made printings. The term is now used to describe any good rough-surfaced paper which bulks well.

antique (*Typog.*). A bold type-face known as *Antique Roman.* The lines of the letters are almost uniform in thickness, with square corners; e.g. **Antique Roman.**

anti-sag bar (*Struct.*). A vertical rod connecting the main tie of a roof truss to the ridge in order to support it against sagging under its own weight.

antisep'sis (*Med.*). The inhibition of growth, or the destruction, of bacteria in the field of operation by chemical agents: the principle of antiseptic treatment.

antiseptic (*Med.*). Counteracting sepsis or contamination with bacteria: an agent which destroys bacteria or prevents their growth.

anti-side-tone (*Acous.*). The provision in a telephone local circuit of means of reduction of side-tone, generally by an effective electrical bridge. See **side-tone.**

anti-singing device (*Teleph.*). Any arrangement for preventing self-oscillation in a telephone circuit, generally arising from terminal unbalances which establish suitable conditions of attenuation and phase retardation round the system at the frequency of oscillation. See **Vodas.**

antispa'dix (*Zool.*). In *Tetrabranchia*, the smaller of the two parts into which the right inner tentacular lobe is divided, bearing four tentacles.

antispectroscopic lens (*Photog.*). Same as *achromatic lens* (q.v.).

anti-spray film (*Elec. Eng.*). An oil film placed on the surface of accumulator cells to prevent the formation of acid-spray due to the bursting of gas bubbles during the charging process.

antisquam'a (*Zool*). In *Insecta*, when two squamae are present, the one nearest the alula. Also SQUAMA ALARIS, ANTITEGULA.

anti-static antenna (*Radio*). An antenna in which the receptive portion is placed outside the interfering field as much as possible, and is connected to the receiver by screened leads

antistyle (*Zool.*). In *Insecta*, a projection at the base of the stylifer.

antiteg'ula (*Zool.*). See **antisquama.**

antithetic alternation of generations (*Bot.*). That explanation of alternation of generations which states that the two are distinct; the gametophyte represents the primitive aquatic phase, while the sporophyte is secondary, having arisen from the germinating zygote in relation to the migration from an aquatic to a terrestrial habitat.

antithrom'bin (*Chem*). An anti-enzyme, produced by the liver, preventing the intravascular clotting of the blood.

antitox'ins (*Path.*). Substances, produced by the organism, which, by uniting with toxins, prevent their poisonous action.

anti-trades (*Meteor.*). Winds, at a height of 3000 feet or more, which sometimes occur in regions where trade-winds are prevalent, their direction being opposite to that of the trade-winds.

antitrochanter, —trō-kan'ter (*Zool.*). In Birds, the iliac articular surface, opposed to the trochanter of the femur.

antitropic (*Bot.*). Left-handed twisting.

antitro'pous (*Bot.*). See **orthotropous.**

antitryp'sin (*Chem., Zool*). An anti-enzyme preventing digestion by the proteases of the digestive juices. It is present, e.g., in the blood.

antler (*Zool.*). In Deer, an annual outgrowth of bony material from the frontal bone.

ant'lia (*Zool.*). In *Lepidoptera* and other insects, the suctorial proboscis composed of the elongate galeae.

antorb'ital (*Zool.*). In front of the orbit.

antorbital capsule (*Zool.*). In developing Vertebrates, a cartilage arising from the outer side of the orbitosphenoid and separating the orbit from the nasal capsule.

antorbital vacuities (*Zool.*). In developing Vertebrates, gaps between certain of the bones in front of the orbit.

antrorse' (*Zool.*). Directed or bent forward.

antres'tomy (*Med.*). A surgical opening made into the antrum of Highmore.

antrot'omy (*Med.*). A cutting into the antrum of Highmore.

antrum (*Zool.*). A sinus, as the maxillary sinus in Vertebrates: a cavity, as the *antrum of Highmore* (q.v.).—*pl.* **antra.**

antrum of Highmore (*Anat.*). An air-containing cavity in the maxilla which communicates with the nasal cavity.

Anu'ra (*Zool*). See **Salientia.**

anu'ral, anu'rous (*Zool.*). Without a tail: pertaining to the *Anura* (*Salientia*, q.v.).

anu'ria (*Med.*). Suppression of the secretion of urine.

a'nus (*Zool.*). The opening of the alimentary canal by which indigestible residues are voided, generally posterior.—*adj.* **anal.**

anvil (*Anat.*) One of the three small bones (ossicles) which transmit mechanical vibrations between the outer ear drum and the inner ear.

anvil (*Eng*). A block of iron, sometimes steel-faced, on which work is supported during forging.

anvil cloud (*Meteor.*). A common feature of a thundercloud, consisting of a wedge-shaped projection of cloud suggesting the point of an anvil.

anvil cutter, anvil chisel (*Eng.*). A chisel with a square shank for insertion in the hardy hole of a smith's anvil, the cutting edge being uppermost.

anxiety (*Psychol.*). A state of mental apprehension and tension experienced by the ego in the face of impending danger. It may be (*a*) normal (or physiological) in relation to an external danger-situation threatening to cause pain to the ego, or (*b*) neurotic in relation to an internal danger-situation of strong instinctive forces threatening pain to the ego.

anxiety hysteria (*Psycho-an.*). A vague term used to denote a severe state of anxiety, often with hypochondriacal accompaniment and phobias, in which hysterical elements are present. It may also occur when hysteria becomes converted into an anxiety state.

anxiety neurosis (*Psycho-an.*). Originally classed by Freud as one of the true *neuroses* (q.v.), but later included in the psycho-neuroses. The term is used generally to denote a pathological state of anxiety, which is caused by partial failure to repress a strong instinctive force, and which is therefore in close conflict with the conscious aims and ideals of the individual, threatening to undermine these. This state gives rise to feelings of sudden panic, nightmares, etc., with general anxiety symptoms (sweating, starting, palpitation, and excitability).

aor'ta (*Zool.*). In *Arthropoda*, *Mollusca*, and most *Vertebrata*, the principal arterial vessel or vessels by which the blood leaves the heart and passes to the body: in *Amphibia*, the principal artery by which blood passes to the posterior part of the body, formed by the union of the systemic arteries: in Fish (*ventral aorta*), the vessel by which the blood passes from the heart to the gills, and also (*dorsal aorta*) the vessel by which the blood passes from the gills to the body.—*adj.* **aortic.**

aortic arches (*Zool.*). In Vertebrates, a series of pairs of vessels arising from the *ventral aorta*. See **aorta.**

aorti'tis (*Med.*). Inflammation (usually syphilitic) of the aorta.

A.P. (*Surv.*). Abbrev. for *Amsterdamsch Peil* (Amsterdam level), i.e. the datum, or mean level, used as a basis for levels in Holland, Belgium, and North Germany.

A.P. (*Typog.*). An abbrev. for *author's proof.*

A.P. shell (*Ammunition*). See **armour-piercing shell.**

ap-. Prefix. See **a-.**

apand'rous (*Bot.*). Having non-functional male organs, or lacking male organs altogether.

apatet'ic coloration (*Zool.*). Resemblance to some part of the environment, or to the appearance of another species.

ap'atite (*Min.*). Naturally occurring phosphate of calcium, with chloride or fluoride of calcium, occurring widely distributed in igneous rocks in the form of hexagonal crystals, usually of very small size.

ape'rient (*Med.*). A drug having a laxative or purgative effect.

aperiodic (*Acous., Elec., etc.*). Said of any potentially vibrating system, electrical, mechanical, or acoustic, which, because of sufficient damping, does not vibrate when impulsed. Used particularly of the pointers of indicating instruments, which, having no natural period of oscillation, do not oscillate before coming to rest in the final position, and so give their ultimate reading as fast as possible.—*n.* **aperiodicity.**

aperiodic antenna (*Radio*). An antenna in which the response to a wide range of frequencies is approximately constant.

aperiodic regeneration (*Radio*). A form of regeneration employing direct- or battery-coupled amplifiers in which the degree of regeneration is independent of frequency.

aperiodicity (*Acous., Elec., etc.*). See **aperiodic.**

aperture (*Build.*). An opening provided in a wall for a door, a window, an alcove, or for ventilation purposes.

aperture (*Optics*). The diameter of the circular passage for light through a lens The effect of the aperture is measured by the *stop*.
See
angular— focal or working— numerical—*

aperture distortion (*Television*). A form of distortion due to the scanning spot having finite, instead of infinitely small, dimensions

aperture lens (*Television*). An electron lens formed from holes in diaphragms, which are maintained at differing potentials.

aperture plate (*Photog.*). A plate with a circular hole which determines the aperture of a lens.

apertured disc (*Television*). A rotatable disc having a number of similar apertures arranged in the form of a spiral near the periphery, used for mechanical scanning.

Apet'alae (*Bot.*). See **Incompletae.**

apet'alous (*Bot.*). Devoid of petals.

apet'aly (*Bot.*). Absence of petals.

apex. The top or pointed end of anything.—(*Anat.*) Said of the root of a tooth, of the top of the upper lobe of a lung, or of the rounded end of the left ventricle of the heart.—(*Bot.*) The end of an organ remote from the point of attachment: the tip of a root or stem.

apex (*Mining*). The 'outcrop' (exposure) or upper edge of a vein reef or lode.

apex beat (*Anat.*). The point below the left nipple where the heart beat is visible and palpable.

apex law (*Mining*). The law entitling the discoverer of an outcrop or exposure of ore to mine its complete extension in depth.

apex, solar (*Astron.*). See **solar apex.**

apex stone (*Build.*). A triangular stone at the summit of a gable wall. It is often decorated with a carved trefoil.

apha'kia, apha'cia (*Med.*). The condition of the eye when the lens has been removed.

aphanip'terous (*Zool.*). Apparently lacking wings.

aphap'totro'pism (*Bot.*). The condition of not reacting to contact stimulus.

apha'sia (*Med.*). Loss of, or defect in, the faculty of expressing thought in words, due to a lesion in the brain.

aphelion, af-ē'li-on (*Astron.*). The point farthest from the sun on the apse line of a central orbit having the sun as a focus.—*pl.* **aphelia.**

apheliotro'pic (*Bot., Zool.*). See **aphototropic.**

aphen'goscope (*Photog.*). An early version of the epidiascope.

aphle'bia (*Bot.*). A lateral outgrowth from the base of the leaf stalk of some fossil ferns, and of a few living ferns.

aph'odus (*Zool.*). In *Porifera*, the opening from a flagellated chamber to an ex-current canal, when it is drawn out into a tube.—*adj.* **aphodal.**

aphonia (*Med.*). Loss of voice in hysteria, or in paralysis of the vocal cords, or in laryngitis.

apho'tic (*Bot.*). Able to grow with little or no light.

apho'tomet'ric (*Bot.*). (1) (Of a leaf) not reacting to light.—(2) (Of a motile organism) always directing the same end towards the light.

aphototac'tic (*Bot.*). Not moving in response to the light intensity.

aphototro'pic (*Bot.*). Growing away from light.—(*Zool.*) Responding actively but negatively to light stimulus. (This is a better term than *apheliotropic*, which means, strictly, growing away from the sun.)—*n.* **aphototro'pism.**

aph'tha (*Med.*). A small grey ulcer in the mouth.—*pl.* **aphthae.**

aphthous fever (*Vet.*). See **foot-and-mouth disease.**

aphyl'lous (*Bot.*). Devoid of leaves.

a'pical. Relating to, pertaining to, or situated at, the apex.

apical body (*Zool.*). See **acrosome.**

apical cell (*Bot.*). A cell at the end of a filament or of a multicellular organ, capable of repeated division, and yielding a progeny of cells from which the tissues of the organ are ultimately derived.

apical cells (*Zool.*). In some *Invertebrata*, e.g. the Limpet (*Patella*), during cleavage of the ovum, a quartette of small cells at the apex of the egg, namely, $1a^{\cdots}$, $1b^{\cdots}$, $1c^{\cdots}$, and $1d^{\cdots}$.

apical growth (*Bot.*). The elongation of a hypha by continued growth at the apex only; this is the normal condition in fungi.

apical mer'istem (*Bot.*). A group of meristematic cells at the tip of a stem or root; from it, all the tissues of the mature axis are ultimately formed.

apical nervous system (*Zool.*). In *Echinodermata*, nerves of mesodermal origin, developed from the peritoneum on the aboral side.

apical organ (*Zool.*). In some Polyzoan larvae, a thickening of ectoderm just below the apex, usually including sensory cells.

apical placentation (*Bot.*). The condition in which the ovule or ovules is/are inserted at the top of the ovary.

apical plate (*Zool.*). In various pelagic larval forms, such as trochophores, tornariae, echinoplutei, and larvae of some *Podaxonia* and *Crinoidea*, an aggregation of columnar ectoderm cells at the apical pole, usually bearing cilia.

apical rosette (*Zool.*). See **apical cells.**

apical sense organ (*Zool.*). In *Ctenophora*, an elaborate sensory structure formed of small otoliths united into a morula, supported on four pillars of fused cilia and covered by a roof of fused cilia.

apical string (*Zool.*). In tornariae, the solidified anterior prolongation of a coelomic sac connecting the apical plate with the proboscis-coelom and the oesophagus.

apicol'ysis (*Surg.*). An operation for compressing or collapsing the apex of the lung; as in the treatment of pulmonary tuberculosis.

apic'ulate (*Bot.*). Ending in a short, sharp point.

apic'ulus (*Bot.*). A short, sharp, and usually somewhat hard point, formed by the prolongation of a vein.

apiculus (*Zool.*). In some *Protozoa*, a minute apical termination.

Apjohn's formula (*Phys.*). A formula which may be used for determining the pressure of water vapour in the air from readings of the wet and dry bulb hygrometer. The formula is:

$$p_t = p_w - 0{\cdot}00075H(t-t_w)[1-{\cdot}008(t-t_w)],$$

where p_w is the saturated vapour pressure at the temperature (t_w) of the wet bulb, H is the barometric height, and t is the temperature of the dry bulb.

a'placen'tal (*Zool.*). Without a placenta.

Aplacoph'ora (*Zool.*). A subclass of worm-like marine *Amphineura* with a vestigial foot; a shell is lacking, but the mantle invests the whole body and often bears calcareous spicules; the branchiae, if present, form a circlet round the cloaca; some forms are found crawling over corals and hydroids on which they feed, while others occur on muddy bottoms and feed on Diatoms and Protozoa.

aplanat'ic (*Optics*). Said of an optical system which produces an image free from spherical aberration.

aplanatic points (*Photog.*). Special points for object and image where a lens or mirror is effectively aplanatic, while not being generally so.

apla'nogamete, —ga'mēt (*Bot.*, *Zool*). A non-motile gamete.

apla'nospore (*Bot.*). A non-motile spore.

apla'sia (*Med.*). Defective structural development

aplite or **haplite** (*Geol.*). A fine-textured, light-coloured igneous rock, in which coloured minerals are largely suppressed. Represents a magmatic residuum, and occurs as veins in intrusive rocks. Variously named according to the nature of the parent magma; e.g. *granite-aplite*, *syenite-aplite*, etc.

apneu'sis (*Physiol.*). Want of oxygen.

apneustic, ap-nū'stik (*Zool.*). Respiring either by means of the general integument, or by gills. having spiracles closed or absent.

apneustic centre (*Zool.*). In the higher Vertebrates, that part of the brain which controls the inflation of the lungs.

apnoe'a (*Zool.*). In forms with pulmonary respiration, cessation of respiratory movements, due to diminution of carbon dioxide tension in the alveolar air.

apo- (Greek *apo*, away). A prefix used in the construction of compound terms; e.g. *apopetalous*, *aposematic* (qq.v.).

apoatropine, ap-ō-at'— (*Chem.*). An alkaloid of the tropane series, obtained from atropine by dehydration and identical with the naturally occurring atropamine.

apocar'pous (*Bot.*). Consisting of two or more carpels, all distinct from one another.

apochromat'ic (*Optics*). Said of a microscope objective in which spherical and chromatic aberrations have been corrected with the greatest possible completeness.

ap'ocyte, apocy'tium (*Bot.*). A mass of multinucleate protoplasm not divided up by cell walls.

Apo'da (*Zool.*). (1) An order of *Amphibia* having a cylindrical snake-like body without limbs, reduced eyes, and an anterior sensory tentacle; burrowing forms, living near water and feeding chiefly upon earthworms. Caecilians.—(2) An order of *Cirripedia* comprising a minute vermiform animal occurring as a parasite in the mantle-cavity of other Cirripedes; it lacks a mantle and has no trunk appendages; hermaphrodite; found in West-Indian waters.

apo'dal, apo'dous (*Zool.*). Without feet: without locomotor appendages.

ap'odeme (*Zool.*). In *Arthropoda*, an ingrowth of the cuticle forming an internal skeleton and serving for the insertion of muscles: in *Insecta*, more particularly, an internal lateral chitinous process of the thorax.

Apo'des (*Zool.*). An order of *Neopterygii*, having a snake-like body without a separate caudal fin; scales are vestigial or absent; there are no pelvic fins. Eels.

ap'ogamy (*Bot.*). Loss of sexual function without the suppression of the normal products of a sexual act.—*adj.* **apog'amous.**

ap'ogee (*Astron.*). The point farthest from the earth on the apse line of a central orbit having the earth as a focus.

ap'ogeny (*Bot.*). Sterility.

ap'ogeotro'pism (*Zool.*). An active but negative response to the stimulus of gravity, as the young of Gossamer Spiders.

ap'ogy'ny (*Bot.*). Sterility in the female organs.

apomecom'eter (*Surv.*). An instrument, embodying features found in the *optical square* and the *sextant* (qq.v.), which may be used to measure the height of buildings, trees, etc. It works on the principle of reflecting rays from the top and bottom of the building (for example) and bringing them to a coincidence, when the distance of the instrument from the foot of the building will be equal to the height of the building.

apomix'is (*Bot.*). The absence of a sexual fusion: apogamy.

apomor'phine (*Chem.*). An alkaloid of the morphine series, obtained from morphine by dehydration. It is not a narcotic, but is an expectorant and emetic.

apon'euro'sis (*Zool.*). A muscle-tendon forming a broad flat sheet, which may occur not only at the end but also in the middle of a muscle.

apopet'alous (*Bot.*). Lacking petals.

apophyge, a-pof'i-jē (*Build.*). A concave moulding forming the highest member of the base of a column.

apophyl'lite (*Min.*) A secondary mineral occurring with the zeolites in geodes in decomposed basalts and other igneous rocks. Composition: hydrated silicate of potassium and calcium. Also called FISH-EYE (q.v.).

apophy'sate (*Bot.*). Possessing an apophysis.

apoph'ysis, *or* a-pof-ī'zis (*Bot.*). (1) The swollen distal end of the seta beneath a moss sporangium.—(2) An enlargement of the distal end of the scale of a pine cone.—(3) A swelling on a fungal hypha beneath a sporangium or other reproductive structure.

apophysis (*Geol.*). A vein-like offshoot from an igneous intrusion.

apophysis (*Zool.*). In *Vertebrata*, a process from a bone, usually for muscle attachment: in *Insecta*, a ventral chitinous ingrowth of the thorax for muscle insertion.

ap'oplexy (*Med.*). Sudden loss of consciousness and paralysis as a result of haemorrhage into the brain or of thrombosis of a cerebral artery.

ap'opyle (*Zool.*). In *Porifera*, the opening by which water escapes from a flagellated chamber.

apor'ogamy (*Bot.*). The entrance of the pollen tube into the ovule by a path other than through the micropyle.

aposemat'ic coloration (*Zool.*). Warning coloration, such as the gaudy colours of some stinging insects.

ap'osporog'ony (*Zool.*). In certain *Sporozoa*, the suppression of sporogony in the life-cycle.

ap'ospor'y (*Bot.*). The elimination of spore formation from the life-history, and the formation of the gametophyte from vegetative tissues and not from a spore.

apos'trophe (*Bot.*). The position assumed by chloroplasts in bright light, when they lie against the radial walls of the cells of the palisade layer.

apothe'cium (*Bot.*). An open, cup-shaped fructification, or a club-shaped derivative from it, producing ascospores; occurs in *Discomycetes* and *Discolichenes*.

ap'otro'pous (*Bot.*). The condition of an anatropous ovule with a ventral raphe.

Appala'chian revolution (*Geol.*). A period of intense mountain-building movements in post-Permian, pre-Triassic times during which the deposits in the Appalachian and Cordilleran geosynclines were folded to form the Appalachian and Palaeocordilleran mountains. Equivalent to, but later than, the Armorican and Hercynian movements in Europe.

apparat'o reticulare (*Zool.*). See **Golgi apparatus.**

apparatus rack (*Teleg.*, *Teleph.*). In telephone manual and automatic exchanges and telegraph stations, a steel structure on which large quantities of similar apparatus are uniformly mounted.

apparatus room (*Auto. Teleph.*). The room in which the automatic telephone switching apparatus is collected together and mounted on racks.

apparent altitude (*Astron.*, *Surv.*). The *altitude* (q.v.) of (usually) a heavenly body as directly observed instrumentally.

apparent depression of horizon (*Astron.*, *Surv.*). See **dip of the horizon.**

apparent expansion, coefficient of (*Phys*). The value of the coefficient of expansion of a liquid which is obtained by means of a dilatometer if the expansion of the dilatometer is neglected. It is equal to the difference between the true coefficient of expansion of the liquid and the coefficient of cubical expansion of the dilatometer.

apparent horizon (*Surv.*). See **visible horizon.**

apparent magnitude (*Astron*). See **magnitudes.**

apparent power (*Elec. Eng.*). A term occasionally used to denote the volt-amperes (i.e. the product of volts and amperes) in an a.c. circuit.

apparent resistance (*Elec. Eng.*). See **impedance.**

apparent solar day (*Astron.*). See **day.**

apparent solar time (*Astron.*). The hour angle, at any moment, of the *true*, or *apparent, sun* as distinguished from the *mean sun*. Apparent noon, for example, is the instant of the meridian transit of the true sun, and an apparent solar day the interval, not uniform, between two such transits. Sundials read apparent solar time.

appearing (*Typog*). A term referring to the length of the actual printed matter on a page, exclusive of white space.

appendage (*Bot.*). A general term for any external outgrowth which does not appear essential to the growth or reproduction of the plant.

appendage (*Zool.*). A projection of the trunk, as the parapodia and tentacles of *Polychaeta*, the sensory tentacle in *Apoda*, the fins of Fish, and the limbs of land Vertebrates: in *Arthropoda*, almost exclusively one of the paired, metamerically arranged, jointed structures with sensory, masticatory or locomotor function, but also used for the wings of *Insecta*.

appendicec'tomy, appendec'tomy (*Surg.*). The surgical removal of the appendix vermiformis.

appendici'tis (*Med.*). Inflammation of the appendix vermiformis.

appendicled (*Bot.*). Bearing small appendages.

appendicos'tomy (*Surg.*). An artificial opening in the appendix through which the bowel may be irrigated: the operation for making this opening.

appendic'ular (*Zool.*). Pertaining to, or situated on, an appendage.

appendicula'ria larva (*Zool.*). See **Ascidian tadpole.**

appendic'ulate (*Bot.*). (1) Bearing appendages.—(2) Retaining fragments of the veil.—(3) Having outgrowths at the throat of the corolla.

appendix (*Zool.*). An outgrowth.

appendix interna (*Zool.*). In *Leptostraca*, *Euphausiacea*, and some *Decapoda*, a process from the base of the inner margin of the pleopods.

appendix vermifor'mis (*Anat.*, *Zool.*). In some *Mammalia*, the distal rudiment of the caecum of the intestine, which in Man is a narrow, blind tube of gut from one to nine inches in length.

appla'nate (*Bot.*). Horizontally expanded.

applaus'eograph (*Acous.*). A recording noise-meter, suitable for recording applause or laughter in a theatre; used for assessing the value of a performance.

apple (*Cinema.*). Colloquialism for a thermionic valve for use in an audio-frequency amplifier.

Applecross Series (*Geol.*). The middle division of the Torridonian or Torridon Sandstone, the youngest Pre-Cambrian rocks in the N.W. Highlands. Consist of coarse-grained feldspathic sandstones (arkoses).

Appleton layer (*Radio*). One of the family of ionised regions in the upper atmosphere which acts as a reflector of radio waves. Frequently called the F-LAYER (q.v.).

applied (*Bot.*). Lying upon another member by a flat surface.

applied power (*Elec. Comm.*). The power applied to an electrical transducer is not equal to the actual power received, because of the reflection of power arising from non-equality of impedance matching. The *applied power* is the power which would be received if the load matched the source in impedance.

applied pressure (*Elec. Eng.*). The potential difference which is applied between the terminals of an electric circuit.

appliqué, a-plē-kā' (*Textiles*). (1) Ornament attached to the surface of a fabric.—(2) A lace in which the body and the design are made separately.

apposition (*Bot.*). The growth in thickness of the cell wall by the deposition of successive laminae of wall material.

apposition image (*Zool.*). See **mosaic image.**

appressor'ium (*Bot.*). (1) A flattened outgrowth which attaches a parasite to its host.—(2) A modified hypha closely applied to the surface of the host and facilitating the entry of a parasitic fungus into a plant cell.

approach (*Civ. Eng.*). The access road leading to a bridge or tunnel.

approach, velocity of (*Hyd.*). See **velocity of approach.**

approximate (*Bot.*). (1) Crowded together but not joined.—(2) (Of gills of agarics) approaching but not touching the stipe.

approximate quantities (*Build.*). A statement of materials and labour required on proposed building works, containing items not completely analysed into individual trade operations, such operations being grouped together, e.g. floors, including concrete, sleeper walls, plates, joists, floor boards.

appulse (*Astron.*). A term, now obsolete, which had two meanings in seventeenth-century astronomy: (1) The coming of a star or planet to the meridian; and (2) the coming to conjunction of two heavenly bodies.

apron (*Aero.*). A firm surface of concrete or 'tarmac' laid down adjacent to aerodrome buildings to facilitate the movements, loading, and unloading, of aeroplanes.

apron (*Carp.*). The wedge securing the bit of a plane.

apron (*Eng.*). (In a lathe) that part of the saddle enclosing the gear operated by the lead screw.

apron (*Furn.*). A slatted or pleated textile screen partly filling the under part of a sideboard or writing-table.

apron (*Hyd. Eng.*). (1) The protecting slope on the downstream side of the sluices of a lock-gate or dam provided to withstand the force of the falling water.—(2) The bags of concrete, blocks of masonry, etc., deposited around the toe of a sea-wall in order to protect its base from scour caused by the returning wave.

apron (*Plumb.*). The lead-sheeting or 'flashing' which is used to divert the drip from a wall into a gutter.

apron cloths (*Textiles*). Cotton fabrics, generally blue-and-white checks; also made with a figured border at one side, intended to lie across the apron.

apron conveyor (*Eng.*). A conveyor for transporting packages or bulk materials, consisting of a series of metal or wood slats attached to an endless chain, and forming a continuous 'apron.' Also called SLAT CONVEYOR.

apron lining (*Join.*). A lining of wrought boarding covering the rough apron-piece of a staircase at a landing.

apron piece (*Join.*). The horizontal timber carrying the upper ends of the carriage pieces or rough-strings of a wooden staircase. Also called a PITCHING-PIECE.

apron plate (*Mining*). An amalgamated copper plate placed in front of the discharge screens of a stamp battery for crushing gold ores.

apro'terodont (*Zool.*). (Of *Vertebrata*) lacking premaxillary teeth.

apse or **apsis** (*Build.*). The semicircular or polygonal recess, either arched or dome-roofed, terminating the choir or chancel of a church.

apse line (*Astron.*). The diameter of an elliptic orbit which passes through both foci and joins the points of greatest and least distance of a planet from the sun, or of the moon from the earth. Also called LINE OF APSIDES.

apteria, ap-tēr'i-a (*Zool.*). In carinate Birds, patches which are naked or covered with down only, lying between the tracts of contour feathers.

apt'erous (*Zool.*). Without wings.

apterygial, ap-ter-ij'i-al (*Zool.*). Without wings: without fins.

Apterygo'ta, ap-ter-i-gō'ta (*Zool.*). A subclass of *Insecta* of small size and retiring habits. They never exhibit any traces of wings; metamorphosis is slight or absent; the mandibles are similar to those of the *Crustacea*, and a pair of maxillulae occurs; they occur in all parts of the world.

Aptian Stage (*Geol.*). A division of the Cretaceous System lying between the Neocomian below and the Albian above; approximately equivalent to the English Lower Greensand.

apty'alism (*Med.*). Deficiency or absence of salivary secretion.

apy'rene (*Zool.*). Said of spermatozoa which develop without maturation divisions and have no nucleus, but possess a number of parallel filaments which are derived from the centrosome of the first spermatocyte; as in certain Gastropods.

apyrex'ia (*Med.*). Absence of fever.

aq (*Chem.*). A symbol representing a large volume of water.

aq'ua fortis (*Chem.*). Concentrated nitric acid.

aqua re'gia (*Chem.*). A mixture consisting of one volume of concentrated nitric acid to four volumes of concentrated hydrochloric acid.

Aquadag (*Chem.*). A proprietary colloidal dispersion of finely ground graphite in water; used for lubrication. See **Oildag**.

aquamarine (*Min.*). A variety of **beryl**, of attractive blue-green colour, used as a gemstone.

aquamotrice, —trēs' (*Civ. Eng.*). A dredging implement like the *bag-and-spoon dredger* (q.v.), but having, hinged to the handle in such a way that it can be turned over to release its contents, an iron scoop or bucket instead of the bag.

aquarium (*Cinema.*). Colloquialism for the booth or sound-proof enclosure in which, in sound-film production, mixing is executed.

Aquarius (*Astron.*). Water-carrier. Eleventh sign of the *Zodiac* (q.v.).

aquatint (*Photog.*). Same as gum-bichromate print, in which imbibition printing is effected on paper coated with gum arabic in which the pigment is dispersed.

aquatint (*Print.*). An intaglio printing process using a copper plate grained by coating with a resinous solution and etching. The varying tones are produced by further etching or by burnishing.

aqueduct (*Civ. Eng.*). An artificial conduit used to convey water, generally for long distances, for public supply purposes.

aqueduct (*Zool.*). A channel or passage filled with or conveying fluid; in higher Vertebrates, the reduced primitive ventricle of the mid-brain

aqueductus Sylvii (*Zool.*). In *Vertebrata*, the ventricle of the mid-brain.

aqueductus vestib'uli (*Zool.*). In certain Fish, the canal by which the otocysts retain their connexion with the exterior.

aqueous. Made by, or pertaining to, water.—(*Chem.*) Consisting largely of water.

aqueous humour (*Zool.*). In *Vertebrata*, the watery fluid filling the space between the lens and the cornea of the eye.

aqueous rocks (*Geol.*). A name, dating from the times of Werner and Hutton, to cover those rocks thought to have been precipitated from the primaeval ocean. Cf. *igneous rocks*.

aquiculture (*Zool.*). Augmentation of aquatic animals of economic importance by direct methods. cultivation of the resources of the sea and inland waters as distinct from their exploitation.

aquin'tocu'bitalism (*Zool.*). See **diastataxy.**

aquo-system (*Chem.*). An ionic system in water.

A.R. (*Chem.*). Abbrev. for *analytical reagent*, indicating a definite standard of purity of a chemical.

Ar (*Chem.*). (1) An alternative symbol for *argon*.—(2) A general symbol for an aryl, or aromatic, radical.

ar- (*Chem.*). An abbrev. indicating substitution in the aromatic nucleus.

arabesque, —bèsk' (*Build.*). An ornamental work used in decorative design for flat surfaces; consists usually of interlocked curves which may be painted, inlaid, or carved in low relief.

ar'abin process (*Photog.*). Same as *gum-bichromate process* (q.v.).

arab'inose (*Chem.*). *l*-Arabinose, $C_5H_{10}O_5$, is produced by boiling gum-arabic, cherry gum, or beetroot chips with dilute sulphuric acid; prisms soluble in water forming a dextro-rotatory solution. Arabinose is a mono-saccharose belonging to the pentose group. See **pentoses.**

arab'itol (*Chem.*). A pentahydric alcohol, $OH{\cdot}CH_2{\cdot}(CH{\cdot}OH)_3{\cdot}CH_2{\cdot}OH$. This is the alcohol corresponding to *arabinose* (q.v.).

ar'achis oil (*Chem.*). Peanut oil.

ar'achnac'tis (*Zool.*). In certain *Anthozoa*, a pelagic larval form.

Arach'nida (*Zool.*). A class of mainly terrestrial *Arthropoda* which breathe by gill-books, lung-books, or tracheae; the head is usually coalesced with the thorax and bears no antennae; the appendages are uniramous; there are four pairs of thoracic walking legs, a pair of pedipalps of variable form and usually a pair of chelicerae. King Crabs, Scorpions, Spiders, Mites, Ticks, etc.

arachnid'ium (*Zool.*). In Spiders, the spinnerets and silk glands.

arach'noid (*Bot.*, *Zool.*). Cobweb-like. Formed of entangled hairs or fibres; pertaining to or resembling the *Arachnida*; one of the three membranes which envelop the brain and spinal cord of Vertebrates, lying between the dura mater and the pia mater.

araeostyle, a-rē'ō-stil (*Build.*). A colonnade in which the space between the columns is equal to or greater than four times the lower diameter of the columns.

araeosys'tyle (*Build.*). A colonnade in which the distance between the columns is alternately wide and narrow.

ar'agonite (*Min.*). The relatively unstable, orthorhombic form of crystalline calcium carbonate, deposited from warm water, but prone to inversion into calcite. See also **flos ferri.**

Arago's rotations (*Elec. Eng.*). Experiments (conducted by Arago before the discovery of electromagnetic induction by Faraday) in which a rotating copper disc was made to cause rotation of a pivoted magnet.

Aran'eae (*Zool.*). An order of *Embolobranchiata* in which the prosoma is joined to the apparently unsegmented opisthosoma by a narrow waist; silk-glands occur opening by spinnerets on the opisthosoma; the chelicerae contain poison glands; the pedipalpi are leglike and tactile, but modified in connexion with fertilisation in the male; respiration is by lung-books, or tracheae, or both; predaceous cosmopolitan forms. Spiders.

ara'neous (*Zool.*). Cobweb-like.

arbor (*Horol.*). The axis or shaft upon which a rotatable part is mounted: the shaft upon which a wheel or pinion is mounted. See **barrel arbor, fusee arbor.**

Arbroath Sandstone (*Geol.*). A series of coarse red sandstones and red flags, some 1200 feet in thickness, occurring high up in the Lower Old Sandstone of the Midland Valley of Scotland. It splits into large, flat sandstones (*Arbroath Flags* or *Dundee Sandstone*) and is much used for paving, being hard and durable, and very impervious to moisture.

arbuscle (*Bot.*). (1) A dwarf tree or shrub of tree-like habit.—(2) A much-branched haustorium formed by some endophytic fungi, and later digested by the cells of the host.

ar'butin (*Chem.*). A glucoside obtained from the bear-berry.

arc. A portion of a circle, or of any other conic section such as a parabola, hyperbola, or ellipse.

arc (*Elec.*). A luminous discharge of electricity through an ionised gas. See **arc lamp, enclosed arc lamp,**

also **flame—** **open—**
iron— **rotary—**
mirror— **sun—**

arc absorber (*Auto. Teleph.*). See **absorber.**

arc balance (*Horol.*). See **balance (arc).**

arc-boutant, ar-boo-tahn^{g}' (*Build.*). See **flying buttress.**

arc-control device (*Elec. Eng.*). A device fitted to the contacts of a circuit-breaker in order to facilitate the extinction of the arc.

arc converter (*Radio*). The electrode system and associated cooling equipment, magnetic field, and hydrogen-atmosphere container of an arc-generator.

arc crater (*Elec. Eng.*). A depression formed in the electrodes between which an electric arc has been maintained. The term is frequently used in connexion with arc welding, in which case the depression occurs in the weld metal.

arc deflector (*Elec. Eng.*). A magnetic arrangement for controlling the position of the arc in an arc lamp. Also used to denote an arc shield.

arc duration (*Elec. Eng.*). A term used, in connexion with switches and circuit-breakers, to denote the period of time during which the arc exists between the contacts. In a.c. circuits it is usually measured in cycles, and may vary between half a cycle and 20 cycles or more.

arc furnace (*Elec. Eng.*). An electric furnace in which the heat is produced by means of an electric arc between carbon electrodes, or between a carbon electrode and the furnace charge.

See **direct—** **Héroult furnace**
indirect— **Stassano furnace.**
Girod furnace

arc generator (*Radio*). A high-frequency generator which depends for its action on the negative-slope resistance of an arc discharge.

arc lamp (*Illum., etc.*). A form of electric lamp which makes use of an electric arc between two carbon electrodes as the source of light. It has an extremely high intrinsic brilliance, and is therefore used for searchlights, spotlights, etc.

See **carbon—** **mirror—** **tungsten—**

arc-lamp carbon (*Illum.*). A cylindrical stick of carbon used as the electrode of a carbon arc lamp. The diameter is usually between about ¼ inch and 1 inch.

arc lighting (*Illum.*). Lighting by means of arc lamps, now almost obsolete except for theatre spot-lights, searchlights, and cinema-studio lighting

arc-lighting dynamo (*Elec. Eng.*). A special form of dynamo arranged to give a constant current; used for supplying a number of arc lamps in series.

arc modulation (*Television*). In a mechanical scanning system, modulation of the intensity of the light-source by variation of the current in an arc discharge.

arc of approach (*Eng.*). The arc on the pitch circle of a gear-wheel over which two teeth are in contact and approaching the pitch point.

arc of contact (*Eng.*). The arc on the pitch circle of a gear-wheel over which two teeth are in contact.

arc of recess (*Eng.*). The arc on the pitch circle of a gear-wheel over which two teeth are in contact while receding from the pitch point.

arc process (*Chem.*). The fixation of nitrogen by passing air or air and oxygen through an electric arc; the nitric oxide thus formed is cooled rapidly and allowed to oxidise to nitrogen dioxide, which is dissolved in water to form dilute nitric acid.

arc rectifier (*Elec. Eng.*). A rectifier in which an arc is maintained between two electrodes, the cathode being kept at incandescence by the passage of the rectified current. See **mercury-arc rectifier, tungar rectifier, atmospheric-arc rectifier.**

arc shield (*Elec. Eng.*). A shield of fireproof material, usually an asbestos compound, placed adjacent to the contacts of certain types of switchgear to confine the arc and prevent its spreading to adjacent metalwork. Also called ARC DEFLECTOR.

arc spectrum (*Light*). A spectrum originating in the non-ionised atoms of an element; usually capable of being excited by the application of a comparatively low stimulus, such as the electric arc. See **spark spectrum.**

arc stream voltage (*Elec. Eng.*). The voltage drop along the arc stream of an electric arc. It does not include the voltage drop at the anode and cathode.

arc suppression coil (*Elec. Eng.*). See **Petersen coil.**

arc suppressor (*Elec. Eng.*). A device for automatically earthing the neutral point of an insulated-neutral transmission or distribution line in the event of an arcing ground being set up. Also called ARCING-GROUND SUPPRESSOR.

arc system (*Radio*). A radio communication system employing an arc transmitter.

arc transmitter (*Radio*). A radio transmitter in which the source of the high-frequency current is an arc discharge.

arc voltage (*Elec. Eng.*). The total voltage across an electric arc, i.e. the sum of the arc stream voltage, the voltage drop at the anode and the voltage drop at the cathode. The term is frequently used in connexion with arc welding, and with the arc in a switch or circuit-breaker.

arc welding (*Elec. Eng.*). A process for the joining of metal parts by fusion in which the heat necessary for the fusion is produced by means of an electric arc struck between two electrodes or between an electrode and the metal. See **automatic— carbon— metal— quasi—**

arcade (*Build.*). (1) A series of arches, usually in the same plane, supported on columns, e.g. the nave arcades in churches. When filled in with masonry, it becomes a 'blind arcade.'—(2) An arched passage, especially one having shops on one or both sides.

arcade (*Zool.*). In higher Vertebrates, a bar of bone bounding one of the vacuities or fossae of the skull.

arch (*Civ. Eng.*). A form of structure having a curved shape, used to support loads or to resist pressures.

arch (*Zool.*). A curved or arch-shaped skeletal structure supporting, covering, or enclosing an organ or organs, as *zygomatic arch*, *haemal arch*, *neural arch* (qq.v.). See also **arcualia.**

arch bar (*Build.*). A flat bar of iron or steel used to support a flat arch in position.

arch brick (*Build.*). A brick having a wedge shape, especially one with a curved face suitable for wells and other circular work.

arch bridge (*Civ. Eng.*). A bridge that depends on the principle of the arch for its stability. See **rigid arch, two-hinged arch, three-hinged arch.**

arch buttress (*Build.*). See **flying buttress.**

arch stone (*Civ. Eng.*). A stone shaped like a wedge, and used as a constituent part in an arch. Also called VOUSSOIR.

Archaean rocks (*Geol.*). Rocks which are older than, and therefore lie beneath, the Cambrian System. Equivalent to *Pre-Cambrian*; sometimes restricted to the older, crystalline part of the Pre-Cambrian.

archaeo- (Greek *archaios*, ancient). A prefix used in the construction of compound terms; e.g. *archaeozoic*, pertaining to the age of the most primitive forms of life, i.e. the period of the formation of the *Archaean rocks* (q.v.).

ar'chaeocyte (*Zool.*). In *Porifera*, a granular cell occurring in the blastocoel, later becoming a wandering cell which may develop into a reproductive cell.

Archaeor'nithes (*Zool.*). A subclass of *Aves* which comprises only the extinct form *Archaeopteryx* and its allies; characterised by the possession of a long lizard-like tail, teeth in the jaw, and claws at the tips of the fingers. Cf. *Neornithes.*

archaeosto'matous (*Zool.*). Having a persistent blastopore, which gives rise to the mouth.

archam'phias'ter (*Cyt.*). The amphiaster which, during maturation divisions of the germ-cells, forms the first or second polar body.

arche- (Greek *archē*, beginning). A prefix used in the construction of compound terms; e.g. *archencephalon* (q.v.).

archecen'tra (*Zool.*). In *Vertebrata*, centra formed by the enlargement of the bases of the arch-elements which grow around the notocord outside its primary sheath; cf. *chordacentra.*—*adjs.* **archecen'trous, arcicen'trous, arcocen'trous.**

arched beam (*Carp.*). A beam formed into an arched shape in order to support a structure such as a roof.

arched buttress (*Build.*). See **flying buttress.**

archedic'tyon (*Zool.*). In Insects of generalised structure, an irregular network of veins found between the principal longitudinal veins of the wing, in which no definite cross veins are present.

Ar'chego'nia'tae (*Bot.*). One of the main divisions of the plant kingdom, including the *Bryophyta* and *Pteridophyta*, with a few thousand species. Characterised by the presence of the archegonium as the female organ, and by the regular alternation of gametophyte and sporophyte in the life-cycle.

archego'niophore, archego'nial receptacle (*Bot.*). A branch of the thallus-bearing archegonia.

archego'nium (*Bot.*). A sessile or stalked organ, bounded by a multicellular wall, and flask-shaped in general outline. It consists of a chimney-like neck containing an axial series of neck-canal cells, and a swollen venter below, containing a single egg and a ventral-canal cell. The archegonium is the female organ of *Bryophyta* and *Pteridophyta*, and, in a slightly simplified form, of most *Gymnospermae.*

ar'chenceph'alon (*Zool.*). In *Vertebrata*, the primitive forebrain; the cerebrum.

archen'teron (*Zool.*). In an embryo, the cavity formed during gastrulation which later gives rise to the gut, and in some cases also to the coelom.

archespor'ium (*Bot.*). Spore-producing tissue.

archi- (Greek *archi-*, first, chief). A prefix used in the construction of compound terms; e.g. *archicerebrum* (q.v.).

Archiannel'ida (*Zool.*). A class of *Annelida*, of small size and marine habit, which usually lack setae and parapodia and have part of the epidermis ciliated; the nervous system retains a close connexion with the epidermis; they resemble the *Polychaeta* in many of their characteristics.

archiben'thal, archiben'thic (*Zool.*). Pertaining to, or living on the steep slopes of, the continental shelf leading down into deep water, as the *archibenthal* fauna.

ar'chiblast (*Zool.*). The protoplasm of the ovum.

archiblas'tic (*Zool.*). Exhibiting total and equal segmentation: pertaining to the protoplasm of the egg: pertaining to an *archiblastula* (q.v.).

archiblas'tula (*Zool.*). A regular spherical blastula, having cells of approximately equal size.

ar'chicarp (*Bot.*). The female branch in *Ascomycetes*, or a derivative from it.

archicer'ebrum (*Zool.*). In *Invertebrata*, a median anterior ganglion forming part of the 'brain' but not associated with any particular somite: the ganglia of the first somite with the ganglia anterior to them: generally, the primitive brain.

Ar'chichlamyd'eae (*Bot.*). A large subdivision of Dicotyledons, including many thousands of species. The flowers are either without a perianth, or have a calyx only, or possess a corolla consisting of a number of distinct petals.

ar'chicoel, —sēl (*Zool.*). See **blastocoel.**

Archime'dean drill (*Eng.*). A drill in which to-and-fro axial movement of a nut on a helix causes an alternating rotary motion of the bit.

Archimedean screw (*Hyd. Eng.*). An ancient water-lifting contrivance—a hollow inclined screw (or a pipe wound in helix fashion around an inclined axis) which had its lower end in water so that, on rotation of the 'screw,' water rose to a higher level.

Archimedes' principle (*Phys.*). When a body is wholly or partly immersed in a fluid, it suffers a loss in weight equal to the weight of fluid which it displaces.

Archimyce'tes (*Bot.*). A group of fungi, with some hundreds of species, which contains the simplest fungi known. The species are mostly aquatic, often of the simplest organisation, and commonly multiply by means of zoospores.

archineph'ric (*Zool.*). In *Vertebrata*, pertaining to the archinephros (see **pronephros**): in *Invertebrata*, pertaining to the larval kidney or *archinephridium* (q.v.).

archinephrid'ium (*Zool.*). In *Invertebrata,* the larval excretory organ, usually a solenocyte.

archineph'ros (*Zool.*). See **pronephros.**

archipal'lium (*Zool.*). In *Vertebrata,* that part of the cerebral hemispheres not included in the olfactory lobes and corpora striata, and comprising the hippocampus and the olfactory tracts and associated olfactory matter: that part of the pallium excluding the neopallium.

archiplasm (*Zool.*). See **archoplasm.**

archipterygium, —ter-ij'i-um (*Zool.*). In *Vertebrata,* a biserial appendage having a jointed central axis and two rows of jointed rays, as the paired fins of *Ceratodus.*

architectural acoustics (*Acous.*). The study of the propagation of sound-waves in interiors, the results being applied to the design of studios and auditoriums for optimum audition.

archit'omy (*Zool.*). In *Annelida,* a form of reproduction by fission, in which regeneration takes place after separation. Cf. *paratomy.*

ar'chitrave (*Build.*). The lowest part of an entablature in immediate contact with the abacus on the capital of a column. Also called EPISTYLE.—(*Carp.*) The mouldings surrounding a door or window opening, including the lintel.

architrave block (*Carp.*). The block, placed at the foot of the side moulding around a door opening, into which the skirting fits.

architrave cornice (*Build.*). An entablature consisting of only two parts, the architrave or lower part and the cornice or upper projecting part.

architrave jambs (*Carp.*). The mouldings at the sides of a door or window opening.

ar'chitype (*Zool.*). A primitive type from which others may be derived.

ar'chivolt (*Build.*). An ornamental moulding carried around the face of an arch.

ar'choplasm, arcoplasm, archiplasm (*Cyt.*). In cell-division, the substance of the radiations surrounding the centrosome, consisting in part of hyaloplasm from the cell-body, and in part of achromatin from the nucleus: peculiarly modified cytoplasm found in connexion with the Golgi apparatus: idioplasm.

archoplasmic apparatus (*Cyt.*). In cell-division, the asters, and the spindle-shaped bundle of fibres between them.

arcicen'trous (*Zool.*). See **archecentra.**

arcif'erous (*Zool.*). Having the two halves of the pectoral girdle overlapping ventrally, and not firmly united. Cf. *firmisternous.*

arcing contact, ark-ing (*Elec. Eng.*). An auxiliary contact fitted to a switch or circuit-breaker, arranged so that it opens after and closes before the main contact, thereby bearing the brunt of any burning due to the arc which occurs when a circuit is interrupted. It is designed so that it can easily be replaced. Also called ARCING TIPS.

arcing ground (*Elec. Eng.*). A fault on a power-transmission system caused by an arc between a conductor and earth. Usually most severe in insulated-neutral systems.

arcing-ground suppressor (*Elec. Eng.*). See **arc suppressor.**

arcing horn (*Elec. Eng.*). Diverging projections pointing vertically upwards so that an arc struck between the lower extremities will travel, under the influence of natural electromagnetic forces, towards upper extremities and extinguish itself. See **insulator arcing horn.**

arcing ring (*Elec. Eng.*). A conductor in the form of a circular or oval ring placed concentrically with the insulators of a suspension insulator string for the purpose of deflecting an arc from the insulator surfaces.

arcing shield (*Elec. Eng.*). See **grading shield.**

arcing tips (*Elec. Eng.*). See **arcing contact.**

arcing voltage (*Elec. Eng.*). The voltage below which a voltage cannot be maintained between two electrodes.

arcocen'trous (*Zool.*). See **archecentra.**

arcoplasm (*Zool.*). See **archoplasm.**

Arctic Circle. The parallel of latitude 66° 33′ N., bounding the region of the earth surrounding the north terrestrial pole, this parallel being the locus of points where the sun touches the horizon but does not set at the summer solstice.

Arctic Ocean. The ocean surrounding the North Pole, within the Arctic Circle.

arcua'lia (*Zool.*). In developing vertebrae, cartilage elements derived in part from the sclerotomes, in part from the perichordal sheath of the notochord; they give rise by their fusion to the neural and haemal arches, and, in some cases, also to part of the centrum.

arc'uate (*Bot., Zool.*). Bent like a bow.

ar'culus (*Zool.*). A characteristic feature of the wing venation of certain Insects (as zygopterous *Odonata*); it consists of two thickened veins so joined as to form an arc.

arcus seni'lis (*Med.*). Fatty degeneration of the periphery of the cornea in old people.

Arden Sandstone (*Geol.*). A group of sandstones occurring in the English Midland counties high up in the Keuper Marl, and containing fossil fish and plant remains.

are (*Surv.*). The metric unit of area, equal to the area enclosed in a square of 10 metres side. 1 are = 119 6 sq. yds.

area (*Build.*). The sunken space around the basement of a building, providing access and natural lighting and ventilation.

area (*Surv.*). In plane surveying, area is the superficial content of a ground surface of definite extent, as projected on to a horizontal plane.

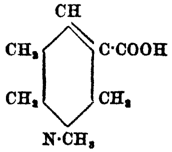
area opa'ca (*Zool.*). In developing Reptiles and Birds, a whitish peripheral zone of blastoderm, in contact with the yolk.

area pellu'cida (*Zool.*). In developing Reptiles and Birds, a central clear area of blastoderm, not in direct contact with the yolk.

area vasculo'sa (*Zool.*). In developing Reptiles and Birds, part of the extra-embryonic blastoderm, in which the blood-vessels develop.

areal velocity (*Astron., etc.*). The rate, constant in elliptic motion, at which the radius vector sweeps out unit area.

ar'ecaine (*Chem.*). Arecadeine, $C_7H_{11}O_2N \cdot H_2O$, an alkaloid of the pyridine group, obtained from the areca or betel-nut palm (*Areca catechu*); colourless four- or six-sided plates, m.p. 222°-223° C, soluble in water, insoluble in most organic solvents. It has the following constitution:



arena'ceous, arenic'olous (*Bot.*). Growing best in sandy soil.—(*Zool.*) Occurring in sand: composed of sand or similar particles, as the shells of some kinds of *Radiolaria.*

arenaceous rocks (*Geol.*). Sediments consisting essentially of sand grains, that is, of quartz and rock fragments down to 0·005 mm. in size. Conglomerates, sandstones, grits, and siltstones fall in this category.

Ar'enig Series (*Geol.*). The lowest (oldest) series of rocks in the Ordovician System, taking their name from Arenig mountain in N. Wales, where they were originally described by Adam Sedgwick.

areola, ar'e-ō'la *or* ar-ē'ol-a (*Bot.*). (1) A small space delimited by lines or cracks on the surface of a lichen.—(2) A small pit.—(*Zool.*) (1) One of the spaces between the cells and fibres in certain kinds of connective tissue.—(2) In the Vertebrate eye, that part of the iris bordering the pupil.—(3) In *Mammalia*, the dark-coloured area surrounding a nipple.—*pl.* **areolae.**

areolar, areolate (*Bot., Zool.*). (1) Divided into small areas or patches.—(2) Pitted.—(3) Pertaining to an areola.

areolar tissue (*Zool*). A type of connective tissue consisting of cells separated by a mucin matrix in which are embedded bundles of white and yellow fibres.

areolation (*Bot*). The net pattern formed by the boundaries of cells.

ar'eole (*Bot*). The area occupied by a group of spines or hairs on a cactus.

a'reopyknom'eter (*Chem.*). An instrument for the measurement of the specific gravity of viscous liquids.

Ar'gand burner (*Illum.*). A form of gas- or oil-burner in which air is admitted to the inside of a cylindrical wick, ensuring a large area of contact between the flame and the fuel.

Argand diagram (*Elec. Eng.*). The usual form of vector diagram employed for showing the magnitude and phase angle of a vector quantity with reference to some other vector quantity. *

ar'gentate (*Bot.*). Of silvery appearance.

argen'teum (*Zool.*) In Fish, a reflecting layer of the dermis containing iridocytes but no chromatophores.

argentic oxide (*Chem.*). Formula, AgO. An oxide of silver.

argentiferous galena (*Min.*) See **silver lead ore.**

argentiferous lead (*Chem.*). Lead which contains silver.

ar'gentite (*Min.*). An important ore of silver, having the composition Ag_2S (silver sulphide); occurs as cubic crystals. Also called SILVER GLANCE.

argentom'eter (*Photog.*). A special form of hydrometer for ascertaining the strength of silver nitrate solution.

argentous oxide (*Chem.*). Formula, Ag_2O. A lower oxide of silver.

argilla'ceous rocks (*Geol.*). Sedimentary rocks of the clay grade, i e. composed of minute mineral fragments and crystals less than 0·005 mm. in diameter, also much colloidal material. Apart from finely divided detrital matter, they consist essentially of the so-called clay minerals, such as montmorillonite, kaolinite, gibbsite, and diaspore.

argillico'lous (*Bot.*). Living on clayey soil.

ar'ginine (*Chem.*). $H_2N{\cdot}C(.NH)\ NH{\cdot}(CH_2)_3{\cdot}CH(NH_2){\cdot}COOH$, α-amino-δ-guanidine-valeric acid, the chief constituent of salmine, a simple protamine.

argol (*Chem*). Crude cream of tartar, $KH(C_4H_4O_6)$, which separates in wine-vats as a reddish-brown crystalline deposit during the fermentation of grape juice to wine.

argon (*Chem.*). Symbol, A. A zero-valent element, one of the rare gases. At. no. 18; at. wt. 39·944. A colourless, odourless, monatomic gas; m.p. −189·2° C.; b.p. −185·7° C.; density 1·7837 gms. per litre at N.T.P. Argon constitutes about 1% by volume of the atmosphere, from which it is obtained by the fractionation of liquid air. It is used in gas-filled electric lamps.

argument (*Maths.*). The angle between a vector and its reference axis.—(*Elec. Eng.*) See under **amplitude.**

Argyll-Robertson pupil (*Med.*). Small pupil which reacts to accommodation but not to light, usually as a result of syphilis of the brain.

argy'ria (*Med.*). Pigmentation of the skin and the tissues as a result of taking preparations of silver.

Aries, ar'i-ēz (*Astron.*). Ram. First sign of the *Zodiac* (q.v.).

Aries, First Point of (*Astron.*). The point in which the ecliptic intersects the celestial equator crossing it from south to north; the origin from which both right ascension and celestial longitude are measured; the beginning of the first sign of the Zodiac. See **equinoctial points.**

a'ril (*Bot.*). An outgrowth on a seed, formed from the stalk or from near the micropyle. It may be spongy or fleshy, or may be a tuft of hairs.

a'rillate (*Bot.*). Having an aril.

aris'ta (*Zool.*). In certain Flies, as *Brachycera*, a slender bristle borne, usually dorsally, by the terminal joint of the antenna.

ar'istate (*Bot.*). Bearing a beard or awn, or other bristle-like outgrowth.

aris'togen (*Photog.*). A concentrated hydroquinone developer for chloride prints.

Aristotle's lantern (*Zool.*). In *Echinoidea*, the framework of muscles and ossicles supporting the teeth, and enclosing the lower part of the oesophagus.

arithmetic. The science of numbers, including such processes as addition, subtraction, multiplication, division, and the extraction of roots.

arkose (*Geol.*). An arenaceous sedimentary rock, like sandstone in its general characters, but containing feldspar to the extent of at least 10%; formed by the disintegration of acid igneous rocks and gneisses.

arm (*Elec. Comm*). The part of an electrical filter between two terminals, or where circuits divide.

arm (*Elec. Eng.*). See **brush-holder arm, cross arm.**

arm (*Zool.*). In *Brachiopoda*, part of the lophophore: in *Echinodermata*, a prolongation of the body in the direction of a radius; in *Cephalopoda*, one of the tentacles surrounding the mouth: in *Pterobranchia*, a hollow, branched, ciliated protrusion of the collar: in bipedal *Mammalia*, one of the upper limbs.

arm of eccentricity (*Struct.*). The *eccentricity* (q.v.).

armature (*Elec.*). A moving part in a magnetic circuit to indicate the presence of electric current as the agent of actuation, as in all relays, electric bells, sounders, telephone receivers, and some loud-speaker mechanisms.—(*Teleph.*) See **isthmus armature** *. — (*Elec. Eng.*) (1) ARMATURE OF A MACHINE, that part of an electric machine in which, in the case of a generator, the e.m.f. is produced; or, in the case of a motor, the torque is produced. It includes the winding through which the main current of the machine passes and the portion of the magnetic circuit upon which the winding is mounted. It may be stationary or rotating. See **drum armature, ring armature.**—(2) ARMATURE OF A PERMANENT MAGNET, a piece of ferro-magnetic material placed across the poles of a permanent magnet in order to complete the magnetic circuit and reduce demagnetisation. Also called KEEPER.

armature bands (*Elec. Eng.*). Steel wire or bands placed round a rotating armature on an electric machine to prevent the conductors being forced out under the action of centrifugal force.

armature bars (*Elec. Eng.*). Rectangular copper bars forming the conductors on the armature in large electric machines having only a few conductors per slot.

armature coil (*Elec. Eng.*). An assembly of conductors ready for placing in the slots of the armature of an electric machine.

armature conductor (*Elec. Eng.*). One of the wires or bars on the armature of an electric machine.

armature core (*Elec. Eng.*). The assembly of laminations forming the magnetic circuit of the armature of an electric machine. The thickness of each lamination is usually of the order of 0·5 mm.

armature core disc (*Elec. Eng.*). A complete circular lamination ready for building up to form the armature core of an electric machine. See **segmental core disc.**

armature ducts (*Elec. Eng.*). Air passages built into the armature core of an electric machine to allow of the flow of cooling air.

armature end connexions (*Elec. Eng.*). The portion of the armature conductors which project beyond the end of the armature core, and which are used for making the connexions between the various conductors. Also called OVERHANG.

armature end-plate (*Elec. Eng.*). The end-plate of a laminated armature core. It is of sufficient mechanical strength to enable the laminations to be clamped together tightly to prevent vibration. Sometimes also called the ARMATURE HEAD.

armature head (*Elec. Eng.*). See **armature end-plate.**

armature reactance (*Elec. Eng.*). A reactance associated with the armature winding of a machine, caused by armature leakage flux, i.e. flux which does not follow the main magnetic circuit of the machine.

armature reaction (*Elec. Eng.*) The magnetomotive force produced in the magnetic circuit of an electric machine by the armature currents.

armature winding (*Elec. Eng.*). The complete assembly of conductors carried on the armature and connected to the commutator or to the terminals of the machine.

Armco iron (*Met.*). A soft iron manufactured by the American Rolling Mill Corporation, with less than 1% impurities. Resistivity 6·2 by volume and 5·4 by mass, compared with copper.

armed (*Bot.*). Provided with prickles or thorns.

armed lodestone (*Elec. Eng.*). A lodestone fitted with iron pole-pieces in order to concentrate the field.

armilla (*Bot.*). See **frill.**

arming press (*Bind.*). A form of blocking press now little used.

armor. The American spelling of *armour*.

Armor'ican (*Geol.*). In the time sense, the term implies an event dating from the interval between the Carboniferous and the Permian Periods. The Armorican mountain ranges were formed at this time, and the Armorican granites were intruded in a belt of country extending from S.W. England through the Channel Islands into Brittany and Normandy (Armorica).

armour (*Bot.*). A covering of old leaf-bases on the stems of cycads and some ferns.

armour (*Mil.*). (1) *Armour plate* (q.v.).—(2) A general term for armour-protected weapons, esp. tanks in land warfare.

armour-clad switchgear (*Elec. Eng.*). See **metal-clad switchgear.**

armour clamp (*Cables*). A fitting designed to grip the armouring of a cable where it enters a box. Also called ARMOUR GLAND and ARMOUR GRIP.

armour-piercing capped shell (*Ammunition*). A.P. shell fitted with caps to ease the impact and so prevent premature break-up of the shell.

armour-piercing shell (*Ammunition*). Shell designed to perforate armour and to burst effectively on the far side. They are of forged or cast steel, and have specially hardened heads. Abbrev. A.P. SHELL.

armour plate (*Met.*). Specially heavy alloy steel plate forged in hydraulic presses, hardened on the surface; used for the protection of warships. Approximate composition: C 0·2-0·4%, Cr 1·0-3·5%, Ni 1·5-3·5%, and Mo 0-0·5%. *

armouring (*Cables*). The steel wires woven on the outside of submarine cables to protect the more delicate insulation from rocks on the sea bottom and ship's anchors, and to take the strain when the cables are laid or raised. Armouring causes eddy current loss in single-core cables, so that 66kV cables are not armoured. See also **bedding.**

Armstrong circuit (*Radio*). A name usually applied to the super-regenerative receiving circuit, but sometimes also to the supersonic heterodyne circuit.

ar'mure (*Textiles*). (1) In silk weaving, small fancy patterns or interlacings distributed over a fabric.—(2) In worsted, an embossed appearance in a dress fabric, produced by a fancy warp-rib weave.

Arnold's test (*Chem.*). A test for diacetic acid in the urine, consisting in the appearance of a purple or violet colour on treatment with solutions containing *p*-aminoacetophenone and sodium nitrite, which are prepared in a special way.

Arnott valve (*Build.*). A flap-valve fitted near the ceiling in a room to permit the escape of hot vitiated air. The air passes away into an air-flue or chimney, while back-flow is automatically prevented by the closing of the flap.

aro'lium (*Zool.*). In *Insecta*, a pad borne by the distal joint of the tarsus.

aromatic acids (*Chem.*). Acids in which the carboxyl group is attached to an aryl radical.

aromatic alcohols (*Chem.*). Derivatives of the aromatic series in which a hydroxyl group has been introduced into the side chain by replacing a hydrogen atom in a CH, CH_2, or CH_3 group.

aromatic aldehydes (*Chem.*). Compounds of the aromatic series containing the group —CHO.

aromatic compounds (*Chem.*). Benzene derivatives.

aromatic hydrogenation (*Chem.*). Hydrogenation in the naphthalene series, of such nature that hydrogenation takes place only in the unsubstituted benzene ring.

aromatic properties (*Chem.*). The characteristic properties of aromatic compounds, viz. reaction with concentrated nitric acid, forming nitro derivatives, reaction with concentrated sulphuric acid, forming sulphonated derivatives. The homologues of benzene differ from paraffins with regard to oxidation by readily forming benzene carboxylic acids. There are many other distinguishing characteristics between aromatic hydrocarbons and paraffins.

aromatic vinegar (*Chem.*). Vinegar obtained by the distillation of copper diacetate. The aromatic odour is due to the presence of acetone.

Aron meter (*Elec. Eng.*). A kilowatt-hour meter in which two clock movements act on a differential gear connected to the counting train; current in the circuit, being metered, controls the swing of one pendulum; the difference between this and the swing of the other pendulum is a measure of the energy consumption, and is registered through the differential gear.

ar'querite (*Min.*). See **silver amalgam.**

arras'tre (*Mining*). A primitive form of grinding mill still used for ores in central America and for cement in Europe. Large pieces of rock are drawn round in a circular stone-lined pit.

array (*Radio*). See **antenna array.**

arrect (*Bot.*). Rigid and erect.

arrec'tores pilo'rum (*Zool.*). In *Mammalia*, unstriated muscles attached to the hair-follicles which cause the hair to stand on end by their contraction.

arrest muscle (*Zool.*). See **catch muscle.**

arrest points (*Met.*). Discontinuities on heating and cooling curves, due to absorption of heat during heating or evolution of heat during cooling, and indicating changes occurring in a metal or alloy.

arrested crushing (*Mining*). Comminution in unscreened machines, in which the crushing surfaces approach within a given distance of one another (called the 'set') but do not touch.

arrested failure (*Cables*). The taking of a cable off voltage and examination before failure is complete. This is very instructive in determining the mechanism of breakdown.

arrester (*Elec. Eng.*). See **lightning arrester.**

arrester, spray (*Elec. Eng.*). See **spray arrester.**

arrhe'nokar'yon (*Cyt.*). A nucleus having a single set of haploid chromosomes, as in dispermy, when the two pairs of centrosomes remain apart without forming a quadripolar figure.

arrhe'noto'ky (*Zool.*). Parthenogenetic production of males.

arrhi'zal, arrhi'zous (*Bot.*). Lacking roots.

arrhyth'mia, arhythmia (*Med.*). Abnormal rhythm of the heart beat.

arris (*Build.*). The (generally) sharp exterior angle formed at the intersection of two surfaces not in the same plane (e.g. the meeting of two sides of a stone block).

arris fillet (*Build.*). A small strip of wood of triangular cross-section packed beneath the lower courses of slates or tiles on a roof in order to throw off the water which might otherwise get under the flashing.

arris gutter (*Build.*). A V-shaped gutter, usually made of wood.

arris rail (*Carp.*). A rail, with triangular cross-section, secured to posts for fences in such a manner as to show the arris in front.

arris tiles (*Build.*). Specially bent tiles which may be used to cover the sharp external angles at hips and ridges in slated and tiled roofs.

arris-wise. A term used to describe (*Build.*) the laying of tiles or slates diagonally; (*Carp.*) the sawing of square timber diagonally.

arrival curve (*Teleg.*). The shape of the received signal, when a specified signal (e.g. a step) is sent over a long submarine cable.

arrow (*Surv.*). The steel pin, looped at one end and pointed at the other, used in surveying to mark in the field the end of a chain.

arrowroot. Starch derived from the roots of plants of the Maranta genus; it provides a nutritious and easily digested food.

ar'senic (*Chem.*). Symbol, As. At. wt. 74·91, at. no. 33, valencies 3, 5. An element which occurs free and combined in a large number of minerals. An impurity of several commercial metals. Described as grey or **γ-arsenic** to distinguish it from the other allotropic modifications. M.p. 814° C. (36 atm.), b.p. 615° C. (sublimes), sp. gr. 5·73 at 15° C. Used in alloys and in the manufacture of lead shot. See also **α-arsenic, β-arsenic, white arsenic.**

α-arsenic (*Chem.*). Yellow arsenic, an allotropic modification of arsenic. May be formed by the rapid condensation of arsenic vapour in an inert atmosphere. Sp. gr. 2·0 at 18° C.

β-arsenic (*Chem.*). Black arsenic, an allotropic modification of arsenic. May be formed by the slow condensation of arsenic vapour in an inert atmosphere. Sp. gr. 3·70.

arsenic halides (*Chem.*). Arsenic pentafluoride, AsF_5; arsenic trifluoride, AsF_3; arsenic trichloride, $AsCl_3$; arsenic tribromide, $AsBr_3$; arsenic triodide, AsI_3.

arse'nic acid (*Chem.*). Formula, H_3AsO_4. Formed by the action of hot dilute nitric acid upon arsenic, or by digesting arsenic trioxide with nitric acid. Arsenic acid is also formed when arsenic pentoxide is dissolved in water.

arse'nical (*Chem.*). Material containing arsenic in one form or another.

arsenical copper (*Met.*). Copper containing up to about 0·6% of arsenic. This element slightly increases the hardness and strength and raises the recrystallisation temperature. Used for fire-box stays, etc.

arsenical nickel (*Min.*). See **niccolite.**

arsenical pyrite or **arsenopyrite** (*Min.*). See **mispickel.**

ar'senide (*Chem.*). Arsenic unites with most metals to form *arsenides*; e.g. iron—$FeAs_2$. Arsenides are decomposed by water or dilute acids with the formation of *arsine* (q.v.).

arse'nious acid (*Chem.*). See **white arsenic.**

ar'senites (*Chem.*). Salts of arsenious acid.

arse'niuret'ted hydrogen (*Chem.*). See **arsine.**

arsen'olite (*Min.*). Arsenic trioxide, a decomposition product of arsenical ores; occurring commonly as a white incrustation, rarely as fibrous cubic crystals.

ar'sine (*Chem.*). Formula, AsH_3. Hydride of arsenic. Produced by the action of nascent hydrogen upon solutions of the element, or by the action of dilute sulphuric acid upon sodium or zinc arsenide. Very poisonous.

arsines (*Chem.*). Organic derivatives of AsH_3 in which one or more hydrogen atoms is replaced by an alkyl radical; other hydrogen atoms may also be replaced by halogen, etc.

art paper (*Paper*). Paper coated on one or both sides with a composition containing china clay. In the manufacture of *imitation art paper* the clay is added to the pulp.

ar'tefact. A man-made stone implement.

artefact (*Zool.*). Any apparent structure which does not represent part of the actual specimen, but is due to faulty preparation.

arterial drainage (*San. Eng.*). A system of drainage in which the flow from a number of branch drains is led into one main channel.

arterial ring (*Zool.*). In *Vertebrata*, a blood-vessel (formed by the splitting of the basilar artery) which surrounds the hypophysis.

arterial road (*Civ. Eng.*). A specially constructed motor road to carry traffic passing from one large town to another: a *trunk road* (q.v.).

arterial system (*Zool.*). That part of the vascular system which carries the blood from the heart to the body.

arte'riole (*Zool.*). A small artery.

arte'riosclero'sis (*Med.*). Hardening or stiffening of the arteries due to increase of muscular, elastic, or fibrous tissue in the middle coat of the vessel: loosely, any degenerative change in the arteries.

arteri'tis (*Med.*). Inflammation of an artery.

artery (*Zool.*). One of the vessels of the vascular system, that conveys the blood from the heart to the body.—*adj.* **arterial.**

Arte'sian well (*Civ. Eng.*). A well sunk into a permeable stratum which has impervious strata above and below it, and which outcrops at places higher than the place where the well is sunk, so that the hydrostatic pressure of the water in the permeable stratum is alone sufficient to force the water up out of the well. Named from Artois (France).

arthr-, arthro- (Greek *arthron*, a joint). A prefix used in the construction of compound terms; e.g. *arthrobranchiae* (q.v.).

arthrec'tomy (*Med.*). Excision of a joint.

arthrit'ic (*Zool.*). Pertaining to the joints: situated near a joint.

arthri'tis (*Med.*). Inflammation of a joint.

arthritis defor'mans (*Med.*). See **osteo-arthritis.**

arthrobran'chiae (*Zool.*). In *Arthropoda*, gills arising from the arthrodial membranes, at the junction of the limbs with the body.

arthrod'esis (*Surg.*). The surgical immobilisation of a joint by fusion of the joint surfaces.

arthro'dia (*Zool.*). A joint.

arthrodial membranes (*Zool.*). In *Arthropoda*, flexible membranes connecting adjacent body sclerites and adjacent limb-joints, and occurring also at the articulation of the appendages.

ar'throgen'ous (*Bot.*). Developed from portions separated off from the parent plant.

Arthrop'oda (*Zool.*). A phylum of metameric animals having jointed appendages (some of which are specialised for mastication) and a well-developed head; there is usually a hard chitinous exoskeleton; the coelom is restricted, the perivisceral cavity being haemocoelic. Centipedes, Millipedes, Insects, Crabs, Lobsters, Shrimps, Spiders, Scorpions, Mites, Ticks, etc.

arthrop'terous (*Zool.*). Having jointed fin-rays.

arth'rospore (*Bot.*). A spore formed by segmentation and separation from the parent cell.

arthros'tracous (*Zool.*). Having a segmented shell, as *Chiton*.

arthrot'omy (*Surg.*). Surgical incision into a joint.

article (*Bot.*). A joint of a stem or fruit, breaking apart at maturity.

artic'ulamen'tum (*Zool.*). In Amphineuran *Mollusca*, the porcellaneous compact lower layer of the shell. Cf. *tegumentum*.

artic'ular (*Anat.*, *Zool.*). Pertaining to, or situated at or near, a joint.

articular corpuscles (*Zool.*). In *Mammalia*, sensory nerve-endings resembling end-bulbs, occurring in the neighbourhood of joints.

articula're (*Zool.*). In *Vertebrata*, a small cartilage at the angle of the mandible, derived from the Meckelian, and articulating with the quadrate forming the lower half of the jaw hinge.—*pl.* **articula'ria.**

Articula'ta (*Zool.*). See **Testicardines.**

articulate, articulated (*Bot.*). Breaking up at maturity, without tearing, into two or more distinct portions.

articulated connecting-rod (*I.C. Engs.*). The auxiliary connecting-rods of a radial engine, which work on pins carried by the master-rod instead of on the main crank-pin. In America called LINK-ROD. See **articulation** (*Eng.*).

articulation (*Acous.*). The vowel, consonant, initial or final consonant, or syllable *articulation*, is the percentage of the specified speech-sounds which are received correctly when called over a circuit in the standard manner, using logatoms.

articulation (*Bot.*). A joint at which natural separation may occur in a fruit or stem.

articulation (*Elec. Comm.*). The measure of the clarity of speech-audition, as heard in an auditorium or over a telephone or other sound-reproducing system.

See **band—** **percentage—**
ideal— **sound—**

articulation (*Eng.*). The connexion of two parts in such a way (usually by a pin-joint) as to permit of the same relative movement.

articulation (*Zool.*). The movable or immovable connexion between two or more bones.

artificial ageing (*Met.*). See **temper hardening.**

artificial antenna (*Radio*). A combination of resistances, condensers, and inductances having the same characteristics as an antenna except that it does not radiate energy. Also called DUMMY ANTENNA.

artificial character (*Bot.*). A character chosen arbitrarily, without regard to the natural relationships of the plants.

artificial classification (*Bot.*, *Zool.*). A classification based on one or a few arbitrarily chosen characters, and giving no attention to the natural relationships of the organism; the old grouping of plants into trees, shrubs, and herbs was an *artificial classification*.

artificial community (*Bot.*). A plant community kept in existence by artificial means; e.g. a garden.

artificial daylight (*Illum*). Artificial light having approximately the same spectral distribution curve as daylight, i.e. having a colour temperature of about 4000 K.

artificial disintegration (*Phys.*). The transmutation of non-radioactive substances brought about by the bombardment of the nuclei of their atoms by high-velocity particles, such as alpha particles, protons, or neutrons.

artificial ear (*Acous.*, *Teleph.*). An acoustic device for testing telephone receivers. It has the same acoustic impedance as an average ear, so that the device to which it is applied operates into this acoustic impedance.

artificial earth (*Radio*). A system of conductors placed a short distance above the ground, and having a large capacitance thereto, so that their potential is substantially that of the ground. Used to reduce earth-current losses. Also called COUNTERPOISE EARTH.

artificial flags (*Civ. Eng.*). Paving flags made by mixing cement, ground destructor clinker, and sand with sufficient mortar to form a paste; the mixture is put into moulds, subjected to hydraulic pressure, and finally seasoned in the open air for six months before use.

artificial harbour (*Civ. Eng.*). A harbour formed by the construction of breakwaters.

artificial horizon (*Surv.*). An apparatus, consisting essentially of a shallow trough filled with mercury, used in order to observe altitudes of celestial bodies with a sextant on land, i.e. where there is no visible horizon. The reflection of the object in the artificial horizon is viewed directly and the object itself indirectly by reflection from the index glass of the sextant.

artificial lines (*Elec. Comm.*). Electrical networks of resistances and condensers used in laboratories for simulating the properties of actual transmission circuits, so obviating the use of the latter.

artificial rubber. See **synthetic rubber.**

artificial silk (*Textiles*). The name formerly applied to filaments produced from solutions of modified cellulose; now known as *rayon* (q.v.).

artificial stone (*Build.*). A special kind of concrete, resembling a natural stone, made by mixing chippings and dust of natural stone with Portland cement (coloured if necessary) and water. This mixture is pressed into moulds, later allowed to dry out, and finally is seasoned in the open air for some months before use.

artificial stones (*Jewel.*). Gemstones manufactured by man, not by nature. The term includes reconstructed stones made by fusing together small crystals or fragments; synthetic stones of composition and physical characters identical with those of the natural stones; and imitation stones (paste) resembling true minerals in superficial appearance only. Some experts restrict the term to the last-named category.

artificial sunlight (*Illum.*). Light from special lamps having a large proportion of ultra-violet (health-giving) rays.

Artigue's process, ar-tēg (*Photog.*). A direct method of carbon printing.

artiodac'tyl (*Zool.*). Possessing an even number of digits.

artotype (*Photog.*). Same as *collotype*.

Arun'del formation (*Geol.*). The middle division of the Comanchean in eastern U.S.A., consisting essentially of lignitic clays with iron ores, and containing plant and dinosaurian remains; it succeeds the Patuxent beds and is overlain by the Patapsco formation.

arundina'ceous (*Bot.*). Reed-like.

ar'yl (*Chem.*). A term for aromatic monovalent hydrocarbon radicals.

aryl amines (*Chem.*). Amino derivatives of the aromatic series.

ar'ylarsin'ic acids (*Chem.*). A group of acids of the formula $R{\cdot}AsO(OH)_2$, the derivatives of which have great importance on account of their therapeutic value.

arytae'noid (*Zool.*). (1) In *Vertebrata*, one of a pair of anterior lateral cartilages, forming part of the framework of the larynx.—(2) In general, pitcher-shaped.

As (*Chem.*). The symbol for *arsenic*.

A.S. (*Timber*). Abbrev. for *air-seasoned timber*.

as- (*Chem.*). An abbrev. for *asymmetrically substituted*.

asbes'tos (*Min.*) Two different mineral species are included under this term: (*a*) amphibole, ranging in composition from tremolite to actinolite; and (*b*) a form of serpentine. Both types of asbestos occur in veins as fibrous crystals, so extremely thin as to be elastic and capable, in some cases, of being woven into fabric. Withstands high temperatures without change, and hence used in making fireproof curtains, washers, etc.; also used, combined with other materials, in building materials and paints, to impart fire-resistant properties. Asbestos in the form of paper and millboard is used for low-voltage insulation, where high temperatures may occur, and for arc-resisting padding inside air-break circuit-breakers, etc. See **Sindanyo.**

asbestos cement sheeting (*Build.*). A fire-resisting, weather-proof building material, made from Portland cement and asbestos; it is rolled into various forms such as plain sheets, corrugated sheets, and tiles, which are available in a number of colours.

asbestos shingles (*Build.*). A fire-resisting roof-covering, consisting largely of asbestos, made into the form of shingles.

asbesto'sis (*Med.*). Disease of the lungs due to inhalation of asbestos particles.

as'bolane or **as'bolite** (*Min.*). A form of *wad*—soft, earthy manganese dioxide, containing up to about 25% of cobalt oxide.

Ascaroi'dea (*Zool.*) A class of *Nematoda* the members of which may be parasitic or free-living; they have normally one dorsal and two subventral lips.

ascending (*Bot.*). (1) Becoming vertical by means of an upward curve.—(2) Said of an ovule which arises obliquely from close to the base of the ovary.

ascending aestivation (*Bot.*). Aestivation in which each petal overlaps the edge of the petal posterior to it.

ascending letters (*Typog.*). Letters the top portions of which rise above the general level of the line; e.g. *b, d, f, h*.

Aschoff's nodes or **Aschoff's bodies** (*Med.*). Inflammatory nodules found in rheumatic inflammation of the heart.

Ascidia'cea (*Zool.*). A class of *Urochorda* in which the adult is tailless and sedentary, with a degenerate nervous system and a dorsal atriopore; the gill-clefts are divided by external longitudinal bars. Sea Squirts.

Ascid'ian tadpole (*Zool.*). In *Urochorda*, a larval form having a tail about four times the length of the trunk, containing the notochord and the hollow dorsal nerve cord.

ascid'iozo'oid (*Zool.*). In *Pyrosomatida*, one of four buds or blastozooids which arise on the stolon of the cyathozooid during development.

ascid'ium (*Bot.*). A pitcher-shaped leaf or part of a leaf.

ascif'erous, ascig'erous (*Bot.*). Bearing asci (see ascus).

asci'iform (*Bot.*). Shaped like a hatchet.

asci'tes (*Med.*). See **hydroperitoneum.**

as'cocarp (*Bot.*). The fructification of the *Ascomycetes*, containing asci and ascospores; it may be a cleistocarp, an apothecium, or a perithecium.

ascog'enous cell (*Bot.*). A cell which gives rise to an ascus.

ascogenous hypha (*Bot.*). A hypha from which one or more asci are formed.

ascogo'nium (*Bot.*). See **archicarp.**

As'colichenes, —li-kē'nēz (*Bot.*). The main group of lichens, with many hundreds of species, in which the fungal constituent is an Ascomycete.

Ascomycetes, —mī-sē'tēz (*Bot.*). One of the main groups of Fungi, including some 15,000 species; characterised by the production of asci and ascospores.

ascon grade (*Zool.*). In *Porifera*, a primitive type of water-vascular system, in which the choanocytes line the whole paragaster.

as'cospore (*Bot.*). A spore formed within an ascus.

Ascothoracica, —thor-as'ik-a (*Zool.*). An order of parasitic *Crustacea* which, as adults, usually live embedded in the tissue of their hosts; there is a free-swimming larval stage; the mantle contains diverticula of the gut; the trunk appendages are more or less reduced.

as'cus (*Bot.*). *Pl.* **asci, as'ī.** An enlarged cell in which spores are formed (commonly in groups of eight). It is the characteristic spore-forming organ of the Ascomycetes; usually elongated and club-shaped, but may be globose or filiform. Asci are often formed in large numbers in apothecia or perithecia.

asep'alous (*Bot.*). Devoid of sepals.

asep'sis (*Med.*). The exclusion of putrefying bacteria from the field of operation, by the use of sterilised dressings and instruments, and the wearing of sterilised gowns and gloves by the surgeon and nurses.

asep'tate (*Bot.*). Not divided into segments or cells by septa.

asexual (*Bot., Zool.*). Without sex: lacking, or apparently lacking, functional sexual organs: (with reference to reproduction) parthenogenetic, vegetative.

asexual generation (*Bot.*). The spore-bearing plant in mosses, ferns, and their relatives.

asexual reproduction (*Biol.*). Any form of reproduction not depending on a sexual process or on a modified sexual process.

ash can (*Cinema.*). A large overhead multiple arc-lamp.

ash handling plant (*Eng.*). The system of conveyors and storage bins for handling and storing the ash from the boiler furnaces of large steam-plants.

Ashgill Series or **Ashgillian** (*Geol.*). The highest series of the Ordovician System, comprising only one graptolite zone, and, together with the Caradocian, equivalent to the Bala Series of N. Wales.

ashlar (*Masonry*). (1) Masonry work in which the stones are accurately squared to given dimensions so as to make very good joints over the whole of the touching surfaces.—(2) A thin facing of squared stones or thin slabs laid in courses, with close-fitting joints, to cover brick or rubble walls.

ashlering (*Carp.*). The vertical timbers or quarterings, 2½ to 3 feet long, fixed in attics between floor-joists and rafters as supports for a partition wall, to cut off the sharp angle under the lower end of the rafter.

asi'phonate (*Zool.*). In *Insecta*, having respiratory tubes opening directly to the exterior; lacking siphons.

aspar'agine (*Chem.*). The monoamide of amino-succinic acid, $NH_2 \cdot CO \cdot CH_2 \cdot CH(NH_2) \cdot COOH$, forming rhombic prisms; found in young leaves, in asparagus, and in other vegetables.

asparagus stone (*Min.*). Apatite of a yellowish-green colour, thus resembling asparagus, especially specimens from the original locality, Marcia (Spain).

aspect (*Aero.*). See under **attitude.**

aspect (*Bot.*). (1) The degree of exposure to sun, wind, etc., of a plant habitat.—(2) The effect of seasonal changes on the appearance of vegetation.

aspect ratio (*Aero.*). The ratio *span/mean chord*, or more precisely the ratio *square of maximum span/total area*, of an aerofoil. Gives a general conception of length to breadth.

aspect society (*Bot.*). A plant community dominated at a given season by a given species or group of species.

as'perate, as'perous (*Bot.*). Having a rough surface due to short, upstanding stiff hairs.

aspergil'liform (*Bot.*). Brush-like, tufted.

asper'gillo'sis (*Vet.*). A contagious infection of the respiratory organs of birds due to moulds of the genus *Aspergillus*.

aspermia (*Med.*). Complete absence of semen.

asphalt. The name given to various bituminous substances which may be (1) of natural occurrence (see below), (2) a residue in petroleum distillation, (3) a mixture of asphaltic bitumen and granite chippings, sand, or powdered limestone. Asphalt is used extensively for paving, road-making, damp-proof courses, in the manufacture of roofing felt and paints, and as the raw material for certain moulded plastics. See **mastic asphalt, bitumens.**

asphalt (*Geol.*). A bituminous deposit formed in oil-bearing strata by the removal, usually through evaporation, of the volatiles. Occurs in the 'tar pools' of California and elsewhere and in the pitch lake in Trinidad, whence enormous quantities are exported.

asphalt blocks (*Civ. Eng.*). Road-surfacing blocks made from a mixture of 8-12% of asphaltic cement and 92-88% of crushed stone. The materials are mixed at a temperature of about 300° F., after which the mixture is placed in moulds and subjected to heavy pressure, the blocks finally being cooled suddenly by plunging them into cold water.

asphalt (or bitumen) process (*Photog.*). An imbibition process using bitumen as the surface, which, after exposure, is differentially hardened and therefore can be developed by the action of turpentine.

asphyxia (*Med.*). State of suspended animation as a result of deficiency of oxygen in the blood, whether from suffocation or other causes.

Aspidobran'chia (*Zool.*). An order of archaic *Streptoneura*, having a decentralised nervous system, paired auricles, and multiple central radula teeth; bipectinate ctenidia, which are free distally, usually occur; mainly marine forms. Limpets, Ear Shells, Top Shells, Ormers, and Abalones.

Aspidochirota, —ki-rō'ta (*Zool.*). An order of *Holothuroidea*, having shield-shaped buccal tentacles lacking retractor muscles, but possessing ampullae and respiratory trees; bottom-feeding forms, living on comparatively firm ground.

As'pidocotyl'ea (*Zool.*). An order of *Trematoda*, in which the ventral sucker covers most of the ventral surface of the body and is usually subdivided; the genital opening is median, ventral, and anterior; parasitic in the gut and gall-bladder of *Chelonia* and Fish, and in various organs of Molluscs.

aspidosper'mine (*Chem.*). $C_{22}H_{30}O_2N_2$, an alkaloid of unknown constitution, found in the *Aspidosperma* species, crystallising in needles, m.p. 208° C.; almost insoluble in water, soluble in most organic solvents.

aspiration (*Med.*). (1) The act of drawing in a breath.—(2) The removal of fluids or gases from the body by suction.

aspiration, ventilation by (*Build.*). A ventilation process in which vitiated air is drawn from a room, etc. by means of a suction fan, while fresh air is admitted at some other point.

aspirator (*Chem.*). A device for drawing a stream of air or liquid through an apparatus by suction.

Aspirigera, as-pī-rij'e-ra (*Zool.*). See **Holotricha.**

aspirin (*Chem.*). The common name for acetylsalicylic acid.

asplanch'nic (*Zool.*). Having no gut.

aspo'rocys'tid (*Zool.*). Said of *Sporozoa* in which the zygote divides to form sporozoites, without the formation of a sporocyst.

assay (*Chem.*). See **wet assay** and **dry assay.**

assay balance (*Chem.*). A balance specially made for weighing the small amounts of matter met with in assaying. See also **chemical balance.**

assayer (*Chem.*). A person who carries out the process of assay. See also **wet assay and dry assay.**

assimilate (*Bot.*). Any substance produced in the plant during the processes of food manufacture.

assimilation (*Bot.*). A general term for the whole of the metabolic processes by means of which food is built up and utilised by the plant. Often used as equivalent to *photosynthesis*.

assimilation (*Geol.*). The incorporation of extraneous material in *igneous magma* (q.v.).

assimilation (*Zool.*). (1) The conversion of food material into protoplasm, after it has been ingested, digested, and absorbed.—(2) The resemblance of an animal to its surrounding, not only by coloration, but also by configuration.

assimilation number (*Bot.*). The amount of carbon dioxide assimilated per hour by a portion of leaf substance containing one gram of chlorophyll.

assimilation quotient (*Bot.*). The ratio of the volume of carbon dioxide absorbed to that of oxygen set free, in a given time.

assimilative induction (*Zool.*). In early embryos, induced development of an organ or structure, by the introduction of material from a similar organ or structure in another embryo or from another part of the same embryo.

assize (*Masonry*). A cylindrical block of stone forming part of a column, or of a layer of stone in a building.

association (*Bot.*). A plant community usually occupying a wide area, consisting of a definite population of species, having a characteristic appearance and habitat, and stable in its duration.

association (*Psychol.*). The response to a stimulus idea by a reaction idea in the individual, following the Freudian law of *psychic determinism* (q.v.).

association (*Zool.*). In certain *Sporozoa*, adherence of individuals without fusion of nuclei: a characteristic set of animals, belonging to a particular habitat.

association fibres (*Zool.*). In the cerebrum of *Vertebrata*, axons passing from the pyramidal cells of the cortex to the grey matter of other parts of the same hemisphere.

association, molecular (*Chem.*). See **molecular association.**

association neurone (*Zool.*). A neurone lying entirely within the central nervous system and connecting a motor neurone with a sensory neurone; it is a constituent of all but the simplest reflexes, which it puts into communication with other regions of the C.N.S.

associative behaviour (*Zool.*). Behaviour governed by conditioned reflexes: behaviour in which the effect of the simultaneous application of two classes of stimuli may, on a subsequent occasion, enter into the result of the simple operation of one of them.

associes, a-sō'sēs (*Bot.*). A plant community which may be regarded as in process of development into an association, and is therefore not yet stabilised.

asta'sia aba'sia (*Med.*). Inability of an hysterical patient to stand or to walk.

astatic galvanometer (*Elec. Eng.*). A moving-magnet galvanometer in which the magnets form an astatic system.

astatic system (*Elec. Eng.*). An arrangement of two or more magnetic needles on a single suspension so that in a uniform magnetic field, such as the earth's field, there is no resultant torque on the suspension.

aste'lic (*Bot.*). Not having a stele.

aster (*Cyt.*). (1) A group of radiating fibrils formed of cytoplasmic granules surrounding the centrosome, seen immediately prior to and during cell-division, and usually more prominent in preparations of animal nuclei than in those of plant nuclei.—(2) During metaphase, the stellate arrangement of the chromosomes.

aster phase (*Zool.*). See **metaphase.**

aster'eogno'sis (*Med.*). Loss of ability to recognise, by the sense of touch, the nature of an object.

asteria (*Min.*). A precious stone which when cut *en cabochon* displays a six- or twelve-rayed star due to asterism. Star-sapphire and star-ruby display this character.

asterism (*Min.*). A light effect due to the presence of minute, almost ultramicroscopic, inclusions arranged in parallel series in some varieties of ruby, sapphire, and phlogopite mica. A point source of light viewed through a plate of this form of phlogopite appears as a light star.

aster'nal (*Zool.*). (Of certain ribs) not directly connected with the sternum.

asteroid (*Astron*). A small planetary body, alternatively called MINOR PLANET. Many hundreds of asteroids have their orbits about the sun, between those of Mars and Jupiter.

Asteroidea, —ō-id'ē-a (*Zool.*). A class of *Echinodermata*, having a dorsoventrally flattened body of pentagonal or stellate form; the arms merge into the disc; the tube-feet possess ampullae and lie in grooves on the lower surface of the arms; the anus and madreporite are aboral, and there is a well-developed skeleton; free-living carnivorous forms. Starfish.

as'terospon'dylous (*Zool.*). Showing partial calcification of cartilaginous vertebral centra, in the form of radiating plates.

asthenia (*Med.*). Loss of muscular strength.

asthe'nic type (*Psychol.*). One of Kretschmer's three types of individuals, characterised by tall thin men, with hands long in proportion to the trunk. The type shows schizoid character traits.

astheno'pia (*Med.*). Weakness of the eye muscles in neurasthenia: eye-strain due to errors of refraction.

asthma (*Med.*). A disorder in which there occur attacks of difficult breathing due to spasm of the bronchial muscles.

asti'chous (*Bot.*). Not arranged in rows.

astig'matism (*Light*). A defect in an optical system on account of which, instead of a point image being formed of a point object, two short line images (focal lines) are produced at slightly different distances from the system and at right angles to each other. Astigmatism is always present when light is incident obliquely on a simple lens or spherical mirror.—(*Med.*) Unequal curvature of the refracting surfaces of the eye, which prevents the focusing of light rays to a common point on the retina.—(*Photog.*) A defect in a lens, causing image blurring in particular directions.

asto'matous (*Bot., Zool.*). Without a mouth.

as'tragal (*Carp.*). A small convex moulding having a semicircular cross-section, sometimes plain and sometimes ornamented with carved work.

astragal (*Civ. Eng.*). A specially shaped bar used for connecting together glazing bars or sheets of glass in a window.

astragal plane (*Carp.*). A plane adapted for cutting astragal mouldings.

astragal tool (*Carp.*). A special tool, with a semicircular cutting edge, used in wood-turning for turning beads and astragals.

astrag'alus (*Zool.*). In land Vertebrates, one of the ankle bones: tibiale.

astrakhan (*Furs*). The dressed skins of very young lambs from the Astrakhan district (Russia); the wool is tightly curled and is usually dyed black.

astrakhan (*Textiles*). A pile fabric with a looped curly surface, the pile being formed either of lustre worsted or mohair yarn curled before weaving; or a pile of mohair weft which curls when the ground texture is shrunk, after weaving.

astral ray (*Bot.*). One of the fibrils in the cytoplasm which seem to play a part in the delimitation of ascospores.

astrin'gent (*Med.*). Having the power to constrict or contract organic tissues: an agent which does this.

as'trocentre (*Cyt.*). See **centrosome.**

as'trocyte (*Zool.*). A neuroglia cell.

ast'roid (*Cyt.*). In cell-division, the star-shaped figure formed by the looped chromosomes aggregated round the equator of the nuclear spindle.

as'trolabe (*Astron.*). An instrument (consisting of a disc of metal or wood provided with a rotatable diametral rule carrying sights) used for taking the altitudes of heavenly bodies from which time and latitude are graphically deducible.

astrology. The spurious science which alleges control over the individual destinies of men by the mere aspect of the relative positions of the principal heavenly bodies, which positions can be calculated, in principle, by astronomical processes over any past or future period of time.

astronomical clock (*Astron.*). A pendulum clock which reads sidereal time; in its most modern form electrically driven and controlled.

astronomical telescope (*Astron.*). The general name for a telescope designed for astronomical purposes; the principal forms are the *equatorial* (*refractor* and *reflector*) and the *meridian* (*transit*) *circle*. The reflector consists of a long-focus convex lens and a short-focus convex lens, mounted coaxially at a distance apart equal to the sum of their focal lengths. The lens of longer focus, which is directed towards the object to be observed, is known as the objective or object glass, the other lens being referred to as the eyepiece.

astronomical triangle (*Astron.*). A triangle on the celestial sphere whose sides are all arcs of great circles, two of which intersect at a heavenly body.

astronomical unit (*Astron.*). The mean distance of the earth from the sun, amounting to 92,900,000 miles; used as the principal measure of distance within the solar system.

astronomy. The science of the heavens in all its branches. It may be conveniently subdivided into three main divisions: (1) positional astronomy; (2) gravitational astronomy; (3) physical astronomy—in historical order of development. See also **descriptive astronomy.**

astrophysics. That branch of astronomy which deals with the material constitution of the stars, such as their temperature, chemical composition, and absolute luminosity.

astrosclereide, —skler'ēd (*Bot.*). A sclereide with radiating branches ending in points.

as'trosphere (*Cyt.*). See **attraction sphere.**

astyl'len (*Civ. Eng.*, *Mining*). A small dam built across an adit to restrict the flow of water.

asylum switch (*Elec. Eng.*). See **locked-cover switch.**

asym'meter (*Elec. Eng.*). An instrument having three movements so arranged that any lack of symmetry when these are connected to a 3-phase system can be observed by a single reading.

asymmet'ric (*Bot.*). Irregular in form: not divisible into halves about any longitudinal plane.

asymmetric carbon atom (*Chem.*). A carbon atom to which four different radicals are attached, resulting in *optical isomerism* (q.v.).

asymmetric conductor (*Elec. Eng.*). A conductor which has a different conductivity to currents flowing in different directions through it.

asymmetric reflector (*Illum.*). A reflector in which the beam of light produced is not symmetrical about a central axis.

asymmetric refractor (*Elec. Eng.*). A refractor in which the light is redirected, unsymmetrically, about a central axis.

asymmetric synthesis (*Chem.*). The synthesis of optically active compounds from racemic mixtures. This can be carried out in some cases by chemical methods in which one component is more reactive than the other one. In other cases asymmetric synthesis takes place in the presence of enzymes.

asymmetric system (*Crystal.*). See **triclinic system.**

asymmetrical effect (*Radio*). See **antenna effect.**

asym'metry. The condition of being *asymmetrical*.—(*Zool.*) The condition of the animal body in which no plane can be found which will divide the body into two similar halves; as in Snails and Whelks.

asymptotic breakdown voltage, a-sim-tot'ik (*Cables*). The voltage which, if applied for a very long time (hundreds of hours), will break down a cable.

asynchronous motor (*Elec. Eng.*). See **non-synchronous motor.**

asyner'gia, asyn'ergy (*Med.*). Lack of co-ordinated movement between muscles with opposing actions, due to a lesion in the nervous system.

a.t. or **A.T.** (*Elec. Eng.*). Abbrev. for *ampere-turn*.

atac'amite (*Min.*). A hydrated chloride of copper, widely distributed in S. America, Australia, India, etc.; occurring also at St. Just (Cornwall).

at'avism (*Gen.*). The phenomenon in which, by skipping a generation, a particular character in the offspring is unlike the corresponding character in the parents but resembles the corresponding one of grandparents: more generally, occurrence of a characteristic observed in more distant ancestors, but not in the more immediate ancestors. —*adj.* **atavis'tic.**

ataxia, ataxy (*Med.*). Inco-ordination of muscles, leading to irregular and uncontrolled movements; due to lesions in the nervous system.

atelec'tasis (*Med.*). Failure of the lungs, or part of the lungs, to expand at birth.

ateleio'sis (*Med.*). Dwarfism, with normal bodily proportions; due to disorder of the pituitary gland.

a'telomit'ic (*Cyt.*). Said of a chromosome having the spindle fibre attached somewhere along the side.

athero'ma, ath'erosclero'sis (*Med.*). Thickening of the intima of the arteries, due to fatty and calcareous deposits and proliferation of fibrous tissue.—*adj.* **athero'matous.**

atheto'sis (*Med.*). Slow, involuntary, spontaneous, repeated, writhing movements of the fingers and of the toes, due to a lesion in the brain.

athletic type (*Psychiatry*). One of Kretschmer's three types of individual, characterised by a well-developed skeletal musculature, in which the relation of limbs to trunk is well-proportioned. This type is seen very often in schizophrenia.

Atkinson cycle (*I.C. Engs.*). A working cycle for internal-combustion engines, in which the expansion ratio exceeds the compression ratio; more efficient than the Otto cycle, but mechanically impracticable.

Atlantic Ocean. An ocean lying between the east coast of the American continent and the west coast of Europe and Africa. It extends from the Arctic Circle to the Antarctic Circle. See **ocean depths,** etc.

Atlantic Province (*Geol.*). A general name for those regions bordering the Atlantic Ocean where Cambrian strata outcrop; characterised by a faunal assemblage different from that occurring in the Pacific Province.

atlas (*Paper*). A standard size of drawing paper, 26 × 34 in.

atlas (*Zool.*). The first cervical vertebra.

at'mograph (*Photog.*). A photographic image obtained by development with vapour or smoke.

atmol'ysis (*Chem., Phys.*). The method of separation of the components of a mixture of two gases which depends on their different rates of diffusion through a porous partition.

atmosphere (*Photog.*). Such qualities in a photograph which give a sense of depth and differentiation of receding planes. Due mainly to dispersion by dust in the atmosphere.

atmosphere, composition of (*Chem., etc.*). Dry atmospheric air contains the following gases in the proportions (by weight) indicated: nitrogen, 75 5; oxygen, 23·2; argon, 1·3; carbon dioxide, ·05-·4; krypton, ·028; xenon, ·005; neon, ·00086; helium, ·000056.

atmosphere, pressure of (*Phys.*). The pressure exerted by the atmosphere at the surface of the earth is due to the weight of the air. Its average value is $1{\cdot}013 \times 10^6$ dynes per square centimetre, or 14·7 lbs. per square inch. Variations in the atmospheric pressure are measured by means of the barometer. See **pressure (barometric).**

atmospheric absorption (*Acous.*). Diminution of intensity of a sound-wave in passing through the air, apart from normal inverse square relation, and arising from true absorption. This occurs appreciably for high audio frequencies only, in addition to apparent absorption by dispersion in aerial strata.

atmospheric arc-rectifier (*Elec. Eng.*). A form of high-power high-voltage rectifier consisting of an arc between electrodes in air, the arc being initiated in alternate half-cycles by means of a pilot spark and extinguished at the end of that half-cycle by rapid cooling. Also called MARX RECTIFIER, after the inventor.

atmospheric electricity (*Meteor.*). The electric charges which exist in the atmosphere.

atmospheric engine (*Eng.*). An early form of steam-engine, in which a partial vacuum created by steam condensation allowed atmospheric pressure to drive down the piston.

atmospheric line (*Eng.*). A datum line drawn on an indicator diagram by allowing atmospheric pressure to act on the indicator piston or diaphragm.

atmospherics (*Radio*). Interfering or disturbing signals of natural origin. Also called STRAYS, STATIC, X'S.

ato'cia (*Med.*). Sterility in the female.

ato'kous (*Zool.*). Having no offspring: sterile.

at'olls. Coral reefs, typically found in the Pacific; usually ring-like in shape, enclosing lagoons.

atom (*Chem.*). The smallest particle of an element which can take part in a chemical reaction. See **atomic structure, Dalton's atomic theory.**

at'omate (*Bot*.). Having small particles sprinkled over the surface.

atom'ic (*Chem.*). (1) Pertaining to an atom or atoms.—(2) Pertaining to a gram-atom.

atomic diameters (*Chem.*). These vary periodically among the elements, as do their chemical properties. The range of diameters is from 0·6 to $5{\cdot}4 \times 10^{-8}$ cm., the inert gases having the smallest diameter in each period and the alkali metals the biggest.

atomic heat (*Chem.*). The quantity of heat required to raise the temperature of one gram-atom of an element by 1° C.

atomic hydrogen (*Chem.*). See **active hydrogen.**

atomic-hydrogen welding (*Elec. Eng.*). A welding process in which an electric arc is drawn between tungsten electrodes placed in a jet of hydrogen. Also called ATOMIC ARC WELDING.

atomic mass (*Chem*.). The mass of an atom.

atomic number (*Chem.*). The number of an element when arranged with others in order of increasing atomic weight. It is equal to the total number of orbital electrons in an atom of the element. Atomic numbers were originally assigned by Moseley from observations on the characteristic X-ray spectra of the elements.

atomic refraction (*Chem.*). The contribution made by a gram-atom of an element to the molecular refraction of a compound.

atomic structure (*Chem.*). An atom consists of a small nucleus, of mass equal to the atomic mass and carrying a charge of positive electricity equal to the atomic number, surrounded at a relatively great distance by a number of electrons equal to the atomic number, the outer ones being largely responsible for the chemical properties of the element.

atomic theory (*Chem.*). See **Dalton's atomic theory.**

atomic volume (*Chem.*). The volume occupied by one gram-atom of an element.

atomic weight (*Chem.*). The relative weight of an atom of an element when the weight of an atom of oxygen is taken as 16 000.

atomicity (*Chem.*). The number of atoms contained in a molecule of an element.

at'omiser (*Eng.*). A nozzle through which oil fuel is sprayed into the combustion chamber of an oil engine or boiler furnace. Its function is to break up the fuel into a fine mist so as to ensure good dispersion and combustion.

atonal'ity (*Acous*.). Musical work in which there is no tonality and key; a semi-tone scale is used, a key being forced by the repetition of harmonically related notes

at'ony, ato'nia (*Med.*). Diminution or loss of muscular tone.

atony of the fore-stomachs (*Vet.*). A slowly developing loss of tone or power of contraction of the rumen, reticulum, or omasum of cattle, sheep, or goats.

Atox'yl (*Chem.*). The sodium salt of *p*-aminophenyl-arsinic acid (arsanilic acid); it has a therapeutical action against syphilis and sleeping-sickness. (Trade-name.)

atrabil'iary (*Med.*). Pertaining to black bile.

at'rate, at'ratous (*Bot.*). Blackened: blackening.

Atre'mata (*Zool.*). An order of primitive *Ecardines* having a thin horny shell with almost equal valves, and a long peduncle; they live in tubes of sand into which they can withdraw; found in Australian and Western Pacific waters.

atre'sia (*Med.*). Pathological narrowing of any channel of the body.—(*Zool.*) Disappearance by degeneration; as the follicles in the Mammalian ovary.—*adjs.* **atre'sic, atret'ic.**

a'trial (*Zool.*). Pertaining to the *atrium* (q.v.).

atrial siphon (*Zool.*). In *Urochorda*, the papilla at the apex of which is the atriopore.

at'ricolor (*Bot.*). Inky.

a'triopore (*Zool.*). The opening by which the atrial cavity communicates with the exterior.

a'trioventric'ular (*Zool.*). See **auriculoventricular.**

a'trium (*Zool.*). In *Platyhelminthes*, a space into which open the ducts from the male and female genital organs: in aquatic *Oligochaeta*, a space lined by the cells of the prostate gland into which the male ducts discharge: in pulmonate *Mollusca*, a cavity into which the vagina and the penis open and which itself opens to the exterior: in ectoproct *Polyzoa*, the cavity of the tentacle sheath: in *Cyphonautes* larvae, the space surrounded by the mantle: in developing entoproct *Polyzoa*, the central invagination the walls of which later give rise to the nervous system: in certain *Mollusca* larvae, the outer stomodaeum: in metamorphosing *Auriculariae*, the cavity into which the larval mouth opens: in *Prochordata*, the cavity surrounding the respiratory part of the pharynx: in *Vertebrata*, the anterior part of the nasal tract: in *Reptilia* and *Aves*, the cavity connecting the bronchus with the lung chambers: in the developing Vertebrate heart, the division between the sinus venosus and the ventricle, which will later give rise to the auricles.

atro'chal (*Zool.*). (Of trochophore larvae) possessing an apical tuft of cilia and a general ciliated covering, but lacking a prototroch.

atro'pamine (*Chem*.). $C_{17}H_{21}NO_2$, a *Solanum*-base alkaloid, identical with *apoatropine* (q.v.).

at'rophy (*Med.*). Wasting of a cell or of an organ of the body.—(*Zool.*) Degeneration, i.e., diminution in size, complexity, or function, through disuse.

at'ropine (*Chem.*). $C_{17}H_{23}O_3N$, an alkaloid of the tropane group, obtained from solanaceous plants in which it occurs in traces, or by treating crude hyoscyamine with dilute alkali, when it undergoes isomerisation to atropine. It crystallises in prisms, m p. 118° C., and sublimes when heated rapidly. It is soluble in alcohol or ether, slightly soluble in water. It causes dilatation of the pupil of the eye. Atropine constitutes the active principle of belladonna (obtained from *Atropa belladonna*, 'deadly nightshade'), which, besides eye dilatation, has numerous other medically valuable properties. Popular legend ascribes the name *belladonna* (=beautiful lady) to the use of the drug by Spanish beauties for purposes of eye dilatation.

at'ropous (*Bot.*). See **orthotropous.**

attached column (*Build.*). A column partially built into a wall, instead of standing detached.

attachment constriction (*Bot.*). A constriction in a chromosome to which the spindle fibre is attached.

attachment organ (*Bot.*). (1) A disc-like or branched outgrowth from the base of the thallus, attaching an alga to a solid object.—(2) A hooked hair or similar structure serving to attach a fruit to an animal, and assisting dispersal.

attachment screw (*Instruments*). A set-screw used to secure two parts of an instrument together in order to prevent relative movement.

attemperators (*Brew.*). Coils of pipe through which cold water circulates; used to regulate the temperature of beer whilst fermenting.

attenuate, attenuated (*Bot.*). Tapering off, and so narrowing gradually to a point.

attenuation (*Bot.*). The weakening or loss of virulence by parasitic bacteria and fungi in culture.

attenuation (*Elec. Comm.*). The diminution of current, voltage, or power in an electrical communicating channel, measured in *nepers* or *decibels*.—(*Radio*) See **absorption.**—See also **geometrical attenuation, frequency of infinite attenuation.**

attenuation compensation (*Elec. Comm.*). The use of networks to correct for varying attenuation; e.g. in transmission lines.

attenuation constant (*Elec. Comm.*). That part of the propagation constant which refers to the diminution of amplitude of an alternating current in passing along unit length (one mile) of transmission line.

attenuation correction (*Elec. Comm.*). Same as *attenuation compensation* (q.v.).

attenuation equaliser (*Elec. Comm.*). An *equalising network* (q.v.).

attenuator (*Elec. Comm.*). An arrangement of resistances in the form of an artificial line, which introduces a known quantity of attenuation into the circuit in which it is inserted. A variable attenuator provides for altering the resistances, so that the attenuation introduced is known and variable.

attenuator pad (*Elec. Comm.*). A single unit of attenuation, either for use in an attenuator, or for insertion in a transmission circuit to introduce a known loss or to change the impedance level without reflection.

attic (*Build.*). The highest storey in a house, usually within the roof space.

attitude (*Aero.*). The *attitude* or *aspect* of an aircraft in flight, or on the ground, is defined by the angles made by its axes with the relative wind, or with the ground, respectively.

attracted-disc electrometer (*Elec. Eng.*). An instrument in which potential is measured by the attraction between two oppositely charged discs.

attracted-iron motor (*Elec. Eng.*). A small motor suitable for operating instruments, etc. It consists of a soft iron core which is free to rotate and which is acted upon by magnetising coils. A laminated iron core is used for motors to operate off an a.c. supply.

attraction cone (*Embryol.*). A structure formed in the cytoplasm of the ovum during fertilisation, at the point of contact with the spermatozoon, facilitating the entry of the latter.

attraction particle (*Cyt.*). See **centriole.**

attraction sphere (*Cyt.*). In cell-division, the archoplasmic masses, and the striations radiating through them from the centrosomes.

attraction spindle (*Cyt.*). In cell-division, the terminal portions of the achromatic spindle.

attrition test (*Civ. Eng.*). A test for the determination of the wear-resisting properties of stone, particularly stone for roadmaking. Pieces of the stone are placed in a closed cylinder, which is then rotated for a given time, after which the loss of weight due to wear is found.

Attwood's formula (*Ship Constr.*). A formula for determining the moment of statical stability at large angles of heel of a ship. Terming angle of heel θ, and the weight of the ship W, moment

$$= W\left(\frac{v \times hh_1}{V} \pm BG \sin\theta\right) \text{ foot tons,}$$

where v = volume of emerged wedge; hh_1 = distance between C.G.'s of emerged and immersed wedges; V = volume of displacement; B = centre of transverse buoyancy; G = centre of gravity.

Au (*Chem.*). The symbol for gold (*aurum*).

Å.U., A.U. (*Phys.*). Abbrev. for *Ångström unit.*

audibility (*Acous.*). Ability to be heard; said of faint sounds in the presence of noise. The extreme range of audibility is 30 to 20,000 in frequency, depending on the applied intensity; and from 0·2 milli-dyne (r.m.s.) at 1000 cycles per second (the zero of the phon scale, selected as the average for good ears), and 120 decibels above this.

audible ringing tone or **audible signal** (*Teleph.*). The tone heard in the telephone receiver which indicates that the *called* subscriber's bell is being rung. The ringing current is allowed partially to leak back to the calling subscriber. Also, any similar signal which indicates the establishing of a telephone connexion.

audio frequency (*Elec. Comm.*). A frequency of oscillation which, when the oscillatory power is converted into a sound pressure, gives rise to aural perception; assumed to be approximately between 30 cycles per second and 15 kilo-cycles per second.

audio-frequency amplifier (*Teleph.*). An amplifier for frequencies within the audible range or some fraction of this.

audio-frequency transformer (*Elec. Comm.*). A transformer for insertion into a communication channel, so designed that it has a specified, normally uniform, response for currents of frequencies required for sound reproduction.

aud'iogram (*Acous.*). The curve, on recognised logarithmic scales, of the minimum intensity of sounds of different frequencies perceivable by an ear.

audiogram, noise (*Acous.*). See **noise audiogram.**

audiom'eter (*Acous.*). An electrical apparatus for measuring the minimum intensities of sounds perceivable by an ear, for specified frequencies. Used also for testing the power of hearing.

audiometer, gramophone (*Acous.*). See **gramophone audiometer.**

audiometer, noise (*Acous.*). See **noise audiometer.**

audion (*Radio*). The original name (now obsolete) given by Lee de Forest to the three-electrode thermionic tube.

audition, limits of (*Acous.*). See **limits of audition.**

audito'rium. The part occupied by the audience in a public building.—Specifically: (*Acous.*) The enclosure in which an audience gathers for hearing original or reproduced sounds. The architecture has to be designed with a view to good audition, respect being had to the type of performance and the size of the audience.

auditory, aural (*Zool.*). Pertaining to the sense of hearing or to the apparatus which subserves that sense: the eighth cranial nerve of Vertebrates, supplying the ear.

auditory perspective (*Acous.*). The faculty of the human pair of ears to appreciate relative distances and bearings of sources of sounds in combination in an auditorium. Shown to be reproducible with a three-channel reproducing system. Also called LOCALISATION.

auditory sensation area (*Acous.*). The area between the limits of maximum tolerable and minimum perceivable intensities appreciated by the normal ear as sound, when these are plotted on an audition diagram.

Auerbach's plexus, ow'er-bahh (*Zool.*). In the small intestine of *Vertebrata*, a close ganglionated plexus of amyelinate nerve fibres belonging to the sympathetic nervous system, and lying between the longitudinal and circular muscle coats; plexus myentericus.

augen-gneiss, ow'gen nis (*Geol.*). A coarsely crystalline rock of granitic composition, containing lenticular, eye-shaped masses of feldspar or quartz embedded in a finer matrix. A product of regional metamorphism.

aug'er (*Carp., Civ. Eng.*). A tool used for boring holes, especially in wood or in the earth. It consists of a long steel shank, having at one end a cutting edge and at the other a cross-piece for use as a handle with which to turn the auger by hand.

augite, aw′jīt (*Min.*). A complex aluminous silicate of calcium, iron, and magnesium, crystallising in the monoclinic system, and occurring in many igneous rocks, particularly those of basic composition; it is an essential constituent of basalt, dolerite, and gabbro.

augmentation of moon's semi-diameter (*Astron.*). The apparent increase in the angular radius of the moon, due to the observer's being nearer to that body when above the horizon than is the centre of the earth, the maximum difference in the distance being the earth's radius, 3963 miles approximately.

augmentative-trophic reaction (*Zool.*). In development, the quantitative effect of stimuli on the increase in size of organs or tissues already present.

augmentor (*Zool.*). In *Vertebrata,* a nerve arising from the sympathetic system and tending, when stimulated, to increase the rate of heart-beat: accelerator: more generally, any nerve which increases the rate-activity of an organ, as a gland or muscle.

aul′ophyte (*Bot.*). A plant inhabiting a cavity in the body of another plant, but not living as a parasite.

aulosto′matous (*Zool.*). Possessing a tubular mouth.

aura (*Med.*). A movement, or sensation, or mental disturbance, which precedes an epileptic convulsion.

aural (*Zool.*). See **auditory.**

aural masking (*Acous.*). See **masking.**

aur′amines (*Chem.*). Dyestuffs of the diphenylmethane series.

aurantia (*Photog.*). A reddish dye for sensitising emulsions and for making gelatine filters.

aur′eole (*Meteor.*). (1) The clear transparent space between the sun or moon and a *halo* (q.v) or corona.—(2) The bright indefinite ring round the sun in the absence of clouds.

auric acid, auric oxide (*Chem*). Formula, Au_2O_3 An acidic oxide of gold.

auricle (*Bot.*). A small ear-shaped lobe at the base of a leaf or other organ.

auricle, auric′ula (*Zool*). A chamber of the heart connecting the afferent blood-vessels with the ventricle: the external ear of *Vertebrata*: any lobed appendage resembling the external ear.—*adj.* **auricular.**

auricled, auriculate. Having auricles.

auric′ula (*Zool.*). In *Echinoidea*, one of the ossicles of Aristotle's lantern, a radially placed arch arising from the inside of the corona. See also **auricle.**

auricula′ria (*Zool.*). In *Holothuria*, a pelagic ciliated larva, having the cilia arranged in a single band, produced into a number of short processes.

auric′ulars (*Zool.*). See **tectrices.**

auric′uloventric′ular (*Zool.*). Pertaining to, or connecting, the auricle and ventricle of the heart; e.g., the *auriculoventricular connexion*, a bundle of muscle-fibres which transmits the wave of contraction from the auricle to the ventricle, in higher Vertebrates.

auriferous deposit (*Geol.*). A natural repository of gold, in the general sense including gold-bearing lodes and sediments such as sands and gravels, or their indurated equivalents, which contain gold in detrital grains or nuggets. See **banket, placers, lodes.**

auriferous pyrite (*Min.*). Iron sulphide in the form of pyrite, carrying gold, probably in solid solution.

aurine (*Chem.*). Pararosolic acid $(HO{\cdot}C_6H_4)_2{:}C{:}C_6H_4{:}O$, made from phenol, oxalic acid, and sulphuric acid. It is similar to rosolic acid in properties.

aurines (*Chem.*). A group of dyestuffs derived from aurine.

aurist (*Acous., etc.*). A medical man skilled in the treatment of defects of the ear, including the measurement of audition.

au′rophore (*Zool.*). In certain *Siphonophora*, a modified medusoid of obscure function, occurring at the side of, and traversed by a canal from, the pneumatophore.

Auro′ra Borea′lis (*Astron.*). A phenomenon of great beauty, believed to be caused by some kind of electric discharge from the sun, best seen in north latitudes about 70°. It consists of arcs or bands of light (often in complex and varied shapes), white, yellow, red, and green. Also called NORTHERN LIGHTS. The corresponding phenomenon in high south latitudes is called the **Aurora Australis.**

aurous (*Chem.*). Containing monovalent gold.

aurum (*Chem.*). Symbol, Au. See **gold.**

auscult′tion (*Med*). The act of listening to the sounds produced in the body.

Austen-Cohen formula (*Radio*). A semi-empirical formula for the field strength at a distance of *r* kilometres from a transmitting antenna of effective height *H* metres, and carrying a current of *I* amperes, the wavelength being λ kilometres. The field strength in microvolts per metre is approximately

$$377\frac{HI}{\lambda r}\epsilon\frac{-0{\cdot}0014r}{\sqrt{\lambda}}, \text{ for } \lambda \text{ greater than 1.}$$

austenite (*Met.*). Originally, a solid solution of carbon in γ-iron; now includes all solid solutions based on γ-iron.

austenitic steels (*Met.*). Steels containing sufficient amounts of nickel, nickel and chromium, or manganese to retain austenite at atmospheric temperature; e.g. *austenitic stainless steel* and *Hadfield's manganese steel.*

Austin Chalk (*Geol.*). A white limestone of Cretaceous age, varying in thickness from 1500 ft. on the Rio Grande to 600 ft. at the type-locality (Austin, Texas) and less than 100 ft. in Colorado. Passes laterally into the Benton Group.

Australasian region (*Zool.*). One of the primary faunal regions into which the land surface of the globe is divided; includes Australia, New Guinea, Tasmania, New Zealand, and the islands south and east of Wallace's line.

australites (*Min.*). See **tektites.**

Austrian cinnabar (*Chem.*). See **basic lead chromate.**

aut-. Prefix. See **auto-.**

aut′acoid, aut′ocoid (*Physiol.*). General name for an endocrine secretion; a specific organic substance formed by the cells of one organ, and passed by them into the circulating fluid, to produce effects upon other organs. *Hormones* (q.v.) are stimulatory and *chalones* are inhibitory or depressive.

autecol′ogy (*Bot., Zool.*). The study of the ecology of any individual species.

author's proof (*Typog.*). The proof returned to the printer by the author, showing his corrections.

auto-, aut- (Greek *autos*, self). A prefix used in the construction of compound terms; e.g. *autocatalysis, autoparthenogenesis* (qq.v.).

auto room (*Auto. Teleph.*). In an automatic telephone exchange, the room in which apparatus is collected in order, on racks.

autoal′logam′y (*Bot.*). The condition of a species in which some individual plants are capable of self-pollination, and others of cross-pollination.

Aut′obasid′iomyce′tes (*Bot.*). A group of about 12,000 species, including mushrooms, toadstools, and many related fungi, characterised by the possession of an *autobasidium* (q.v.).

autobasid′ium (*Bot.*). A basidium which does not become septate.

autobrecciation, —brech′i-ā′shun (*Geol.*). The production of a brecciated appearance by fracturing the consolidated 'roof' of a lava flow, the fragments sinking into the still fluid portion, which, on final consolidation, may differ slightly from the crust in physical characters.

auto-capacity coupling (*Radio*). The coupling of two circuits by a condenser included in series with a common branch.

aut'ocarp (*Bot.*). A fruit resulting from self-fertilisation.

autocatal'ysis (*Chem.*). The catalysis of a reaction by a product of that reaction.

autocatal'ysis (*Zool.*). Reaction or disintegration of a cell or tissue, due to the influence of one of its own products.

autochrome (*Photog.*). Lumière three-colour starch-grain mosaic colour photographic system.

autoclave (*Chem.*). A vessel, usually constructed of thick-walled steel, for carrying out chemical reactions under pressure and at high temperatures. Pressure gauge, safety valve, and thermometer pocket are provided for control.—(*Med.*) An apparatus for sterilisation by steam at high pressure.

auto-converter (*Elec. Eng.*). A special form of converter used with certain types of electric-battery vehicle; it is arranged to operate from a constant-voltage battery supply and give an output voltage inversely proportional to the current.

autoch'thonous (*Zool.*) In an aquatic community, said of food material produced within the community: more generally, indigenous, inherited, hereditary (e.g. *autochthonous* species, *autochthonous* characteristics). Cf. *allochthonous.*

aut'ocyst (*Zool.*). In *Neosporidia*, a thick membrane formed by the parasite, and separating it from the host tissues.

autodyne (*Radio*). Another name for *autoheterodyne.*

autoecious, autoxenous, aw-tē̆'si-us, —zē̆'nus (*Bot.*). A term applied to parasitic fungi which complete the whole of their development upon one species of host plant.

auto-emission (*Thermionics*). The emission of electrons from a conductor by virtue of high potential gradient at the surface. Also called COLD EMISSION.

auto-er'otism (*Psychol.*). A condition where sensual pleasure is sought and gratified in one's own person, without the aid of an external love-object; e.g. masturbation. See also **narcissism.**

auto-frettage (*Eng.*). A process of gun-tube manufacture by which a plain tube is initially stressed so as to simulate the desirable stress-distribution of a compound cylinder.

autog'amy (*Bot., Zool.*). (1) Self-fertilisation.—(2) The fusion of sister-cells, or of two sister-nuclei.

autogenesis, autogeny (*Bot., Zool.*). See **spontaneous generation.**

autogenic movement (*Bot*). See **autonomic movement.**

Autogi'ro (*Aero.*). A trade-name for a flying-machine whose chief support in flight is derived from the reaction of the air upon a system of freely revolving planes or rotors; a rotaplane.

autographic film (*Photog.*). Camera film which uses a transferable substance which is conveyed to the back of the base by writing with a stylus on the red paper backing, the written words appearing on the final positive.

autohet'erodyne, autodyne (*Radio*). A heterodyne receiving circuit in which the same valve is used for rectification and generation of local oscillations. Also called ENDODYNE, SELF-HETERODYNE.

autohetero'sis (*Zool.*). Independent modification of a merome, or meromes, without consequent modification of the other meromes in the same somite.

autoi'cous (*Bot.*). Having male and female inflorescences on the same plant.

auto-ignition (*I.C. Engs.*). The self-ignition or spontaneous combustion of a fuel when introduced into the heated air-charge in the cylinder of a compression-ignition engine. See **spontaneous ignition temperature.**

auto-inductive coupling (*Radio*). The coupling of two circuits by an inductance included in series with a common branch.

auto-infection (*Zool.*). Re-infection of a host by its own parasites.

auto-intoxication (*Med.*). Poisoning of the body by toxins produced within it.

autol'ysis, *or* —lī'sis (*Bot., Zool.*). The breakdown of the cell contents of a cell, or of an organ, by the action of enzymes produced in the cells concerned: self-digestion.—*adj.* **autolytic.**

auto-manual switchboard (*Teleph.*). The section of an automatic telephone exchange used by operators to obtain numbers in exchanges which are not automatic, and to handle trunk and toll calls, phonograms, and miscellaneous enquiries.

automatic alarm (*Radio*). See **automatic call device.**

automatic arc lamp (*Illum.*). An arc lamp in which the feeding of the carbons into the arc and the striking of the arc are done automatically, by electromagnetic or other means.

automatic arc welding (*Elec. Eng.*). Arc welding carried out in a machine which automatically moves the arc along the joint to be welded, feeds the electrode into the arc, and controls the length of the arc.

automatic bias (*Radio*). The provision of grid-bias by the inclusion of a resistance in the cathode circuit of a thermionic valve, the grid circuit being returned to the end of the resistance remote from the cathode.

automatic call device (*Radio*). A system of relays, responsive to a prearranged set of signals, connected to an unattended receiver, so that an alarm is sounded on operation. Frequently used on ships for detection of distress signals. Also called AUTOMATIC ALARM.

automatic camera (*Photog.*). A camera in which exposure and processing are carried out automatically, the finished photographs becoming available in a short time. See **Photomaton.**

automatic circuit-breaker (*Elec. Eng.*). A circuit-breaker which automatically opens the circuit as soon as certain predetermined conditions (e.g. an overload) occur.

automatic control (*Elec. Comm.*). Reduction or expansion of the difference between the maximum and minimum modulation levels in communication circuits by means of devices operated by the modulation currents themselves.

automatic cut-out (*Elec. Eng.*). A term frequently applied to a small automatic circuit-breaker suitable for dealing with currents of a few amperes.

automatic direction-finder (*Radio*). A direction-finding system in which servo motors, controlled by the incoming signal, cause the rotatable loop antenna or goniometer to hunt for the direction of maximum or minimum signal response.

automatic exchange (*Teleph.*). An exchange in which the normal connexions between subscribers, or from subscribers to other exchanges, are set up by switches operated by impulse trains and not by operators.

automatic flushing cistern (*San. Eng.*). A tank which discharges its contents, at regular intervals, by a siphonic action started when the water entering the tank rises to a certain level. Used for flushing urinals; also for drains having insufficient fall to ensure self-cleansing.

automatic frequency control (*Radio*). An arrangement sometimes used in superheterodyne receivers to hold the local oscillator at its correct frequency after the desired station has been tuned in. Usually abbreviated to **A.F.C.**

automatic gain control (*Radio*). An arrangement usually found in a radio-receiver for counteracting changes in the magnitude of a received radio signal due to variations in signal-strength, whether such variations arise from power or distance of the transmitter, or from rapid fading. The gain of the radio-frequency section of the receiver is made inversely dependent on the demodulated carrier. Erroneously termed *automatic volume control* (*A.V O.*), which should refer to control of contrast. See **control** (*Acous.*) and **compandor** (*Elec. Comm*). See also **delayed automatic volume control.**

automatic gate (door) (*Elec. Eng.*). A gate (or door) on a lift-car which is automatically opened by the action of the lift as it approaches a landing, and which automatically closes as the car leaves the landing.

automatic gate (door) lock (*Elec. Eng.*). A lock on the gate (or door) of a lift-car or landing, which is arranged so that it can only be released, and the gate or door opened, when the car is in a position of safety at the landing concerned.

automatic generating plant (*Elec. Eng.*). A small generating station, usually for private-house lighting, consisting of a petrol-engine-driven generator in conjunction with a battery; the engine is automatically started up when the battery voltage falls below a certain value and stopped when it is fully charged. The term is also applied to the plant in small unattended hydro-electric generating stations.

automatic ignition advance (*Automobiles, etc.*). A device, fitted to the ignition distributor of a petrol-engine, which adjusts the ignition-timing in accordance with engine-speed, induction-pipe depression, or both.

automatic loom (*Textiles*). A loom equipped with mechanism for automatically replenishing the weft: a warp stop motion: a warp let-off motion.

automatic pistol (*Small Arms*). A pistol which is reloaded by means of the energy produced by the discharge of the previous round.

automatic shutter (*Cinema.*). In a film projector, the shutter which cuts off the light from the arc if the film should stop (instead of maintaining intermittent motion); without this safeguard, the intense heat from the arc would ignite the film.

automatic signalling (*Elec. Eng.*). A system of railway signalling, usually with electric control, in which the signals behind a train are automatically put to 'danger' as soon as the train has passed, and held in that position until the train has attained the next section of line.

automatic starter (*Elec. Eng.*). A starter for an electric motor which automatically performs the various starting operations (e.g. cutting out steps of starting resistance) in the correct sequence, after being given an initial impulse by means of a push-button or other similar device.

automatic stoker (*Eng.*). See **mechanical stoker.**

automatic substation (*Elec. Eng.*). A substation containing rotating machinery (and therefore normally requiring the presence of an attendant), which, as occasion demands, is started and stopped automatically; e.g. by a voltage relay which operates when the voltage falls below or rises above a certain predetermined value.

automatic synchroniser (*Elec. Eng.*). A device which, by means of suitable relays, performs the process of synchronisation automatically.

automatic tandem working (*Auto. Teleph.*). The use of an intermediate exchange for routing calls between automatic and manual exchanges, thus facilitating connexions during conversion from manual to complete automatic working in an area.

automatic tap-changing equipment (*Elec. Eng*). A voltage-regulating device which automatically changes the tapping on the winding of a transformer in order to regulate the voltage in a desired manner.

automatic telegraphy (*Teleg.*). The use of a punched slip for operating telegraph machines, which transmit signals regularly and accurately.

automatic telephone (*Teleph.*). A telephone system in which the required subscriber is obtained by the calling subscriber setting up a train of impulses which route the call to the desired subscriber without the intervention of an operator.

automatic telephone exchange (*Auto. Teleph.*). The location of all the automatic switches and associated equipment required for the automatic routing of calls controlled by dialling to or from a specified telephonic area.

automatic train stop (*Elec. Eng.*). A catch, used in conjunction with an automatic signalling system, which engages a trip-cock on the train if the train passes a signal at danger.

automatic trolley reverser (*Elec. Eng.*). An arrangement of the overhead contact line of a tramway, located at terminal points, which ensures that the trolley collector is reversed when the direction of motion of the car is reversed.

automatic tuning (*Radio*). A system of tuning in which any of a number of predetermined frequencies may be selected by means of push-buttons or similar devices.

automatic voltage regulator (*Elec. Eng.*). A voltage regulator which automatically holds the voltage of a distribution circuit or an alternator constant within certain limits, or causes it to vary in a predetermined manner. See **automatic tap-changing equipment, moving-coil regulator, Tirrill regulator.**

automatic volume control (*Radio*). See **automatic gain control.**

autom'atism (*Psycho-path.*). An automatic act done without the full co-operation of the personality, which may even be totally unaware of its existence. Commonly seen in hysterical states, such as fugues and somnambulism, but may also be a local condition, as in automatic writing.

autometamor'phism (*Geol.*). Changes in the mineral composition of an igneous rock consequent upon the action of solutions and possibly of vapours derived from the same body of magma as the rock itself.

aut'omix'is (*Biol.*). The mingling of chromatin from the same source, as in self-fertilisation; hence self-fertilisation especially in lower plants.

automixte system (*Elec. Eng.*). A system of operation of petrol-electric vehicles in which a battery, connected in parallel with the generator, supplies current during starting and heavy-load periods, and is charged by the generator during light-load periods. Also called PIEPER SYSTEM.

automobile, —mō-bēl'. A common synonym for a *motor-car.*

automobile engine (*I.C. Engs.*). A multi-cylinder petrol or oil engine used for the propulsion of motor vehicles.

autonom'ic, auton'omous (*Bot., Zool.*). Independent: self-regulating: spontaneous.

autonomic (or **autogenic**) **movement** (*Bot.*). A movement of a plant, or of part of a plant, not stimulated by any external condition.

autonomic nervous system (*Zool.*). In Vertebrates, a system of motor nerve-fibres supplying the smooth muscles and glands of the body. See **sympathetic nervous system, parasympathetic nervous system.**

auton′omous (*Zool.*). Subject to the same laws, especially of growth and specialisation. Cf. *heteronomous*. See also **autonomic.**

autopal′atine (*Zool.*). In some Fish, an ossification at the extreme anterior end of the PPQ Bar.

autopar′asite (*Bot.*). A parasite which attacks another parasite.

autopar′thenogen′esis (*Zool.*). Artificially stimulated development of unfertilised eggs.

autoph′agous (*Zool.*). Capable of self-feeding from the moment of birth, as some Birds, which run about and feed as soon as they are hatched.

autoph′agy (*Zool.*). The eating of a part of the body, usually after its amputation.

Autophotic cell (*Photo-electronics*). The same as *Photronic cell.*

autophy′a (*Zool.*). Elements of the shell or skeleton secreted by the organism itself. Cf. *xenophya.*

aut′ophyte (*Bot.*). A plant which builds up its food substances from simple compounds.

autoplas′ma (*Zool.*). In tissue culture, a medium prepared with plasma from the same animal from which the tissue was taken; cf. *homoplasma, heteroplasma.*—*adj.* **autoplastic.**

autoplas′tic transplantation (*Zool.*). Re-insertion of a transplant or graft from a particular individual in the same individual. Cf. *heteroplastic, homoioplastic, xenoplastic.*

autopo′dium (*Zool.*). In *Vertebrata*, the hand or foot.

autopol′yploid (*Cyt.*). A polyploid having similar sets of chromosomes in its total chromosome content.

autopot′amous (*Ecol.*). Originating in rivers and streams.

aut′opsy. See **necropsy.**

auto-reclose circuit-breaker (*Elec. Eng.*). A circuit-breaker which, after tripping due to a fault, automatically recloses after a time interval which may be adjusted to have any value between a fraction of a second and one or two minutes.

autorhyth′mus (*Zool.*). In metameric animals, repetition of meromes within a somite.

autoset level (*Surv.*). A form of dumpy level for rapid operation, in which the essential features are a quick-levelling head, and an optical device which neutralises errors of levelling so that the bubbles need not be central while an observation is being made.

autoskel′eton (*Zool.*). A skeleton formed of autophya; usually an endoskeleton.

aut′osome (*Cyt.*). Any chromosome other than a sex-chromosome; a typical chromosome. See **allosome.**

autos′pasy (*Zool.*). The casting of a limb or part of the body when it is pulled by some outside agent, as when the Slow-worm casts its tail.

autosper′mathe′ca (*Zool.*). In *Oligochaeta*, a spermathecal sac, which is a reservoir for the animal's own spermatozoa, which are discharged on its own ova during the formation of the cocoon.

aut′ospore (*Bot.*). A daughter cell formed within an algal cell, and having all the characters of the parent in miniature before it is set free.

autostoper (*Mining*). An air-fed stoper; a form of light compressed-air rock-drill so mounted, on a long cylinder containing compressed air, that it is kept up against the rock face without manual effort or mechanical supports.

aut′osto′ses (*Zool.*). See **cartilage bones.**

aut′osty′ly (*Zool.*). A type of jaw suspension found in *Hexanchidae* (Comb-toothed Sharks), in which the upper jaw articulates directly with the cranium posteriorly, but is attached by a ligament or cartilaginous process anteriorly.—*adj.* **autosty′lic.**

autosuggestion (*Psychol.*). A condition of self-induced suggestion, brought about when the mind has lessened conscious direct effort and control, and is absorbed only with the suggested idea. In certain cases it may induce a state of light auto-hypnosis.

auto-synchronous motor (*Elec. Eng.*). A term frequently used to denote a *synchronous induction motor.*

autotet′raploid (*Cyt.*). A tetraploid with four similar sets of chromosomes in its nuclei.

autot′illy (*Zool.*). The removal of a limb or part of the body by the animal itself, as in certain Spiders.

autot′omy (*Zool.*). Voluntary separation of a part of the body (e.g. limb, tail), as in certain Worms, Arthropods, and Lizards; self-amputation.

auto-transformer (*Elec. Eng.*). A single-winding transformer in which the primary voltage is applied to the whole winding and the secondary voltage is taken from suitable tappings on the winding.

auto-transformer starter (*Elec. Eng.*). A starter for squirrel-cage induction motors, in which the voltage applied to the motor at starting is reduced by means of an auto-transformer.

autotransplantation (*Zool.*). See **autoplastic transplantation.**

autotroph′ic (*Bot.*). Able to build up food materials from simple substances.

autotrophic bacteria (*Bot.*). Bacteria which are able to utilise carbon-dioxide in assimilation.

autotro′pism (*Bot.*). The tendency to grow in a straight line.

aut′otype (*Photog.*). The printing of photographic images by the carbon or pigment process.

auto-valve arrester (*Elec. Eng.*). A form of arrester, consisting of a porous material, in which the discharge is confined to very narrow passages and therefore cannot assume the characteristics of an arc.

autoxidation (*Chem.*). (1) The slow oxidation of certain substances on exposure to air.—(2) Oxidation which is induced by the presence of a second substance. See **induced reaction.**

autox′idator (*Chem.*). An olefine-oxygen compound acting as a carrier or intermediate agent during oxidation, in particular during *autoxidation* (q.v.).

autozo′oid (*Zool.*). In *Anthozoa*, an ordinary typical zooid. Cf. *siphonozooid.*

autumn wood (*Bot.*). See **summer wood.**

autumnal equinox (*Astron.*). The instant at which the sun in its apparent annual motion reaches the First Point of Libra and crosses the celestial equator from north to south, the calendar date being September 23rd.

aut′unite (*Min.*). Hydrous phosphate of calcium and uranium, resembling torbernite, but yellow.

auxanom′eter (*Bot.*). An instrument which is used to measure the rate of elongation of a plant member.

auxe′sis (*Zool.*). Induction of cell-division, especially by the influence of a chemical agent.

auxe′tic (*Zool.*). Inducing or stimulating cell-division.

auxiliary attachment (*Horol.*). A special attachment to a compensation balance, for the purpose of reducing the *middle-temperature error* (q.v.).

auxiliary cell (*Bot.*). One of a group of cells which are not part of the sexual organs of red algae, but nevertheless play a part (probably nutritive) in the formation of the fruit.

auxiliary contact (*Elec. Eng.*). See **auxiliary switch.**

auxiliary electrode (*Elec. Eng.*). An additional electrode placed in an electrolytic cell for the purpose of making potential measurements.

auxiliary grid (*Thermionics*). In a pentode, the second grid, maintained at a high positive potential.

auxiliary lift-motor (*Elec. Eng.*). A small motor forming part of the driving equipment of an electric lift; used for operating the lift at reduced speeds.

auxiliary plant (*Elec. Eng.*). A term used in generating-station practice to cover the condenser pumps, mechanical stokers, feed-water pumps, and other equipment used in conjunction with the main boiler, turbine, and generator plant.

auxiliary pole (*Elec. Eng.*). See **compole.**

auxiliary spark gap (*Elec. Eng.*). A small spark gap for automobile ignition, placed in series with the main gap of a sparking-plug; it improves the quality and certainty of the spark.

auxiliary switch (*Elec. Eng.*). A small switch operated mechanically from a main switch or circuit-breaker; used for operating auxiliary devices such as alarm bells, indicators, etc. Also called AUXILIARY CONTACT.

auxiliary tanks (*Aero.*). See under **fuel tanks.**

auxiliary valency (*Chem.*). The valency remaining after saturation of the principal valency of an atom.

auxiliary winding (*Elec. Eng.*). A special winding on a machine or transformer, additional to the main winding; used for some special purposes. An example is the starting winding of a single-phase induction motor.

auxin (*Bot., Chem.*). $C_{18}H_{32}O_5$, a plant hormone from *Avena* or from maize germ, which causes elongation of individual cells in the growing tips of plants. Auxin is a monobasic trihydroxy-acid forming a lactone, $C_{18}H_{30}O_4$.

aux'ochromes (*Chem.*). Certain groups introduced into dyestuffs giving full effectiveness to the colouring properties. The principal auxochromes are Cl, Br, SO_3H, NO_2, NH_2, OH. Auxochromes may, furthermore, permit by their presence the formation of salts and the creation of a dyestuff.

aux'ocyte (*Cyt.*). Any cell in which meiosis is started: a spermatocyte or oöcyte, during the period of growth.

auxospi'reme (*Cyt.*). In meiosis, the spireme formed after syndesis.

aux'ospore (*Bot.*). A resting spore formed by diatoms after a sexual fusion.

auxoton'ic (*Zool.*). (Of muscle contraction) of or against increasing force.

availability, full (*Auto. Teleph.*). See **full availability.**

available water (*Bot.*). The total amount of water in the soil (at any given time) which can be drawn upon by plants.

avant-garde film, a-vahn^{g} gard (*Cinema.*). A film which purports to advance the technique of cinematograph film on the artistic side, as contrasted with those films made to take advantage of possible box-office returns.

avas'cular (*Med.*). Not having blood-vessels.

A.V.C. (*Radio*). Abbrev. for *automatic volume control*. See **automatic gain control.**

aven'turine feldspar (*Min.*). A variety of sodic plagioclase, near albite in composition, characterised by minute disseminated particles of red iron oxide which cause fire-like flashes of colour. Also called SUNSTONE.

aventurine glass (*Glass*). Glass containing 'spangles' of material, separated out from the main body. It may be produced from glasses containing excessive amounts of copper or chromium compounds, melted under special conditions.

aventurine quartz (*Min.*). A form of quartz charged, sometimes densely, with minute inclusions of either mica or iron oxide. Used in ornamental jewellery.

average current (*Elec. Eng.*). A term used in connexion with alternating currents to denote the average value of the current taken over half a cycle.

average haul distance (*Civ. Eng.*). The distance between the centre of gravity of a cutting and that of the embankment formed from material excavated from the cutting.

average speech power (*Acous.*). The average of the instantaneous acoustic powers of a speaker while speaking.

average speed. The average speed of a train between start and stop. Cf. *schedule speed*. See also **speed.**

averse (*Bot.*). Turned back.

aversion (*Bot.*). The tendency shown by elongating fungal hyphae to avoid coming into contact.

Avertin (*Chem.*). Tribromethyl alcohol, $CBr_3 \cdot CH_2OH$, white crystals, soluble in alcohol, ether, very slightly in water, used as an anaesthetic administered per rectum. (Trade-name.)

avian paratyphoid (*Vet.*). See **paratyphoid.**

avian spirochaetosis (*Vet.*). See **spirochaetosis.**

avian typhoid (*Vet.*). See **typhoid (avian).**

aviation spirit (*Aero.*). A motor fuel with a low initial boiling-point and complying with a certain specification, for use in aeroplanes.

avicula'rium (*Zool.*). In *Polyzoa*, a modified zooecium, having a movable mandible with powerful muscles acting against a fixed mandible, and capable of snapping movements; its function is mainly defensive.

avidity (*Chem.*). The relative strength of an acid (or base) in a mixture of acids (or bases), measured by the proportion of a base (or acid) neutralised by that acid (or base).

avitamino'sis (*Med.*). The condition of being deprived of vitamins: any deficiency disease caused by lack of vitamins. *

Avogad'ro constant (or **number**) (*Chem.*). The number of molecules in a gram-molecule, about $6{\cdot}1 \times 10^{23}$.

Avogadro's hypothesis (*Chem.*). Equal volumes of different gases at the same temperature and pressure contain the same number of molecules.

Avonian (*Geol.*). Synonymous with *Lower Carboniferous* and equivalent to the two stages, Dinantian and Visean, of the continental geologists. Named from the type-sections in the Avon Gorge, Bristol district.

avulsion (*Med.*). The tearing away of a part.

A.W. (*Chem.*). Abbrev. for *atomic weight*.

A.W. (*Timber*). (Of cut timber) an abbrev. signifying *all-widths*.

awl (*Carp.*). A small pointed tool for making holes which are to receive nails or screws.

awn (*Bot.*). (1) A long bristle borne on the glumes of some grasses and cereals; e.g. the beards of barley.—(2) A long thread-like outgrowth on certain fruits.

awning deck (*Ship Constr.*). A superstructure deck, as the name implies. In its simplest form, it is the top deck of a two-deck ship, and places the ship in a certain category for scantling and freeboard.

axe (*Tools*). (1) A tool for chopping wood, consisting of a steel blade attached to a wooden handle, the edge of the blade being in line with the handle.—(2) A pointed hammer used for dressing stone.

axed arch (*Build.*). An arch built from bricks cut to a wedge-shape.

axed work (*Masonry*). Hard building-stone dressed with the axe to leave a ribbed face.

axes. *Pl.* of *axis* (q.v.). See also **co-ordinate—*, oblique—*, rectangular—*.**

axes (*Crystal.*). Lines of reference intersecting at the centre of a crystal. Crystal (or morphological) axes, usually three in number, by their relative lengths and attitude, determine the system to which a crystal belongs. See **cubic system, tetragonal system, orthorhombic system,** etc.

axial (*Bot.*). Relating to the axis of a plant: of shoot nature.

axial ducts (*Elec. Eng.*). Ducts placed parallel with the shaft in the stator or rotor of an electrical machine, in order to facilitate the passage of cooling air.

axial filament (*Zool.*). An internal thread, running down a flagellum and entering the body of the cell, to join the basal granule or blepharoplast: the stiff central thread of a radiate pseudopodium.

axial girder (*Aero.*). The girder forming the actual axis of a rigid-airship frame. It connects the hull structure fore and aft with a central fitting of each braced transverse frame.

axial gradient (*Bot.*). The physiological gradient along the axis of a plant, activity being highest at one end and falling off towards the other.—(*Zool.*) A gradient of physiological activity, preceding the development of the axiate pattern.

axial organ (*Zool.*). In *Echinodermata*, a structure composed of connective and lacunar tissue, together with genital cells, lying near the axial sinus and stated to be contractile.

axial pitch (*Eng.*). (In a screw-thread or helix) the distance from a point on the helix, measured parallel with the axis, to the corresponding point after one complete turn.

axial response (*Acous.*). The response of a microphone or loudspeaker, measured with the sound-measuring device on the axis of the apparatus being tested.

axial sinus (*Zool.*). In *Echinodermata*, a vertical space, communicating at one end with the exterior or the coelom, via the madreporite, and at the other end with the inner perihaemal ring.

axial skeleton (*Zool.*). The skeleton of the head and trunk: in *Vertebrata*, the cranium and vertebral column, as opposed to the appendicular skeleton.

axiate pattern (*Zool.*). The morphological differentiation of the parts of an organism, with reference to a given axis.

axil (*Bot.*). The solid angle between a stem and the upper surface of a leaf base growing from it.

axile (*Bot.*). Coinciding with the longitudinal axis.

axile chloroplast (*Bot.*). A chloroplast lying in the axis of the containing cell.

axile placentation (*Bot.*). The condition when the ovules are attached to tissue lying in the axis of the ovary.

axile strand (*Bot.*). A simple condition of a vascular system, with conducting elements in the centre of the plant axis, giving off strands to the leaves; roughly equivalent to a protostele, but also includes the simple strands present in the larger mosses.

axilem'ma (*Zool.*). In medullated nerve-fibres, the whole of the medullary sheath.

axil'la (*Zool.*). The arm-pit: the angle between the fore-limb and the body.—*adj.* **axil'lary.**

axil'lant (*Bot.*). Subtending an angle.

axil'lary (*Bot.*). Situated in an axil; applied especially to buds, and to shoots developing from them.

axillary (*Zool.*). In Insects, one of the articular sclerites of the wing. See also **axilla.**

ax'inite (*Min.*). A complex borosilicate of calcium and aluminium, with small quantities of iron and manganese, produced by pneumatolysis and occurring as brown wedge-shaped triclinic crystals.

axis. A line, usually imaginary, which has a peculiar importance in relation to a particular problem or set of circumstances. Thus the *axis of symmetry* of a figure is a line which divides it symmetrically; the *axis of rotation* is the line about which a body rotates; the principal *axis of a lens* (q.v.) is the line joining the centres of curvature of its two faces.—Specifically: (*Bot.*). (1) The line passing through the middle of any organ.—(2) The main trunk of a root or shoot.—(3) The central stalk in a grass spikelet.—(4) Any plant part bearing lateral branches.—(*Crystal.*) See **axes.**—(*Zool.*) In the higher Vertebrates, the second cervical vertebra: the central line of symmetry of an organ or organism.—*pl.* **axes.**

axis cylinder (*Zool.*). The excitable core of a medullated nerve-fibre. See also **axon.**

axis of a lens (*Photog.*). The line of symmetry of the optical system; the line along which there is no refraction.

axle (*Eng., etc.*). The cross-shaft or beam which carries the wheels of a vehicle; they may be either attached to and driven by it, or freely mounted thereon.

axle-box (*Eng.*). The bearings used for the axles of railway rolling-stock, consisting of an upper half-bearing integral with a box-shaped housing which holds the lubricant.

axle pulley (*Join.*). A pulley set in a sash-frame so that the sash-cord connecting the window and its balancing weight may run over it.

Axminster carpet (*Textile*). A high-class machine-made carpet with a cut pile surface; named after Axminster (Devon), its place of origin.

axon (*Zool.*). The impulse-carrying process of a typical nerve-cell or neurocyte, usually giving rise either to a non-medullated nerve-fibre, or to the axis cylinder of a medullated nerve-fibre.

ax'oneme (*Zool.*). In certain *Ciliophora*, the central strand of the stalk: the axial filament of a flagellum.

ax'onost (*Zool.*). In Fish, the basal bone of a fin-ray: interspinal bone.

axopo'dium (*Zool.*). A pseudopodium, strengthened and stiffened by an axial rod, as in some *Heliozoa* and *Radiolaria*.

axosper'mous (*Bot.*). Having axile placentation

ax'ostyle (*Zool.*). In some *Protozoa*, a slender flexible skeletal rod of an organic nature.

Aymestry Limestone (*Geol.*). A subdivision of the Silurian System occurring between the Lower and Upper Ludlow beds; it takes its name from a locality in Shropshire, being typically exposed in the Ludlow-Wenlock country.

Ayrton shunt (*Elec. Eng.*). A relatively large resistance for connecting across a galvanometer; tappings on the resistance are taken at 1/10, 1/100, and 1/1000 of the whole.

Ayrton-Mather galvanometer (*Elec. Eng.*). A moving-coil galvanometer having no iron within the moving-coil.

azaline (*Photog.*). A dye mixture for sensitising ortho emulsions for red and yellow light.

a'zeotrop'ic mixtures (*Chem.*). Mixtures of two or more liquids distilling over without decomposition in a certain ratio at a constant boiling temperature; e.g. chlorhydrin and water form an *azeotropic mixture*, also *iso*propyl alcohol and water. The boiling-point of the azeotropic mixture is lower than that of its constituents.

a'zides (*Chem.*). (1) See **acid azides.**—(2) Salts of hydrazoic acid. The heavy metal azides are explosive. Used as a coating, which is subsequently reduced to metal, on the filaments of radio receiving valves, to improve electron emission.

azimi'no compounds (*Chem.*). Heterocyclic compounds containing three adjacent nitrogen atoms in one ring, very stable. They are prepared by the action of nitrous acid on *o*-diamines or 1.8-diamino-naphthalenes.

az'imuth (*Astron., Surv.*). The azimuth of a line or celestial body is the angle between the vertical plane containing the line or celestial body and the plane of the meridian, conventionally measured from North through East in astronomical computations, and from South through West in triangulation and precise traverse work.

azimuth compass (*Surv.*). A magnetic compass fitted with sights for taking bearings.

azimuthal angle (*Surv.*). An angle measured 'in azimuth' (see **azimuth**), that is, a horizontal angle.

a'zines (*Chem.*). Organic bases containing a heterocyclic hexagonal ring of four carbon and two nitrogen atoms, the nitrogen atoms being in the *para*-position with respect to one another.

a'zo group (*Chem.*). The group —N.N—, generally combined with two aromatic radicals. The azo group is a chromophore, and a whole class of dyestuffs is characterised by the presence of this group.

azo dyes (*Chem.*). Derivatives of azobenzene, obtained as the reaction products of diazonium salts with tertiary amines or phenols. They are usually coloured yellow, red, or brown, and have acidic or basic properties.

azoim'ide (*Chem.*). Hydrazoic acid, N_3H, a weak unstable acid, prepared by the action of nitrous acid on hydrazine; a colourless liquid, b.p. 37° C. The acid and its derivatives are explosives.

azomethane (*Chem.*). $CH_3{\cdot}N.N{\cdot}CH_3$, b.p. 1·5° C., a yellow liquid, obtained by the oxidation of *sym.* dimethyl-hydrazine with chromic acid.

azo'nium bases (*Chem*.). A group of bases including *azines* (q.v.) and *quinoxalines* (q.v.).

azoosper'mia, ă-zŏ-o— (*Path.*). Complete absence of spermatozoa in the semen.

azophenine (*Chem.*). 2.5-Dianilo-*p*-benzaquinone-diphenyldiimine, m.p. 246° C., an intermediate for induline dyes.

azoproteins (*Chem.*). Derivatives obtained by coupling diazotised aromatic amines with serum proteins. On injection into the blood stream they cause the production of antibodies which react with other azoproteins containing the same amine.

azotaemic (azotemic) nephritis (*Med.*). Nephritis in which there is retention of nitrogenous products in the blood.

azote' (*Chem.*). The French name for nitrogen, given to it by Lavoisier.

azotom'eter (*Chem.*). Analytical apparatus for measuring the volume of nitrogen evolved during the combustion of an organic compound by Dumas's method.

azotu'ria (*Vet.*). See **haemoglobinaemia (paralytic).**

azoxy compounds (*Chem.*). Mostly yellow or red crystalline substances obtained by the action of alcoholic potash upon the nitro compounds, or by the oxidation of azo compounds.

azure quartz (*Min.*). See **sapphire quartz.**

a'zurite (*Min.*). A basic carbonate of copper, occurring either as deep-blue monoclinic crystals or as kidney-like masses built of closely packed radiating fibres. Also called CHESSYLITE (from Chessy, in France).

azy'gobran'chiate (*Zool.*). Having ctenidia or branchiae developed on one side only.

azy'gomat'ous (*Zool*.). Lacking a zyomatic arch.

azy'gos, *or* az'i-gos (*Zool.*). An unpaired structure. —*adj.* **azygous.**

azy'gospore (*Bot.*). A structure resembling a zygospore in morphology, but not resulting from a previous sexual union of gametes or of gametangia.

B, β

b (*Elec. Eng.*). The symbol for susceptance in an a.c. circuit; measured by the negative of the reactive component of the admittance.

b-group (*Light*). A close group of Fraunhofer lines in the green of the solar spectrum, due to magnesium.

β- (*Chem.*). A symbol indicating: (1) Substitution on the carbon atom of a chain next but one to the functional group; (2) substitution on a carbon atom next but one to an atom common to two condensed aromatic nuclei; (3) substitution on the carbon atom next but one to the hetero-atom in a hetero-cyclic compound; (4) a stereo-isomer of a sugar.

β female (*Zool.*). See **beta female.**

βl or **beta-ell** (*Elec. Comm.*). The Continental expression for the total attenuation, in népers, of a line of length l and attenuation constant β per unit length.

β particle (*Phys.*). See **beta particle.**

β rays (*Phys.*). See **beta rays.**

B (*Chem.*). The symbol for *boron.*

B (*Elec.*). The symbol for flux density in a magnetic circuit; measured in 'lines per sq. cm.,' there being 4π 'lines' of flux emanating from the defined unit N-pole.

[B] (*Light*). A Fraunhofer line in the red of the solar spectrum, due to absorption by the earth's atmosphere. [B] is actually a close group of lines having a head at wavelength 6867·457 A.

B. and B.B. (*Met.*). Brand-marks signifying *Best* and *Best Best,* placed on wrought-iron to indicate the maker's opinion of its quality.

B-amplifier (*Elec. Comm.*). The amplifier following mixers or faders associated with microphone circuits in broadcasting studios, the faders and mixers following the A-amplifiers.

B. and S. Wire Gauge. Abbrev. for *Brown and Sharpe Wire Gauge.*

B-battery (*Elec. Comm.*). The battery or power supply required for the anode current of thermionic valves. Referred to as *High-Tension,* as contrasted with the relative *Low-Tension* A-battery.

B-layer (*Radio*). A weakly reflecting and scattering layer or region 10-30 km. above the earth's surface, possibly associated with water-vapour or ice in the stratosphere; postulated to explain short-period return signals when these are projected vertically.

B-operator (*Teleph.*). The operator in a manual exchange who completes a wanted call, by inserting the incoming junction cord plug into one of the required jacks in the multiple, on the instructions of a distant A-operator in another exchange.

B-position (*Teleph.*). In a manual telephone-exchange, the section of the switchboard allocated to a B-operator, who has access to all subscribers' lines connected to her exchange, which appear as jacks in the multiple.

B-position keysending (*Teleph.*). The provision of a set of plunger keys, by means of which a B-operator sets up trains of impulses for operating automatic switches in distant exchanges.

B-position keysending with cords (*Teleph.*). A keysending B-position which is provided with cords so that through-connexions can also be obtained.

B-service-area (*Radio*). The region surrounding a broadcasting transmitter where the field-strength is between 5 and 10 millivolts per metre.

B-side (*Teleg.*). In quadruplex telegraphy, the channel which uses single-currents for sending signals, in contrast with the *A-side,* which uses double-current signals.

B-wire (*Teleph.*). The wire of a subscriber's pair which is connected to the ring of the answering plug of a cord circuit, when it is inserted into the subscriber's line jack.

Ba (*Chem.*). The symbol for *barium.*

B.A. ohm (*Elec. Eng.*). A unit of resistance adopted by the British Association in 1865 and now superseded by the international ohm. The B.A. ohm is equal to 0·9866 of the international ohm.

B.A. thread (*Eng.*). See **British Association screw-thread.**

Babbitt's metal (*Met.*). A bearing alloy containing, originally, a high proportion of tin and equal parts of copper and antimony. The addition of lead greatly extends the range of service; proportions for general use: tin 40, copper 1·5, antimony 10, lead 48·5.

babble (*Teleph.*). The combination of a number of simultaneous cross-talks.

Babcock and Wilcox boiler (*Eng.*). A water-tube boiler consisting in its simplest form of a horizontal drum from which is suspended a pair of headers carrying between them an inclined bank of straight tubes.

Babinet's compensator, bab′ĕ-nă (*Light*). A device used, in conjunction with a Nicol prism, for the analysis of elliptically polarised light. It consists of two quartz wedges having their edges parallel and their optic axes at right-angles to each other.

Babinet's formula for altitude (*Phys.*).

$$\text{Altitude} = \frac{32(500+t_1+t_2)\,(B_1-B_2)}{B_1+B_2}\,\text{metres},$$

t_1 and t_2 being the temperatures in degrees Centigrade, and B_1 and B_2 the respective barometric heights at sea-level and at the station whose altitude is required.

Babinet's principle (*Light*). Similar diffraction patterns are produced by two complementary screens, the opaque portions of one corresponding to the transparent portions of the other.

bab′ingtonite (*Min.*). A silicate of iron, calcium, and manganese, belonging to the pyroxene group and crystallising in the triclinic system. The essential molecule is probably $FeSiO_3$, but the iron is replaced in varying degree by calcium and manganese. It occurs as a rare constituent of granite.

Babin′ski's reflex (*Neurol.*). Extension of big toe and fanning of other toes on stimulation of sole of foot; a sign of organic disease of the nervous system.

Babo's law (*Phys.*). The vapour pressure of a liquid is lowered when a non-volatile substance is dissolved in it, by an amount proportional to the concentration of the solution.

baby (*Cinema.*). A small incandescent spotlight, used in sound-film production.

bacca (*Bot.*). A berry formed from an inferior ovary: a berry in general.—*adjs.* **baccate.** Resembling a berry, pulpy; **bacciferous** (bak-sif′er-us). Bearing berries; **bacciform** (bak′sĕ-form). Resembling a berry in shape.

bacillae′mia, bacille′mia (*Med.*). Presence of bacilli in the blood.

bacil′lar (*Bot.*). Shaped like a rod.

Bacillar'iophy'ta (*Bot.*). A group of unicellular algae, distinguished by the heavily silicified cell wall (consisting of two halves, one fitting into the other like a box and its lid) and by the yellow or brown coloration. There are many hundreds of species inhabiting fresh and salt water, and less often occurring on or in the soil. They are often called DIATOMS.

bacillary white diarrhoea (*Vet.*). Salmonellosis. A contagious infection of young birds due to *Bacterium pullorum*.—Abbrev. **B.W.D.**

bacillu'ria (*Med.*). Presence of bacilli in the urine.

bacil'lus (*Bacteriol.*). A rod-shaped member of the Bacteria.—*pl.* **bacilli.**

back. A large vat used in various industries, such as dyeing, soap-making, brewing. Also BECK.

back (*Bind.*). See **spine.**

back (*Build., Carp.*). The upper part of a hand-rail, roof rafter, or dome rib. The *back* of a window is the part between the sill of the sash-frame and the floor.

back (*Elec. Eng.*). See **leaving edge.**

back (*Masonry, etc.*). (1) The part of a stone or ashlar opposite to its face.—(2) The extrados of an arch or vault.

backs (*Furs*). Skins after belly parts have been removed.

backs (*Quarrying*). A quarryman's term for one set of joints traversing rock, the other being known as *cutters*.

back ampere-turns (*Elec. Eng.*). That part of the armature ampere-turns which produces a direct demagnetising effect on the main poles. Also called DEMAGNETISING AMPERE-TURNS.

back band (*Build.*). The outside member of a door or window casing.

back boiler (*Plumb.*). A domestic boiler placed behind an open fire; usually made of cast-iron or copper.

back brusher (*Mining*) A man engaged in ripping or taking down the roof in roadways, some distance back from the working face in a mine.

backbye deputy (*Mining*). A man who timbers roads in a direction away from the working places.

back cavity (*Bot.*). The widened opening between the lower faces of the two guard cells of a stoma.

back centre (*Eng.*). In a lathe, a pointed spindle (carried by the loose headstock) on which the end of the work remote from the chuck is supported.

back cock (*Horol.*). In a clock, the bracket (on the back plate) from which the pendulum is suspended.

back contact (*Teleph.*). A contact in a relay assembly which is isolated when a moving contact separates from it on the operation of the relay.

back-coupling (*Radio*). Any form of coupling which permits the transfer of energy from the output circuit of an amplifier to its input circuit. Also called FEEDBACK, REACTION, REGENERATION.

back cross (*Gen.*). A cross between a hybrid and one of its parents.

back cutting (*Civ. Eng.*). Earth obtained for a railway or canal bank, when the excavated earth does not suffice for a regular cut and fill.

back edging (*Build.*). A method of cutting a tile or brick by chipping away the biscuit below the glazed face, the front itself being scribed.

back-e.m.f. (*Elec. Eng.*). An electromotive force which opposes the normal flow of current in a circuit. Sometimes called COUNTER-E.M.F.

back-e.m.f. cells (*Elec. Eng.*). Cells connected into an electric circuit in such a way that their e.m.f. opposes the flow of current in the circuit.

back-end man (*Mining*). A man who cleans the cuttings from behind the coal-cutting machine, sprags the overhang, and props the roof.

back-fire (*I.C. Engs.*). Premature ignition during the starting of an internal-combustion engine, resulting in an explosion before the end of the compression stroke, and consequent reversal of the direction of rotation.

back-flap (*Join.*). The part of a shutter which folds up behind; also known as the BACK-FOLD, or BACK-SHUTTER.

back-flap hinge (*Build.*). A hinge in two leaves, screwed to the face of a door which is too thin to permit of the use of a butt hinge.

back flow (*Hyd., San. Eng.*). Water or sewage flow in a direction contrary to normal.

back-fold (*Join.*). See **back-flap.**

back gauge (*Build.*). The distance from the centre of a rivet- or bolt-hole to the back edge of an angle cleat or channel.

back gear (*Eng.*). A speed-reducing gear fitted to the headstock of a belt-driven metal-turning lathe. It consists of a simple layshaft, which may be brought into gear with the coned pulley and mandrel when required.

back-geared motor (*Elec. Eng.*). An electric motor in which a geared countershaft is mounted as an integral part of the motor frame to provide speed reduction.

background (*Photog.*). The remote surround, either real or artificial, forming the completion of a picture of objects which form the foreground.

background noise (*Acous.*). The residuum of noise, with zero modulation, which is present in all forms of sound reproduction to a greater or less degree. It may arise from radio interference, grain in records, room noise in studios, or from minute arcing between carbon granules in microphones.

back hearth (*Build.*). In a stone or an iron hearth to a fireplace, the part under the grate.

back inlet gulley (*San. Eng.*). A trapped gulley in which the inlets discharge under the grating and above the level of the water in the trap, so that splashing and blocking of the grating are avoided.

back iron (*Carp.*). The stiffening plate screwed to the cutting iron of a jack plane. Also called CAP IRON, COVER IRON.

back joint (*Masonry*). The part of the back of a stone step which is dressed to fit into the rebate of the upper step.

back-kick (*I.C. Engs.*). Term applied to the violent reversal of an internal-combustion engine during starting, due to a *back-fire* (q.v.).

backlash (*Eng.*). The lost motion between two elements of a mechanism, i.e. the amount the first has to move, owing to imperfect connexion, before communicating its motion to the second.

backlash (*Radio*). The property of some regenerative or oscillator circuits by which oscillation is maintained with a smaller feedback than is required for inception.

back lining (*Join.*). (1) The part of a cased sash-frame next the wall, opposite the pulley-stile.—(2) The piece of framing which forms the back of a recess for boxing shutters.

back observation (*Surv.*). Any observation made with a surveying instrument in a direction opposite to the direction of progress of the survey. Cf. *fore observation.*

back-overman (*Mining*). An official who has charge of the back shift of workers in a coal-mine, i.e. the men away from the face.

back pages (*Typog.*). The pages bearing the even numbers in a book, i.e. the left-hand or the verso pages.

back painting (*Dec.*). Designs in colours or gold painted on the back of mirrors previous to silvering, or on glass sheets intended for panel glazing.

back pitch (*Elec. Eng.*). The winding pitch of the winding of an electrical machine, at the end remote from the commutator.

backplate lampholder (*Elec. Eng.*). A lampholder fitted with a support which enables it to be screwed on to a flat surface. Also called a BATTEN-LAMPHOLDER.

back pressure (*Eng.*). The pressure opposing the motion of the piston of an engine on its exhaust stroke: the exhaust pressure of a turbine.

back pressure (*Med.*). The pressure of blood held up in a chamber of the heart as a result of valvular disease.

back pressure (*Plumb.*). Air pressure in pipes when it exceeds atmospheric pressure.

back-pressure engine (*Eng.*). A steam-engine (for industrial heating purposes) in which the steam is exhausted at a pressure exceeding the normal terminal pressure.

back-pressure turbine (*Eng.*). A steam-turbine from which the whole of the exhaust steam, at a suitable pressure, is taken for heating purposes.

back projection (*Cinema.*). The use of a previously photographed background, projected on a glass or paper screen, to form a background when photographing action in the studio.

back putty (*Build.*). Putty put in sash rebates before fitting the glazing.

back rest (*Textiles*). The rod, roller, or oscillating bar at the back of a loom, over which the warp threads pass from beam to healds.

back saw (*Carp.*). A saw stiffened by a thickened back; e.g. a tenon saw.

backsetting (*Build.*). A stone with a boasted or broached face, but with a smooth border all round.

back shore (*Carp.*). One of the outer members of an arrangement of raking shores or props, for supporting temporarily the side of a building. The *back shore* supports the raking shore, or raker, which takes the thrust from the highest part of the building.

back shunt (*Rail.*). See **switchback.**

back-shutter (*Join.*). See **back-flap.**

back sight (*Surv.*). The levelling-staff reading, when taken back to a station which has been passed by the instrument. The first reading taken by the levelling instrument at any given set-up is invariably a *back sight.* See **fore sight, intermediate sight.**

back stay or **back rest** (*Eng.*). See **steady.**

back stop (*Teleg.*). The device which holds a telegraphist's key in the unoperated position.

back stops (*Textiles*). In cotton spinning, buffers which prevent the mule carriage from travelling beyond a fixed point on its inward run.

back stopes (*Mining*). Overhead stopes; stopes worked by putting in overhead holes and blasting down the ore.

back stripper (*Mining*). A man who breaks the large lumps of mined coal and fills the tubs at the coal face.

back-to-back houses (*Build.*). Houses built back-to-back, usually in rows, and without through-ventilation.

back-to-back test (*Elec. Eng.*). The arrangement, originated by Hopkinson, for testing two substantially similar electrical machines on full load, by coupling them mechanically and loading them by regulating the electrical circuit, the total power supply accounting for the total losses only; it has been extended to transformers and mechanical gearing.

backward shift, backward lead (*Elec. Eng.*). Movement of the brushes of a commutating machine around the commutator, from the neutral position, and in a direction opposite to that of the rotation of the commutator, so that the brushes short-circuit zero e.m.f. conductors when the load current, through armature reaction, results in a rotation of the neutral axis of the air-gap flux. Shifting the brushes in this way reduces sparking on the commutator.

back washer (*Textiles*). A machine consisting of washing-bowls, steam-heated cylinders, and a gill-box, for scouring, drying, and opening out carded slivers in worsted manufacture.

back washing (*Textiles*). A second scouring process used to free wool, in sliver or top form, from further impurities.

back-water (*Hyd. Eng.*). Water dammed back in a stream or reservoir by some obstruction. *

backwater curve (*Hyd. Eng.*). The longitudinal profile of the water surface in the case of non-uniform flow in an open channel, when the water surface is not parallel to the invert, owing to the depth of water having been increased by the placing of a weir across the flow.

backed cloth (*Textiles*). A woollen fabric which is made with two warps and one weft, or with two wefts and one warp, to increase the weight and to obtain a weave or colours different from that on the face.

backer (*Build.*). A narrow slate laid on the back of a broad, square-headed slate, at the place where a course of slates begins to diminish in width.

backing (*Bind.*). The process by which one half of the sections of a volume are bent over to the right and the other half to the left at the back. A projection is formed on each side, termed the joints, and to these the covers are hinged. Machine backing includes *rounding* (q.v.).

backing (*Carp.*). The operation of packing up a joist so that its upper surface shall be in line with those of deeper joists employed under the same floor.

backing (*Masonry*). The coursed masonry built upon and immediately in contact with the extrados of an arch.

backing (*Meteor.*). The changing of a wind into a counter-clockwise direction. Cf. *veering.*

backing (*Photog.*). The coating on the back of film base or glass plates to reduce halation, for which purpose it should attenuate light and have a refractive index the same as the support, to reduce reflection.

backings (*Join.*). Wooden battens, secured to rough walls, for the fixing of wood linings, etc.

backing boards (*Bind.*). Wedge-shaped wooden boards between which an unbound book is held in the lying-press, while the joints are being formed for attaching the cover.

backing-off (*Textiles*). The reversing of the spindles of the mule in cotton spinning, for unwinding the yarn between the cop and the spindle tip, after completion of twisting and drawing out.

backing-up (*Build.*). The use of inferior bricks for the inner face of a wall.

backing-up (*Print.*). Printing on the back of a printed page; e.g. *backed-up* illustrations.

bacterae′mia, bacte′remia (*Med.*). Bacteriaemia.

Bacteria (*Bacteriol.*). A large group of unicellular or filamentous organisms of simple organisation, lacking photosynthetic pigments, without a well-defined nucleus, and with the cells covered by a thin wall. They occur in air, water, soil, rotting organic material, animals and plants. Saprophytic forms are more numerous than parasites, but the latter include both animal and plant pathogens. See also **bacterium.**

bacteria beds (*Sewage*). Layers of a filtering medium such as broken stone or clinker, used in the final or oxidising stage in sewage treatment. See **contact bed, percolating filter.**

bacteriae'mia, bacterie'mia (*Med.*). Presence of bacteria in the blood.

bacte'ricides (*Chem.*). Substances preventing the growth of micro-organisms; e.g. toluene, xylene, etc.—*adj.* **bacterici'dal.**

bacte'riocyte (*Zool.*). A phagocytic cell which engulfs bacteria.

bacte'rioid, bac'teroid (*Bot.*). A swollen hypertrophied bacterium occurring in large numbers in swellings on roots of beans and other plants; the bacterioids are ultimately absorbed by the cells of the root tubercles.

bacteriology. The scientific study of bacteria — *n.* **bacteriologist.**

bacte'rioly'sin (*Chem*). Any of a group of immune bodies with a specific action against the bacterial species used in immunisation, causing digestion of the bacterial cells with the formation of soluble products. Specifically (*Med.*)., an antibody formed in the blood in response to infection by a bacterium and capable of destroying the latter.

bacteriol'ysis (*Med.*). The destruction of bacteria by antibodies formed in response to infection.—*adj.* **bacteriolyt'ic.**

bacte'riophage (*Bot.*). An agent of obscure nature, probably an enzyme, which destroys bacteria in cultures, as well as in the cells of some plants.

bacte'riorrhiza (*Bot.*). A symbiotic relationship between a root and bacteria.

bacterio'sis (*Bot.*). A disease caused by bacteria.

bacte'rium (*Bacteriol.*). A rod-shaped member of the Bacteria.—*pl.* **bacteria.**

bacteriu'ria (*Med.*). The presence of bacteria in the urine.

bac'teroid (*Bacteriol.*). Of bacterial nature. See also **bacterioid.**

bacteroids (*Zool.*). In *Oligochaeta*, rod-like bodies of unknown function occurring in the connective tissue.

bacu'liform (*Bot.*). (Of fungal spores) stick-shaped or rod-shaped.

bac'ulum (*Zool.*). See **os penis.**

bad colour (*Print*). An unsatisfactory impression, due to uneven distribution of the ink on a printing machine.

bad copy (*Typog.*). A compositor's term for MS. or copy that is difficult to read.

bad matter (*Typog.*). A term applied to type that has been used for printing and awaits distribution.

badger (*Build.*). An implement used to clear mortar from a drain after it has been laid.

badger plane (*Join.*). A plane having a skew mouth, with iron flush at one side, in order to facilitate close working to a corner in making a rebate, or for use in sinking.

badger (*Furs*). The dressed skin of the badger; the natural badger fur is brown near the skin, with longer outstanding grey hairs tipped with white.

badger softener (*Dec.*). A broad brush set with badger hair, used in grained work to produce light dragging effects.

badigeon, ba-dij'on (*Build.*). A mixture used for stopping holes in stone- or wood-work, in order to hide defects.

ba'dious (*Bot.*). Chestnut-brown.

Baeyer's tension (or **strain**) **theory,** bī'er (*Chem.*). This theory assumes that the four valencies of the tetravalent carbon atom are symmetrically distributed in space around the carbon atom. One may predict from this assumption the strain involved in the formation of a ring compound from a chain of carbon atoms, and also estimate the stability of a ring compound from the number of carbon atoms in the ring.

baffle (*Acous.*). A rigid structure for regulating the distribution of sound-waves from a reproducer; frequently in the form of a limited plane with the reproducing diaphragm mounted in the centre.

See **box— directional— exponential—**

baffle (*Cinema.*). Any portable surface for regulating the reflection of sound in a set, during sound-film production.

baffle blankets (*Cinema.*). Blankets temporarily placed about a set, to regulate the distribution of reflected sound during sound-film production.

baffle board (*Mining*). A board fitted across a compartment in an ore-washing machine, to retain the ore when lighter material flows away.

baffle loudspeaker (*Acous.*). An open-diaphragm loudspeaker, in which the radiation of sound power is enhanced by surrounding it with a large plane baffle, generally of wood.

baffle plate (*Eng., etc.*). A plate used to prevent the movement of a fluid in the direction which it would normally follow, and to direct it into the desired path.

baffle tube (*Met., etc.*). A pipe of sufficient length to lower the temperature of hot gases before they enter a furnace.

bafts (*Textiles*). Coarse cotton cloths, grey or coloured, used as loin cloths by African natives.

bag and spoon dredger (*Civ. Eng.*). An implement consisting of a leather bag laced to a steel hoop; it is suspended from a chain and guided by a long handle; used to dredge soft material.

bag, changing (*Photog.*). See **changing bag.**

bag hides (*Leather*). The upper, or grain, part of split ox- or cow-hides, tanned and dyed; used for portmanteaux, etc.

bag plug (*San. Eng.*). A drain plug consisting of a cylindrical canvas bag which is placed in the drain pipe and then inflated.

bag pump (*Hyd. Eng.*). A form of bellows pump, in which the valved disc taking the place of the bucket is connected to the base of the barrel by an elastic bag, distended at intervals by rings.

bagasse' (*Fuels*). Crushed sugar-cane from which the sugar has been extracted; used in sugar refineries for raising steam.

Baggy Beds (*Geol.*). A formation occurring in the Upper Devonian Series in North Devon, and comprising green shales and yellowish sandstones, which yield lamellibranchs, gastropods, and plant remains.

Bagshot Beds (*Geol.*). A formation of the British Eocene Series, following upon the London Clay in both the London and the Hampshire Basins. The beds comprise coarse current-bedded sands with interstratified beds of pipe-clay. The latter in Hants and Dorset yield abundant stems and leaves of plants, indicating a warm climate.

baguette, ba-get' (*Build.*). A small moulding similar to the *astragal* (q.v.).

baguio, bah'gē-o (*Meteor.*). A local name for the typhoon arising in the region of the Philippine Islands.

bailiff (*Mining*). See **overman** (1).

Baillarger's lines, bī-yar-zhă (*Histol.*). A tract of nerve-fibres in the cerebrum.

Baily furnace (*Elec. Eng.*). An electric-resistance furnace in which the resistance material is crushed coke placed between carbon electrodes; used for heating ingots and bars in rolling mills, for annealing, etc.

Baily's beads (*Astron.*). A phenomenon, first observed by Baily, in which, during the last seconds before a solar eclipse becomes total, the advancing dark limb of the moon appears to break up into a series of bright points.

baize (*Textiles*). A coarse woollen material with a long nap.

Bajo'cian Series (*Geol.*). Broadly, the lower division of the Middle Jurassic rocks, including, in Britain, various sands above the Lias, the Inferior Oölite, and the Dogger, Lower Estuarine Sands, and Millepore Oölite of Yorks.

bake-out (*Elec. Eng.*). The preliminary heating of the electrodes and container of a mercury-arc rectifier, to ensure freedom from the later release of gases.

baked (*Typog.*). Said of type which, having become stuck together, is difficult to distribute.

baked core (*Foundry*). A dry-sand core baked in the oven to render it hard and to fix its shape; opposite of *green core*. See **core sand.**

Bakelite (*Plastics*). Trade-name for synthetic resin (named after L. H. Baekeland), the product of the condensation of cresol or phenol with formaldehyde. First product is *Bakelite A*, a liquid; this is changed by heat into *Bakelite B*, which is a solid that is soft when hot and hard when cold and is thus suitable for moulding. The final product, *Bakelite C*, is obtained by heating *Bakelite B* under pressure. Bakelite is much used for insulating purposes and in the manufacture of plastic products, paints, varnishes, etc.

bakelite wood (*Diel.*). See **Permali.**

Baker's cyst (*Med.*). A cyst formed by the protrusion of the synovial membrane of a joint through its capsule, communication between the cyst and the joint being cut off.

baking (*Pot.*). The process of firing shaped clay articles in kilns, in order to give them permanent hardness.

baking soda (*Chem.*). Sodium bicarbonate.

Bala Series (*Geol.*). The topmost division of the Ordovician System in Britain, named from the type-locality around Lake Bala in N. Wales, where the beds comprise fossiliferous sandstones and a thin band of limestone.

balance. Equilibrium of the body; governed from the cerebellum, in response to stimuli from the eyes and extremities and especially from the *semicircular canals* (q.v.) of the ears.

balance (*Acous.*). The technique of arranging sources of sound, such as artists and instruments, so that the reproduction of the sounds made by them (e.g. in broadcasting or recording) appears to be the optimum from the artistic point of view.

balance (*Chem.*). See **chemical balance.**

balance (*Elec. Comm.*).

See **line— duplex— capacity— repeater—**

balance (*Elec. Eng.*). A term used in connexion with electrical bridge measurements. A balance is said to be obtained when the various impedances forming the arms of the bridge have been adjusted, so that no current flows through the galvanometer. See also **current weigher.**

balance (*Horol.*) The vibrating member of a watch, chronometer, or clock (with platform escapement). In conjunction with the balance-spring it forms the time-controlling element.

balance (*Photog.*). The harmonious use of masses and contrast in the composition of a photograph picture. See also **balancing.**

balance arc (*Horol.*). The portion of the vibration during which the balance is not detached from the escapement.

balance arm (*Horol.*). The portion of the balance connecting the rim to the staff.

balance bar (*Hyd. Eng.*). The heavy beam by which a canal-lock gate may be swung on its pintle, and which also partially balances the outer end of the gate.

balance bob (*Mining*). A counterbalance to take the excess weight of the pit work, or timber beams, in a shaft; used with the Cornish type of reciprocating pump.

balance box (*Eng.*). A box, filled with heavy material, used to counterbalance the weight of the jib and load of a crane of the cantilever type.

balance-bridge (*Civ. Eng*). See **bascule bridge.**

balance cock (*Horol.*). The detachable bracket which carries the upper pivot of the balance staff.

balance-crane (*Eng.*). A crane with two arms, one having counterpoise arrangements to balance the load taken by the other.

balance cylinder (*Eng.*). A small auxiliary steam-cylinder sometimes fitted to large vertical steam-engines. Steam is admitted to the underside of the balance piston, which is connected to the engine slide-valve in order to reduce the load on the valve gear.

balance gate (*Hyd. Eng.*). A flood-gate which revolves about a central vertical shaft, and which may be made self-opening or self-closing as the current sets in or out of a channel by giving a preponderating area to the inner leaves of the gate.

balance pipe (*Eng.*). A connecting pipe between two points at which it is desired to equalise the pressure.

balance piston (*Eng.*) See **dummy piston.**

balance point (*Civ. Eng.*). Any point where a *mass-haul curve* (q.v.) cuts the datum line, showing that up to this point all excavated material has been used up in embankment.

balance rim (*Horol.*). The circular rim of the balance. It may be mono-metallic or bi-metallic. See **compensation balance.**

balance spring (*Horol.*). A very fine metal ribbon, forming a flat spiral, cylindrical, or helical spring round the balance staff. It regulates the movement of the balance.

balance staff (*Horol.*). The staff which carries the balance, and the collet to which the balance spring is attached.

balance weight (*Eng.*). A weight used to counterbalance some part of a machine; e.g. the weights applied to a crankshaft to minimise or neutralise the inertia forces due to reciprocating and rotating masses of the engine. *

balanced-armature loudspeaker (*Acous.*). A driving mechanism for loudspeakers, in which the motion is obtained by a pivoting member which is twisted by varying magnetic fluxes across its ends.

balanced-armature pick-up (*Acous.*). A pick-up in which the reproducing needle is held by a screw in a magnetic arm, which is pivoted so that its motion diverts magnetic flux from one arm of a magnetic circuit to another, thereby inducing electromotive forces in coils on these arms.

balanced-beam relay (*Elec. Eng.*). A relay having two coils arranged to exert their forces on each end of a beam pivoted about its central point and acted on by solenoids at its extremities.

balanced circuit (*Elec. Comm*). A circuit in which the voltages on the two wires comprising the circuit are equal, but opposite in phase with respect to earth. Cf. *unbalanced circuit.*

balanced draught (*Eng.*). A system of air-supply to a boiler furnace in which one fan forces air through the grate, while a second, situated in the uptake, exhausts the flue gases. The pressure in the furnace is thus kept atmospheric, i.e. is *balanced.*

balanced load (*Elec. Eng.*). A load connected to a polyphase system, or to a single-phase or d.c. 3-wire system, in such a way that the currents taken from each phase, or from each side of the system, are equal and at equal power factors.

balanced modulator (*Radio*). A matched pair of valves, operated as modulators, with their anodes connected in push-pull. The carrier voltage is applied to the two grids in phase, and the modulating voltage in antiphase, so that the carrier components in the anode currents cancel out. Used in suppressed-carrier systems.

balanced network (*Elec. Comm.*). A network arranged for insertion into a *balanced circuit* (q.v.) and therefore symmetrical electrically about the midpoints of its input and output pairs of terminals.

balanced pedal (*Acous.*). In an organ console, the foot-operated plate, pivoted so that it stays in any position, for remote control of the shutter of the chambers in which ranks of organ pipes are situated ; it also serves for bringing in all the stops in a graded series. See **swell.**

balanced protective system (*Elec. Eng.*). A form of protective system for electric transmission lines and other apparatus, in which the current entering the line or apparatus is balanced against that leaving it ; so long as there is no fault on the line or apparatus this balance will be maintained, but an upsetting of the balance owing to a fault causes relays to trip the faulty circuit. Also called DIFFERENTIAL PROTECTIVE SYSTEM.

balanced reaction (*Chem.*). See **incomplete reaction.**

balanced sash (*Join.*). See **sliding sash.**

balanced solution (*Bot.*). A solution of two or more salts, in such proportions that the toxic effects of the individual salts are mutually eliminated ; sea water is a *balanced solution.*

balanced steps (*Join.*). See **dancing steps.**

balanced voltage (or **current**) (*Elec. Eng.*). A term used, in connexion with polyphase circuits, to denote voltages or currents which are equal in all the phases. Also applied to d.c. 3-wire systems.

balancer (*Elec. Eng.*). A device used on polyphase or 3-wire systems to equalise the voltages between the phases or the sides of the system, when unbalanced loads are being delivered.

See **a.c.—** **d.c.—** **static—**

balancer-booster (*Elec. Eng.*). A balancer set having boosters mounted on the same shaft, to compensate for the voltage drop in feeders.

balancer field rheostat (*Elec. Eng.*). A special form of shunt field rheostat, for controlling the field currents of a balancer set. Cutting the resistance out of one field puts a corresponding amount into the other field.

balancer transformer (*Elec. Eng.*). An autotransformer connected across the outer conductors of an a.c. 3-wire system, the neutral wire of which is connected to an intermediate tapping.

balancers (*Zool.*). See **halteres.**

balancing (*Photog.*). Control of the densities of the three printings in a three-colour subtractive system to get as near as possible to the theoretical requirements. Effected by matching grey tones.

balancing (*Radio*). See **neutralisation.**

balancing (*Surv.*). The process of adjusting a traverse, i.e. applying corrections to the different survey lines and bearings so as to eliminate the closing error.

balancing antenna (*Radio*). (1) An auxiliary reception antenna which responds to interfering but not to the wanted signals. The interfering signals thus picked up are then balanced against those picked up by the main antenna, leaving signals free from interference.—(2) See **counterpoise antenna.**

balancing capacitance (*Radio*). A capacitance connected between appropriate points in the grid and anode circuits of a valve amplifier to neutralise the effects of internal grid-anode capacitance. Also called NEUTRALISING CAPACITANCE, NEUTRODYNE CAPACITANCE.

balancing capacitance (*Teleph.*). A small capacitance added to conductors in telephone cables to perfect the capacitance balance between circuits or to earth.

balancing condenser (*Radio*). The same as *balancing capacitance.*

balancing, dynamic (*Acous.*). The technique of balancing the centrifugal forces in rotating machines so that there is no residual unbalance and consequent vibration to give rise to noise.

balancing flux (*Elec. Eng.*). Flux provided in an electric machine to compensate for the unbalanced magnetic pull.

balancing impedance (*Elec. Comm.*). See **line balance.**

balancing machine (*Eng.*). A machine for testing the extent by which a revolving part is out of balance, and to determine the weight and position of the masses to be added to obtain balance.

balancing network (*Elec. Comm.*). See **line balance.**

balancing ring (*Elec. Eng.*). See **equaliser ring.**

balancing speed (*Elec. Eng.*). See **free-running speed.**

balani'tis (*Med.*). Inflammation of the glans penis.

Bal'anoglos'sida (*Zool.*). A class of *Hemichorda* of worm-like form with a simple collar not modified to form tentacles ; solitary bottom-feeding forms of burrowing habit.

bal'anoposthi'tis (*Med.*). Inflammation of the glans penis and prepuce.

balanorrha'gia (*Med.*). Gonorrhoeal inflammation of the glans penis, with discharge of pus.

bala'nus (*Anat.*). The terminal bulbous portion of the penis ; the glans penis.

balas ruby (*Min.*). A rose-red variety of the mineral spinel (magnesium aluminate $MgO \cdot Al_2O_3$, crystallising in the cubic system). See **false ruby.**

bal'ata. The coagulated latex of the bullet tree of S. America. Similar in properties to gutta-percha, but softer and more ductile. Used extensively in the manufacture of golf balls, and for impregnating cotton duck belting.

balbuties, —bŭ'shi-ēz (*Med.*). Stammering, stuttering.

Balclatchie Beds (*Geol.*). A group of sandstones and shales in the Upper Ordovician (Ardmillan) Series of Southern Scotland.

balconet (*Build.*). A low ornamental railing to a door or window, projecting very little beyond the sill or threshold; mainly used in the Swiss style of architecture.

balcony (*Build.*). A projecting platform, either inside or outside a building, usually supported by pillars, but sometimes cantilevered and surrounded by a parapet.

baldachin, bal'da-kin (*Build.*). A canopy suspended above altars, tombs, etc., or supported in such position by columns. Also BALDACHINO (—kē'nō), BALDAQUIN (—kin).

bale breaker (*Textiles*). A machine that opens up the highly compressed cotton fibres taken from the bales and releases dust, which is extracted by a fan.

balection moulding (*Join.*). See **bolection moulding.**

baleen' (*Zool.*). In certain Whales, horny plates arising from the mucous membrane of the palate and acting as a food strainer.

baler (*Agric. Mach., etc.*). A machine for compressing loose bulky material such as hay or cotton and securing it in a form convenient for transport.

Balfour's rule (*Zool.*). The velocity of segmentation in any part of the ovum is, roughly speaking, proportional to the concentration of the protoplasm there ; and the size of the segments is inversely proportional to the concentration of the protoplasm.

balk (*Civ. Eng.*). The material between two excavations. Also BAULK.

balk back (*Textiles*). A woollen or worsted cloth with a fibrous back and a smart surface.

Balkan frame (*Med.*). A frame, with pulleys attached, for supporting the leg in the treatment of fractures.

balking (*Elec. Eng.*). See **crawling.**

ball or **bloom** (*Met., etc.*). (1) A rounded mass of spongy iron, prepared in a puddling furnace.—(2) A mass of tempered fireclay, used for forming the crucible in crucible-steel production.

ball or **bolus** (*Vet.*). A cylindrical-shaped mass of drugs for the curative treatment of horses.

ball-and-socket joint (*Anat.*). Enarthrosis. A joint in which the hemispherical end of one bone is received into the socket of another.

ball-and-socket joint (*Eng.*). A joint between two rods, permitting considerable relative angular movement in any plane. A ball formed on the end of one rod is embraced by a spherical cup on the other. Used in light control systems (e.g. in connecting a pair of bell-cranks which operate in planes at right-angles) and in the steering mechanism of motor vehicles.

ball-bearing (*Eng.*). A shaft bearing consisting of a number of hardened steel balls which roll between an inner race forced on to the shaft and an outer race carried in a housing. The races carry shallow spherical grooves (*ball-tracks*), and the balls are spaced by a light metal cage. Used to obtain a high load capacity in small compass, to combine the functions of a journal and thrust bearing, or to secure minimum friction. The same principle is applied to thrust bearings.

ball caster (*Furn.*). See **caster.**

ball catch (*Join.*). A door-fastening in which a spring-controlled ball, projecting through a smaller hole, engages with a striking plate.

ball centrosome (*Cyt.*). That centrosome of the spermatozoon which gives rise to the long axial fibre of tail.

ball clay (*Geol.*). Fine-textured and highly plastic detrital clay which, on firing, yields pale-coloured or white pottery. Mixed with kaolin, it imparts plasticity to the latter. Also called POTTERS' CLAY.

ball-cock (*Plumb., San. Eng.*). A self-regulating cistern-tap which, through a linkage system, is turned off and on by the rising and falling of a hollow ball floating on the surface of the liquid.

ball-ended magnet (*Elec. Eng.*). A permanent magnet, consisting of a steel wire with a steel ball attached to each end; this gives a close approximation to a unit pole.

ball flower (*Build.*). An ornament like a ball enclosed within three or four petals of a flower, often inserted in a hollow moulding.

ball joint (*Eng., etc.*). A connexion in which the end of one member is partly spherical and fits into a corresponding spherical cavity in the other, thus permitting relative angular movement.

ball lightning (*Meteor.*). A slowly-moving luminous ball, not more than a foot in diameter, which is occasionally seen during a thunderstorm.

ball-pane hammer (*Eng.*). A fitter's hammer the head of which has a flat face at one end, and a smaller hemispherical face or pane at the other; used chiefly in riveting.

ball race (*Eng.*). (1) The inner or outer steel ring forming one of the ball-tracks of a ball-bearing.—(2) Commonly, the complete *ball-bearing* (q.v.).

ballstone (*Geol.*). The name applied to masses of fine unstratified limestone, occurring chiefly in the Wenlock Limestone of Shropshire, and representing colonies of corals in position of growth.

ball-track (*Eng.*). See **ball-bearing.**

ball valve (*Eng.*). A simple non-return valve consisting of a ball resting on a cylindrical seating; used in small water- and air-pumps.

ball warping (*Textiles*). The preparation of cotton warp on a warping mill. The warp is wound on a frame in the form of untwisted rope and eventually made up as a ball (*balled warp*).

Ballagan Beds (*Geol.*). The lowest division of the Lower Carboniferous rocks of the Glasgow district, comprising sandstones, shales, and limestones.

ballast (*Civ. Eng., Rail., etc.*). (1) A layer of broken stone, gravel, or other material deposited above the formation level of road or railway; it serves as foundation for road-metal or permanent-way respectively.—(2) Sandy gravel employed as a coarse aggregate in making concrete.—(*Naut.*) Gravel, stone, or other material placed in the hold of a ship to increase her stability when floating without cargo or with insufficient cargo.

ballast car (or **wagon**) (*Civ. Eng.*). A truck used for the transport and dumping of ballast in road or rail construction.

ballast lamp (*Elec. Comm.*). An incandescent lamp used as a ballast resistance.

ballast resistance (*Elec. Comm.*). A resistance inserted in a circuit to swamp changes (e.g. those due to temperature) in the resistance of other parts of the circuit; or to neutralise the apparent negative resistance of an arc and so stabilise the arc circuit. Cf. *barretter*.—(*Elec. Eng.*) A term used in electric-railway signalling to denote the resistance between the two track rails across the ballast on which the track is laid.

ballast tube (*Elec. Comm.*). A *barretter* (q.v.).

balled warp (*Textiles*). See **ball warping.**

balling (*Met.*). (1) A process that occurs in the cementite constituent of steels on prolonged annealing at 650°-700° C.—(2) The operation of forming balls in a puddling furnace.

balling (*Textiles*). The preparation of balled warp, mechanically or by hand. See **ball warping.**

balling gun (*Vet.*). An instrument for the administration of balls to horses.

ballis'tics (*Mech.*). The science of projectiles.

ballistic circuit-breaker (*Elec. Eng.*). A very high-speed circuit-breaker, in which the pressure produced by the fusing of an enclosed wire causes interruption of the circuit.

ballistic fruit (*Bot.*). A fruit which discharges its seeds by means of some elastic means of propulsion.

ballistic galvanometer (*Elec. Eng.*). A galvanometer in which the time of swing is long compared with the duration of the transient which the instrument is intended to measure.

ballistic method (*Elec. Eng*). A method of high-grade testing used in electrical engineering, a ballistic galvanometer being used.

ballistic pendulum (*Mech., Phys.*). A heavy block suspended by strings so that its swings are restricted to one plane. If a bullet is fired into the block, the velocity of the bullet may be calculated from a measurement of the angle of swing of the pendulum.

ballonet' (*Aero.*). An air compartment in the envelope of an aerostat, used to adjust changes of volume in the filler gas.

balloon (*Aero.*). A general term for aircraft supported by buoyancy and not driven mechanically.

See **barrage—** **nurse—**
captive— **pilot—**
free— **sounding—**
kite—

balloon (*Build.*). A spherical ball or globe crowning a pillar, pier, etc.

balloon barrage (*Aero.*). An anti-aircraft device consisting of suitably disposed *barrage balloons* (q.v.).

balloon framing (*Carp.*). A cheap and rapid method of construction in which all timbers are of light scantling, and are held together entirely by nails and spikes, only the corner posts being tenoned: used in place of braced framing.

ballooning (*Textiles*). The name given to the form assumed by cotton yarn in ring spinning as it passes from the guide-eye to the bobbin.

ballott′ement (*Med.*). Method of diagnosing pregnancy by manual displacement of the foetus in the fluid which surrounds it in the uterus.

Balmer formula (*Light*). The formula which gives the wavelengths of the lines of the Balmer hydrogen series:

$$\lambda_m = 3646{\cdot}13\left(\frac{m^2}{m^2-4}\right),$$

taking successive integral values 3, 4, 5 . . . for *m*.

Balmer series (*Light*). The atomic spectrum of hydrogen in the visible and near ultraviolet regions of the spectrum.

balneol′ogy (*Med.*). The scientific study of baths and bathing, and of their application to disease.

bal′neother′apy (*Med.*). Treatment by baths and bathing.

balsa wood (*Acous.*, *Timber*). The wood of *Ochroma lagopus* ('West Indian corkwood'); it is a highly porous wood, and is valued for its lightness; used for vibration isolation.

balsam, Canada (*Chem.*). See **Canada balsam.**

balsam of fir (*Chem.*). See **Canada balsam.**

balsam of Peru (*Chem.*). An oleoresin containing esters of benzoic and cinnamic acids, obtained from a South American tree, *Myroxylon pereiroe.*

balsam of Tolu (*Chem.*). An oleoresin containing esters of benzoic and cinnamic acids, obtained from a South American evergreen tree, *Myroxylon toluiferum.*

balsamif′erous (*Bot.*). Yielding balsam.

baluster (*Build.*). A small pillar supporting the coping of a bridge parapet, or the handrail of a staircase.

balustrade (*Build.*). A coping or handrail with its supporting balusters.

Bamberger's naphthalene formula (*Chem.*). A centric formula for naphthalene, showing the valencies of the benzene rings pointing towards the centres. This formula does not assume any double bonds as in the Kekulé formula.

band (*Bot.*). A strand of thickened tissue in the thallus of a liverwort; it has strengthening functions.

band (*Build.*). A flat horizontal member, occasionally ornamented, separating a series of mouldings or dividing a wall surface.

bands (*Bind.*). The tapes, or cords, placed across the back of a book, to which the sections are attached by sewing. The ends of the bands are subsequently secured to the boards of the cover. See **flexible, raised bands.**

band-and-hook hinge (*Carp.*). See **strap hinge.**

band articulation (*Teleph.*). The percentage of speech-bands correctly received over a telephone system, with respect to the total bands transmitted. See **speech-bands.**

band brake (*Eng.*). A flexible band wrapped partially round the periphery of a wheel or drum. One end is anchored, and the braking force is applied to the other.

band chain (*Surv.*). A steel tape, graduated in feet or links, used for distance measurement when greater accuracy is desired than can be obtained with the ordinary chain. Brass handles, included in the measurement, are provided at each end.

band clutch (*Eng.*). A friction clutch in which a fabric-lined steel band is contracted on to the periphery of the driving member by means of engaging gear. See **friction clutch.**

band (or belt) conveyor (*Eng.*). An endless band passing over, and driven by, horizontal terminal drums, thus constituting a moving track which is used to convey loose material or small articles between two points.

band-elimination filter (*Elec. Comm.*). A filter which highly attenuates currents having frequencies within a specified nominal range and freely passes currents having frequencies outside this range. Also called BAND REJECTION FILTER, BAND STOP FILTER.

band film (*Cinema.*). See **cycle film.**

band, frequency (*Radio*). See **frequency band.**

band losses (*Elec. Eng.*). Energy losses due to currents induced in the armature bands of an electric machine.

band-pass filter (*Elec. Comm.*). A filter which freely passes currents having frequencies within specified nominal limits, and highly attenuates currents with frequencies outside these limits.

band-pass tuning (*Radio*). An arrangement of two coupled circuits, tuned to the same frequency and having the property of substantially uniform response to a range of frequencies, instead of the marked response to a single frequency which characterises a single-tuned circuit.

band relay (or **repeater**) (*Elec. Comm.*). The special name for a public-address system which is used in restaurants or pleasure-gardens, for relaying or repeating music through a microphone-amplifier-loudspeaker system.

bandsaw (*Eng.*). A narrow endless strip of saw-blading running over and driven by vertical pulleys, as a belt; used for cutting wood or metal to intricate shapes.

band spectrum (*Light*). A type of spectrum consisting of broad bands, each usually having one sharp edge. Under high dispersion a band is seen to consist of regularly spaced sharp lines very close together. Band spectra are of molecular origin.

band spreading (*Radio*). The use of a relatively large fixed condenser in parallel with a smaller variable condenser, to reduce the band of frequencies covered by variation of the latter.

band switching (*Radio*). A system of inductance or condenser switching, allowing a number of frequency bands to be covered by the same tuning dial.

banded column (*Build.*). A column having cinctures at intervals.

banded filter (*Photog.*). A two- or three-colour filter for colour photography, with the separate filters side by side.

banded precipitate (*Chem.*). See **Liesegang phenomenon.**

banded structure (*Geol.*). A structure developed in crystalline rocks, both igneous and metamorphic; due to the alternation of layers differing in texture, composition, or both.

ban′deler (*Build.*). A plain moulding.

bandelet (*Build.*). A small flat moulding encompassing a column.

banding plane (*Carp.*). A plane used for cutting out grooves and inlaying strings and bands in straight and circular work.

bandings (*Dec.*, *Furn.*). (1) Narrow inlays.—(2) Strips of wood to cover edges of plywood.

Bangor Series (*Geol.*). A group of Pre-Cambrian rocks in N. Wales, including granitoid and felsitic masses, together with a large thickness of grits, slates, and agglomerates.

Bang's bacillus (*Bacteriol.*). *Brucella abortus*; the cause of contagious abortion in animals and of undulant fever in man.

banister (*Arch.*, *Carp.*). Alternative term for *baluster* (q.v.).

banjo axle (*Automobiles*). The commonest form of rear-axle casing, in which the provision of the differential casing in the centre produces a resemblance to a banjo with two necks.

bank (*Auto. Teleph.*). An assemblage of contacts over which wipers pass in order to effect a specified connexion.

bank (*Civ. Eng.*). See **embankment.**

bank (*Eng., etc.*). A number of similar pieces of equipment grouped in line and connected; e.g. a *bank* of engine cylinders, a *bank* of coke-ovens, a *bank* of transformers.

bank (*Textiles*). A large frame for holding bobbins of yarn when the yarn is being transferred to a warper's beam.

bank (*Typog.*). A bench on which sheets are placed as printed, or on which standing type-matter rests.

bank-and-bond paper (*Paper*). Thin strong writing paper used for currency work; made in various qualities.

bank cable (*Auto. Teleph.*). The multiple cable connecting the switch (bank) contacts to the end terminals of a shelf of apparatus.

bank multiple (*Auto. Teleph.*). The multiple connecting the bank of contacts in selectors or uniselector switches in automatic telephone exchanges. The switches are usually detachable from the contacts and multiples for repair, without disturbing the large number of connexions in the multiple. See **slipped bank, straight bank.**

bank protector (*Hyd. Eng.*). Any device for minimising erosion of river banks by water; e.g. groins, pitching, etc.

bank wires (*Auto. Teleph.*). The wires connecting the corresponding contacts in the banks of a shelf of switches. See **slipped bank, straight bank.**

Banka tin (*Met.*). Tin of high purity (99·75% tin and upwards), produced in Banca, Dutch East Indies, and the Malay States. Also called STRAITS TIN.

banked fire (or **boiler**) (*Eng.*). A boiler furnace in which the rate of combustion is purposely reduced to a very low rate for some period during which the demand for steam has ceased. See **dead bank, floating bank, banking loss, banking-up.**

banker (*Build.*). A bench upon which bricklayers and stonemasons shape their materials.

banket (*Min.*). The term originally applied by the Dutch settlers to the gold-bearing conglomerates of the Witwatersrand. It is now used more widely for similar conglomerates and conglomeratic quartzites.

banking (*Aero.*). Angular displacement of the wings of an aeroplane about the longitudinal axis, to effect turning.

banking (*Mining*). The operations involved in removing full trucks, tubs, or wagons and replacing them by empty ones at the top of a shaft.

banking loss (*Eng.*). The fuel used in maintaining a *floating bank* (q.v.), or to maintain a *dead bank* (q.v.), and then raise the steam pressure to normal.

banking pins (*Horol.*). Vertical pins in the bottom plate of a watch which limit the motion of the lever. In the cylinder escapement, the action of the balance is limited by a single banking pin on the balance. In some watches part of the plate itself forms a solid banking.

banking-up (*Eng.*). Reducing the rate of combustion in a boiler furnace by covering the fire with slack or fine coal.

banner (*Bot.*). See **standard.**

Bannisdale Slates (*Geol.*). The topmost division of the Salopian Series of the Silurian System of Westmorland.

bannister harness (*Textiles*). A harness used for weaving wide patterns in fine reeds, with a jacquard loom.

Bannockburn tweed (*Textiles*). A Cheviot quality woollen cloth, originally produced at Bannockburn.

banquet, bahn^{g}-ket′ (*Build.*). A narrow window-seat in masonry, brickwork, or wood.

banquette, bahn^{g}-ket′ (*Civ. Eng.*). (1) A raised footway inside a bridge parapet.—(2) A ledge on the face of a cutting. See **berm.**

Banti's disease (*Med.*). See **splenic anaemia.**

bar (*Acous.*). The unit of alternating acoustic (sound or excess) pressure in a freely progressing wave or on a surface; equals one r.m.s. dyne per sq. cm.

bar (*Meteor.*). A unit of pressure, equal to a million dynes per sq. cm. This is equivalent to a pressure of 75·007 cm. of mercury (at 60° C. and in lat. 45°). The *millibar* (10^{-3} bar) is a more convenient unit for expressing atmospheric pressure.

bar (*Civ. Eng., etc.*). A deposit of sand, gravel, or other material in a river, or across the mouth of a river or harbour: a boom of logs, preventing or tending to prevent navigation.

bar (*Eng., etc.*). Material of uniform cross-section, which may be either rolled or extruded.

bar (*Elec. Eng.*). See **commutator bar, electrolytic wire bar.**

bar (*Horol.*). A narrow detachable plate.

bars (*Foundry*). Ribs placed across the top part of a box or flask to hold the sand.

bars (*Textiles*). In a lace machine, strips of flexible steel that stretch from one end of the machine to the dropper box at the jacquard end.

bar-and-yoke method (*Elec. Eng.*). A method of magnetic testing in which the sample under test is in the form of a bar, clamped into a yoke of relatively large cross-section, which forms a low-reluctance return path for the flux.

bar coal-cutting machine (*Mining*). A machine, mounted on skids and having a revolving bar, fitted with a pick, or a series of picks, which cuts through the coal.

bar keel (*Ship Constr.*). See under **keelson.**

bar lathe (*Eng.*). A small lathe of which the bed consists of a single bar of circular, triangular, or rectangular section.

bar magnet (*Elec. Eng.*). A straight bar-shaped permanent magnet, with poles at each end.

bar mill (*Met.*). A rolling mill with grooved rolls, for producing round, square, or other forms of bar iron of small section.

bar movement (*Horol.*). A watch movement in which the upper pivots are carried in bars.

bar of Sanio (*Bot.*). A horizontal rod or band of thickening, consisting of pectic materials or of cellulose, occurring between pits in the walls of tracheides and vessels.

bar solder (*Eng.*). Solder cast in small bars for convenience in use. See **solder.**

bar-suspension (*Elec. Eng.*). A method of mounting the motor on an electrically propelled vehicle. One side of the motor is supported on the driving axle, and the other side is supported from a spring-suspended bar lying transversely across the truck. Also called YOKE SUSPENSION.

bar timbering (*Mining*). A method of timbering with horizontal bars of wood, which are supported by side legs or walls.

bar tracery (*Build.*). Window-tracery characteristic of Gothic work, resembling more a bar of iron twisted into various forms than stone.

bar-type current transformer (*Elec. Eng.*). A current transformer in which the primary consists of a single conductor that passes centrally through the iron core upon which the secondary is wound.

bar warp machines (*Textiles*). Lace machines which make warp net from beams only.

bar winding (*Elec. Eng.*). An armature winding for an electric machine; in it the conductors are formed of copper bars.

bar-wound armature (*Elec. Eng.*). An armature with large sectioned conductors which are insulated and fixed in position and connected, in contrast with former-wound conductors which are sufficiently thin to be inserted, after shaping in a suitable jig.

baragno'sis (*Med.*). Loss of the ability to judge differences between the weights of objects.

Bárány's tests (*Med.*). Tests for gauging the efficiency of the balancing mechanism connected with the inner ear.

barathea (*Textiles*). (1) Botany worsted coating material of twilled mat weave.—(2) A dress fabric with a spun-silk warp and a Botany worsted weft.

barb (*Bot.*). A hooked or doubly-hooked hair.—(*Zool.*) Any hooked, bristle-like structure: in Birds, one of the lateral processes of the rachis of the feather which form the vane.

Barba'dos Earth (*Geol.*). A siliceous accumulation consisting of the remains of radiolaria, formed originally in deep water and later upraised above sea-level.

barbate (*Bot.*). Bearded: bearing tufts of long hairs.

barbel (*Zool.*). In some Fish, a finger-shaped tactile appendage arising from one of the jaws.

barber's rash (*Med.*). Infection of the beard region of the face with either a bacterium or a fungus.

bar'bicel (*Zool.*). In Birds, one of the minute hooked processes on the lower face of a barbule of a feather.

bar'bierite (*Min.*). A feldspar of the composition of *albite* (q.v.), but crystallising in the monoclinic system.

barbitu'ric acid (*Chem.*). Malonyl urea, CO$(NH{\cdot}CO)_2CH_2$, crystallising in large colourless crystals. The hydrogen atoms of the methylene group are reactive and can be replaced by halogen. Basis of important derivatives with therapeutic action.

barbo'ne (*Vet.*). An acute contagious septicaemia of buffaloes, due to *Pasteurella bovis*.

bar'botine (*Pot.*). A term applied to vases and other pieces decorated with flowers, leaves, etc., in high relief and coloured in different enamels.

barbule (*Bot.*). The inner row of peristome teeth in some mosses.

barbule (*Zool.*). In Birds, one of the processes borne on the barbs of a feather.

Barcoo rot (*Med.*). See **veldt sore.**

bare (*Eng., etc.*). A term signifying slightly smaller than the specified dimension. Cf. *full*.

bare carbon (*Illum.*). An arc lamp carbon which is not coated with a layer of copper to improve its conductivity.

bare conductor (*Elec. Eng.*). A conductor not continuously covered with insulation, but supported intermittently by insulators; e.g. bus-bars and overhead lines.

bare electrodes (*Elec. Eng.*). Electrodes used in welding that are not coated with a basic slag-forming substance.

bareface tenon (*Carp., Join.*). A tenon which has a shoulder on one face only; used when jointing a rail which is thinner than the stile.

Barfoed's test (*Chem.*). A specific test for monosaccharoses, based upon the reduction of cupric acetate to red cuprous oxide.

Bargate Beds (*Geol.*). A group of calcareous sandstones and conglomerates forming part of the Lower Greensand of Surrey.

barge board (*Build.*). A more or less ornamental board fixed under the gable end of a roof. It hides the ends of the horizontal timbers, and protects from the weather the underside of the *barge-course* (q.v.).

barge-couple (*Carp.*). A beam which is tenoned into another to add strength to a building.

barge-course (*Build.*). (1) That part of the roof of a house which projects slightly over the gable end, and is made up underneath with mortar to keep out rain, etc.—(2) A coping course of bricks laid edge-wise and transversely on a wall.

ba'rite (*Min.*). See **barytes.**

ba'rium (*Chem.*). Symbol, Ba. A heavy metallic element in the second group of the periodic system, an alkaline earth metal. At. no. 56, at. wt. 137·7.

barium carbonate (*Min.*). Witherite.

barium getter (*Thermionics*). A *getter* (q.v.) in which barium is used; the metal is supported in a nickel capsule until heated with eddy-current heating.

barium hydroxide (*Chem.*). $Ba(OH)_2$. See **barium oxide.**

barium meal (*Radiol.*). A mixture of barium sulphate used in radiology for outlining the alimentary tract.

barium oxide (*Chem.*). BaO. Also called BARYTA. When freshly obtained from the calcined carbonate it is even more reactive than calcium oxide with water and forms barium hydroxide.

barium plaster (*Build.*). A cement-sand plaster containing barium salts, used for lining hospital and experimental X-ray rooms in order to prevent the dangerous reflection of the rays.

barium sulphate (*Chem.*). $BaSO_4$. Formed as a heavy white precipitate when sulphuric acid is added to a solution of a barium salt. Its low solubility is used in analytical chemistry for the detection and estimation of both barium and sulphuric acid. Although of little pigmentary value, it is much used in paint manufacture and in the preparation of lake pigments. See **barytes.**

bark (*Bot.*). Strictly, all tissues external to the cork cambium; popularly, the corky and other material which can be peeled from a woody stem.

bark (*Chem.*). A term which is used in the white lead industry to indicate the waste tan from tanneries. Used in the manufacture of white lead by the stack process.

bark-bound (*Bot.*). An unhealthy condition in a tree when the bark resists splitting and compresses the growing tissues beneath it.

barkhan' (*Geol.*). An isolated crescentic sand-dune.

Barker's mill (*Hyd. Eng.*). A mechanical contrivance for producing rotary motion, in which water admitted to a central container passes out under pressure through side holes in hollow arms projecting radially from the central container. The excess of hydrostatic pressure on the sides of the arms opposite to the discharge causes rotation in a direction contrary to the direction of discharge.

Barkhausen effect, bark'how-zen (*Magn.*). Small discontinuities in the magnetisation curve of ferro-magnetic materials, which may occur when the magnetising force is being increased, and which are thought to be due to a reorientation of the components of the atoms.

Barkhausen oscillator (*Radio*). A generator of very high frequency oscillation (above 10^8 cps.), whose action depends on the transit time of the electrons from cathode to anode of a three-electrode valve.

Barkhausen-Kurz (koorts) **oscillations** (*Radio*). Oscillations of very high frequency generated in a triode valve with a positive grid, the anode potential being approximately the same as the cathode. The oscillations are those of electrons passing to and fro through the grid.

barkom'eter or **barktrom'eter** (*Tanning*). A hydrometer used for gauging the density of tanning liquors.

barley (*Mining*). See **birdseye.**

barley wine (*Brew.*). See **beer.**

Barlow's disease (*Med.*). Infantile scurvy caused by deficiency of vitamin C. See also **scurvy.**

Barlow's wheel (*Elec.*). A primitive electric motor formed from a pivoted starwheel, intermittently dipping into mercury, torque being obtained from interaction of the radial current and a perpendicular magnetic field supplied by a permanent magnet.

barm (*Baking*). The top-yeast used to make dough rise.

Barmen machine (*Textiles*). A circular table used in lace manufacture, the outer surface carrying the bobbin tracks.

Barmouth Grits (*Geol.*). A thick grit formation in the Lower Cambrian (Harlech) Series of N. Wales.

Barnach Stone (*Geol*). A famous building-stone forming part of the Lincolnshire Limestone (Middle Jurassic).

bar'ograph (*Meteor*). A recording barometer, usually of the aneroid type, in which variations of atmospheric pressure cause movement of a pen which traces a line on a clockwork-driven revolving drum.

barometer (*Meteor.*). An instrument used for the measurement of atmospheric pressure. The *mercury barometer* (q.v.) is preferable if the highest accuracy of readings is important, but where compactness has to be considered, the *aneroid barometer* (q v.) is often used.

barometer, altitudes by (*Phys.*). See **Babinet's formula for altitude.**

barometer corrections (*Meteor.*). Corrections to be applied to the reading of a mercury barometer on account of expansion of the scale and the mercury, variations of gravity with latitude and altitude, and capillarity.

barometer, photographic. See **photographic barometer.**

barometric error (*Horol.*). The error in the time of swing of a pendulum due to change of air pressure. The error is very small, but is avoided in precision clocks by causing the pendulum to swing in an atmosphere kept at a constant (low) pressure.

barophore'sis (*Chem.*). Diffusion of suspended particles at a speed dependent on extraneous forces.

baroque organ, bar-ok' (*Acous.*). A type of pipe organ in which low fundamentals are obtained by the subjective difference tones arising from pipes operating at the musical interval of the fifth.

baroque pearls (*Gems*). Pearls of irregular form, generally obtained from fresh-water mussels.

baroscope (*Meteor.*). An instrument giving rough indications of changes in atmospheric pressure.

barother'mograph (*Meteor.*). A self-recording instrument which automatically provides continuous records of atmospheric pressure and temperature; a meteorograph.

Barr Series (*Geol.*). The middle division of the Ordovician System of the Girvan district of Scotland. It includes shales, sandstones, conglomerates, and a notable limestone horizon.

barrage, ba-rahzh' *or* bar'ij (*Hyd. Eng.*). An artificial obstruction placed in a water-course in order to secure increased depth for irrigation, navigation, or some other purpose.

barrage balloon (*Aero.*). A small non-rigid kite balloon filled with hydrogen; used for holding up about a mile of steel wire, which acts as an obstruction to aircraft attack at low altitude.

barrage-fixe, —fēx (*Hyd. Eng.*). A permanent masonry dam.

barrage-mobile, —mō-bēl' (*Hyd. Eng.*). A dam provided with sluices controlling the flow of water.

barrel (*Elec. Comm.*). The length of pole route over which is effected a complete sequence of transposition without repetition.

barrel (*Horol.*). The cylindrical container for housing a mainspring.

See **fusee—** **going—** **pin—**

barrel arbor (*Horol.*). The arbor carrying the barrel; upon its centre portion is coiled the mainspring during winding. In a 'detachable barrel' the arbor and barrel can be withdrawn from between the plates without taking the plates apart.

barrel bolt (*Build.*). A bolt working in a barrel-like case. Also called a TOWER BOLT.

barrel cap (*Horol.*). The detachable cover of a barrel.

barrel cover (*Horol.*). The cap or cover which snaps into a grooved recess at one end of the barrel.

barrel distortion (*Light*). A type of distortion produced by a lens by which the image of a square appears with sides curved outwards, giving a sort of barrel shape. The defect arises when a stop is placed on the object side of a lens suffering from spherical aberration. See **pincushion distortion.**

barrel drain (*Build.*). A cylindrical drain.

barrel elevator (*Eng.*). This comprises parallel travelling chains with curved arms projecting. The chains pass over sprocket wheels at the top and bottom of the elevator, and lift barrels from a loading platform to a runway.

barrel hook (*Horol.*). The means by which the mainspring is attached to the barrel. The hook may be riveted or screwed into the barrel, or pressed out of the barrel itself.

barrel, lens (*Photog.*). See **lens barrel.**

barrel nipple (*Plumb., etc*). A nipple threaded at both ends and having a plain middle part.

barrel-plating (*Elec. Eng.*). A process of electroplating in which the articles to be plated are placed in a rotating container provided with suitable negative contacts.

barrel-type crankcase (*I.C. Engs.*). A petrol-engine crankcase so constructed that the crankshaft must be removed from one end; in more normal construction the crankcase is split. See **split crankcase.**

barrel vault (*Build.*). A vault of semicircular, or nearly semicircular, cross-section, and usually of length greater than the diameter. Also called WAGON VAULT, TUNNEL VAULT.

barrel winding (*Elec. Eng.*). See **drum winding.**

barren (*Bot.*). (1) Lacking pollen.—(2) Unable, for some reason, to produce seed; infertile.

barren (*Geol.*). Without fossils.

barret'ter (*Elec. Eng., Radio*). An iron wire resistance mounted in a glass bulb containing hydrogen, and having a temperature coefficient so arranged that the variation of resistance produced ensures that the current in the circuit to which it is connected remains constant over a wide range of voltage.

barrier (*Cinema.*). The thin black line which separates adjacent frames in the projection print of a film.

barrier (*Elec. Eng.*). (1) In transformers, the solid insulating material which provides the main insulation, apart from the oil.—(2) The refractory material intended to localise or direct any arc which may arise on the operation of a circuit-breaker.

barrier button (*Teleph.*). A form of transmitter capsule in which the current passes through the carbon granules perpendicularly to the applied alternating pressure.

barrier pillar (*Mining*). A pillar of solid coal left in position to protect a main road from subsidence, or as a division.

barrier reef (*Geol.*). A coral-reef developed parallel with the shore-line and enclosing a lagoon between itself and the land. It may be regarded as marking a stage intermediate between a fringing-reef and an atoll.

barring gear (*Elec. Eng.*). The arrangement for moving heavy electrical machines or transformers by man-power, using crowbars inserted in holes in wheels, thus obtaining a large mechanical advantage.

barring motor (*Elec. Eng.*). A small motor which can be temporarily connected, by a gear or clutch, to a large machine in order to turn it slowly for adjustment or inspection.

barrow pump (*Hyd.*). A combined suction and force pump mounted for ease of transport on a two-wheeled barrow; much used for agricultural purposes.

Bartholin's glands, bar'tō-lĕn (*Zool.*). In some female Mammals, glands (corresponding with Cowper's glands in the male) lying on either side of the upper end of the vagina.—BARTHOLIN'S DUCT, an excretory duct of the sublingual gland.

Bartonian Series (*Geol.*). The topmost division of the Eocene rocks in Britain; comprising in the type locality the Barton Clay, with its rich molluscan fauna, and the overlying Barton Sands. In the London Basin the whole series is sandy and poorly fossiliferous. The equivalent beds near Paris include the famous beds of gypsum.

bartrees or **warping woof** (*Textiles*). A wooden frame with pegs for supporting the warp threads, used in hand warping.

bary'ta (*Chem.*). See **barium oxide.**

baryta water (*Chem.*). A suspension of barium hydroxide in distilled water.

barytes (ba-rī'tēz) or **ba'rite** (*Min.*). *Barium sulphate* (q.v.), typically showing tabular orthorhombic crystals. It is a common veinstone in association with lead ores, and occurs also as nodules in limestone and in the Fuller's Earth beds of Surrey; also locally as a cement of sandstones. Also called HEAVY SPAR.

bary'tocal'cite (*Min.*). A double carbonate of calcium and barium, $CaCO_3 BaCO_3$, crystallising on the monoclinic system, and occurring typically in lead veins.

bas relief, bah— (*Arch.*). Sculpture or carved work in which the figures project less than their true proportions from the surface on which they are carved.

ba'sal (*Bot.*). (1) Situated at the base.—(2) Said of an ovule which springs from the base of the ovary.

basal anaesthesia (*Med.*). Anaesthesia which acts as a basis for further and deeper anaesthesia.

basal body (*Bot., Zool.*). In flagellate *Protozoa*, zoospores, or spermatozoids, a small, deeply staining granule lying at the base of the flagellum and believed to represent the centrosome. See also **blepharoplast.**

basal bone (*Zool.*). In *Gymnophiona*, a bone of the skull formed by the fusion of the exoccipitals and the pro-otics with the parasphenoid.

basal cell (*Bot.*). (1) An attaching cell.—(2) The lower cell of a crozier.—(3) A uninucleate cell which may be the oögonium in *Uredinales*.

basal corpuscle (*Bot., Zool.*). See **basal body.**

basal disc (*Zool.*). In Corals, the primary plate of the skeleton formed at the base of each coral polyp.

basal ganglia (*Zool.*). In Vertebrates, ganglia connecting the cerebrum with other nerve-centres.

basal granule (*Bot., Zool.*). See **basal body.**

basal metabolic rate (*Zool.*). The rate of oxygen consumption in a resting organ or organism.

basal placentation (*Bot.*). The condition when the placenta is at the base of the ovary.

basal planes (*Crystal.*). The name applied to the faces representing the terminating *pinacoid* (q.v.) in all the crystal systems exclusive of the cubic system. See also **pedion.**

basal plates (*Zool.*). In the developing Vertebrate skull, a plate of cartilage formed by the fusion of the parachordals: in *Crinoidea*, certain plates situated at or near the top of the stalk: in *Echinoidea*, certain plates forming part of the apical disc.

basal rim (*Zool.*). In some *Protozoa*, a row of basal granules of cilia forming an undulating membrane.

basal walls (*Bot.*). The walls which separate the hypobasal and epibasal halves of a fern embryo when this consists of eight cells.

basa'lar (*Zool.*). Said of certain small plates (sclerites) located below the articulation of the wings in some Insects.

basale, ba-sa'le (*Zool.*). In Fish, the proximal segment of a fin-ray.

bas'alt (*Geol.*). A fine-grained often porphyritic (see **porphyritic texture**), igneous rock of dark colour, composed essentially of basic plagioclase feldspar and pyroxene, with or without olivine. In the field, the term is generally applied only to lavas, but many minor intrusions of basic composition show identical characters, and therefore cannot be distinguished in the laboratory.

basalt glass (*Geol.*). See **tachylite.**

basalte (*Pot.*). Fine-grained black unglazed stoneware. Also called BLACK EGYPTIAN WARE.

bas'anite (*Geol.*). A basaltic rock containing plagioclase, augite, olivine, and a feldspathoid (nepheline, leucite, or analcite).

bascule bridge (*Civ. Eng.*). A counterpoise bridge which can be rotated in a vertical plane about axes at one or both ends. The roadway over the river rises while the counterpoise section descends into a pit. Also called BALANCE-BRIDGE.

base (*Bot.*). That end of a plant member nearest to the point of attachment to another member, usually of different kind.

base (*Build.*). The plinth and mouldings which form the slightly projecting part at the bottom of a wall or pillar.

base (*Chem.*). A substance which tends to gain a proton. A substance which dissolves in water with the formation of hydroxyl ions. A substance which reacts with an acid, without gas evolution, to form a salt.

base (*Masonry*). The lowest course of masonry in a building.

base (*Paint., etc.*). (1) A substance, generally a metallic oxide, which forms a paint when mixed with a suitable liquid.—(2) The chief ingredient of a dye. Sometimes called a PIGMENT.

base (*Photog.*). The material on which the photo-sensitive material is carried; e.g. glass, celluloid, or paper.

baseboard (*Build.*). See **skirting board.**

base bullion (*Met.*). Impure lead, produced by smelting ore in the blast furnace. Contains some silver which is recovered during the refining of the lead. Also called WORK LEAD.

base circle (*Eng.*). The circle used in setting out the profiles of gear-wheel teeth of involute form.

base-exchange (*Geol.*). A property by virtue of which certain minerals, notably the zeolites, can exchange atoms of, say, calcium for sodium, when in a suitable environment. See **Permutite.**

base frequencies (*Acous.*). See **bass frequencies.**

base line (*Surv.*). A survey line the length of which is very accurately measured by precise methods; used as a basis for subsequent triangulation.

base load (*Elec. Eng.*). That part of the total load on an electrical power system which is supplied, as far as possible, by the most efficient connected generating stations, the remaining *peak load* (q.v.) being supplied intermittently by the more expensive stations.

base metal (*Chem.*). A metal with a relatively negative electrode potential.—(*Met.*) In general metallurgy, the term is used of the metals copper, lead, zinc, and tin, as distinct from the precious metals gold and silver; they become oxidised when heated in air. In electrometallurgy, it means the metals at the end of the electrochemical series away from the *noble metals* (q.v.).

base moulding (*Build.*). Any moulding placed towards the base of a column, wall, etc.

base plate (*Eng.*). See **bed plate.**

Basedow's disease, ba′ze-dō (*Med.*). Exophthalmic goitre. A condition due to overactivity of the thyroid gland; manifested by enlargement of the thyroid gland, protrusion of the eyeballs, rapid pulse, tremors, and nervousness.

basement (*Build.*). The lower storey of a building, below or partly below ground-level.

basement membrane (*Histol.*). A thin homogeneous layer of connective tissue, intervening between an epithelium and adjacent tissues.

ba′seost (*Zool.*). In Fish, one of the distal elements of a fin-ray.

basi- (Greek and Latin *basis*, base). A prefix used in the construction of compound terms; e.g. *basicranial*, at the base of the skull.

basibran′chial (*Zool.*). In some Fish, a median ventral cartilage forming part of the branchial basket, and connecting the hypobranchials of the two sides.

basic dyes (*Chem.*). Mostly colour bases with hydrochloric acid, or double salts with zinc chloride; chiefly used for printing cotton with a tannin mordant, and in colour photography.

basic lavas (*Geol.*). The lavas poor in silica (less than 52%). The rocks are typically dark in colour and heavy, and are well represented by the familiar type basalt.

basic lead carbonate (*Chem.*). Approximate composition $2PbCO_3 \cdot Pb(OH)_2$. See **white lead.**

basic lead chromate (*Chem.*). $PbCrO_4 \cdot Pb(OH)_2$. Also known as AUSTRIAN CINNABAR and CHROME RED. Used as a pigment. Produced when lead chromate is boiled with aqueous ammonia or potassium hydroxide.

basic lead sulphate (*Chem.*). $2PbSO_4 \cdot PbO$. Obtained by roasting galena. The fine fume carried away by the gases from the roasting furnace is passed through chambers, where the basic lead sulphate settles out as a finely divided powder.

basic loading (*Elec. Eng.*). The limiting mechanical load, per unit length, on an overhead line conductor.

basic network (*Elec. Comm.*). The two-terminal network which is a first approximation, as a balancing network, to the impedance of a line over the working frequency range.

basic number (*Bot.*). The lowest haploid chromosome number in any member of a euploid series formed by the species of a genus.

basic process (*Met.*). A steel-making process, either Bessemer, open-hearth, or electric, in which the furnace is lined with a basic refractory, a slag rich in lime being formed and phosphorus removed.

basic refractory (*Met.*). A heat-resisting material rich in metallic oxides, used to line metallurgical and other furnaces; e.g. magnesite and dolomite.

basichro′matin (*Cyt.*). A form of chromatin which stains relatively deeply and contains a fairly high proportion of nucleic acid. Cf. *oxychromatin.*

basicity, bă-sis′— (*Chem.*). The number of hydrogen atoms of an acid replaceable by a metal atom.

basicon′ic (*Zool.*). (In Insects) said of certain subconical and immobile sensillae arising from the general surface of the cuticle.

basicra′nial (*Zool.*). Pertaining to, or situated at, the base of the skull.

ba′sicyte (*Zool.*). A form of ovoidal connective-tissue corpuscle, full of basiphil granules.

basid′ial (*Bot.*). Relating to a basidium.

basidial layer (*Bot.*). The hymenium in a Basidiomycete.

basid′iogenet′ic (*Bot.*). Produced upon a basidium.

Basid′iolichenes, —li-kē′nēz (*Bot.*). A small group of lichens, entirely tropical in occurrence, in which the fungus is a member of the *Basidiomycetes.*

Basidiomyce′tes (*Bot.*). A major group of fungi with about 14,000 species, world-wide in distribution. They have a septate mycelium, and in the higher forms develop complicated sporophores. The principal spores are basidiospores, produced on the outside of basidia, usually in groups of four. The *Basidiomycetes* include the *Ustilaginales*, the *Uredinales*, and many species placed in the *Autobasidiomycetes*, familiar as toadstools.

basid′iophore (*Bot.*). A fruit body bearing basidia.

basid′iospore (*Bot.*). The characteristic spore of the *Basidiomycetes*, formed on the outside of the basidium, usually in groups of four.

basid′ium (*Bot.*). (1) A row of cells, or more often a single rounded to club-shaped cell, which bears the basidiospores.—(2) A sterigma in some moulds (not a good use of the term).—*pl.* **basidia.**

ba′sidor′sal (*Zool.*). In developing vertebrae, one of a pair of small cartilages occurring laterodorsally on the notochord.

ba′sifixed (*Bot.*). Said of an anther which is attached by its base to the filament.

ba′sifu′gal (*Bot.*). Developing in order from the base upwards.

ba′sigam′ous, ba′sigam′ic (*Bot.*). Said of an embryo sac in which the synergidae and egg lie towards the base of the cavity, and not at the end nearest to the micropyle.

ba′sihy′al (*Zool.*). A broad median plate constituting the basal or median ventral portion of the hyoid arch.

basil (*Leath.*). Tanned sheepskin that has not been dyed; retanned and finished when intended for bookbinding and fancy-goods.

ba′silab′ium (*Zool.*). In Insects, a small sclerite formed by the fusion of the labiostipites.

ba′silar (*Bot., Zool.*). Situated near, pertaining to, or growing from the base.

basilar membrane (*Acous., Zool.*). In Mammals, a flat membrane forming part of the partition of the cochlea, containing the collection of auditory nerves in the inner ear which translate mechanical vibrations of differing frequencies into nerve impulses, which are passed to the brain.

basilin′gual (*Zool.*). In Amphibia and some Reptiles, a broad plate of cartilage forming the main part of the hyoid.

ba′simandib′ula (*Zool.*). In some Insects, a small sclerite at the base of the mandible.

ba′simaxil′la (*Zool.*). In some Insects, a small sclerite at the base of the maxilla.

basin (*Geol.*). A geological formation in which the strata dip towards the centre. See **syncline.**

basin (*Hyd. Eng.*). (1) Any hollow space containing water.—(2) A dock into which ships can be admitted at high tide.

ba′sinerved (*Bot.*). Having veins proceeding from the base.

basioccipital, bā-si-ok-sip′— (*Zool.*). In higher Vertebrates, a cartilage bone, occurring mid-ventrally in the occipital region of the skull.

ba′sion (*Anat.*). The mid-point of the anterior margin of the foramen magnum.

ba'siophthal'amite (*Zool.*). In *Crustacea*, the proximal joint of the eye-stalk.

basiot'ic (*Zool.*). See **mesotic.**

basip'etal (*Bot.*). With each new member of a series developing nearer to the base than the next oldest one.

basipetal sorus (*Bot.*). See **gradate sorus.**

ba'siphar'ynx (*Zool.*). In Insects, the fused epipharynx and hypopharynx.

ba'siphil (*Zool.*). Having a marked affinity for basic dyes. Also BASOPHIL(E).

basiphil cells (*Physiol.*). White blood cells, forming 0·1% of the granulocytes. The term is also applied to cells in the anterior lobe of the pituitary gland.

basiphilia (*Path.*). See **basophilia.**

basip'odite (*Zool.*). In the appendages of some *Crustacea*, the second or distal joint of the protopodite.

ba'sipo'dium (*Zool.*). The wrist or ankle.

ba'siprobos'cis (*Zool.*). In certain Insects with suctorial mouth-parts, that portion of the proboscis consisting of the mentum, submentum, cardines, and stipites.

ba'sipterygium, —ter-ij'i-um (*Zool.*). In Fish, a bone or cartilage in the pelvic fin, representing the fused basalia.

ba'sipter'ygoid (*Zool.*). In some Reptiles and Birds, a process of the basisphenoid.

basiscop'ic (*Bot.*). On the side towards the base.

ba'sisphenoid, —sfē'noid (*Zool.*). A cranial bone of some Vertebrates, extending forward from the base of the basioccipital to the presphenoid.

basitem'poral (*Zool.*). A cranial bone of Birds, formed by the fusion of the otic capsules and the basal plate.

basiton'ic (*Bot.*). Having the base of the anther against the rostellum.

basiven'tral (*Zool.*). In developing vertebrae, one of a pair of small cartilages occurring lateroventrally on the notochord.

basiver'tebral (*Zool.*). Situated on, pertaining to, or emerging from the posterior surface of a vertebra.

basket cells (*Zool.*). Nerve-cells showing extensive arborisation of their axis-cylinder processes.

basket coil (*Radio*). A self-supporting inductance coil, wound in the form of a spiral with the adjacent turns in criss-cross formation, to reduce self-capacity to a minimum.

basket-handled arch (*Build.*). A three-centred, low-crowned arch.

basket ware (*Pot.*). Articles formed of plaited or woven strips of clay, to represent straw or osiers.

basket weave (*Textiles*). Woollen fabrics of hopsack or mat-weave, with a basket effect.

basket winding (*Elec. Eng.*). See **chain winding.**

Baskett's reducer (*Photog.*). An abrasive reducer for local negative reduction, based on terebene.

ba'sophil(e). See **basiphil.**

basophil cells. See **basiphil cells.**

basophil'ia (*Med.*). An increase of basophil cells in the blood.—PUNCTATE BASOPHILIA, a degeneration of red blood cells found, for example, in lead-poisoning.

bass (or **base**) **frequencies** (*Acous.*). Those frequencies towards the lower end of the audible scale.

Bassan'i process (*Photog.*). A colour cinematographic system in which the gate of the camera moves as a whole, with the film in it, to take the three negatives corresponding to the three colours.

basswood (*Timber*). Timber from the American linden, much used for cheap furniture; easy to work.

bast (*Bot.*). (1) Flexible fibrous material obtained from the rind of some trees, and used as binding material; often known as RAFFIA.—(2) See **phloem.**

bast cylinder (*Bot.*). See **stereome cylinder.**

bast fibre (*Bot.*). An elongated, slender, thick-walled cell in the phloem; a strand of such fibres.

bast island (*Bot.*). See **phloem island.**

bastard ashlar (*Masonry*). (1) Stones, intended for ashlar work, which are merely rough-scabbled to the required size at the quarry.—(2) The face-stones of a rubble wall which are selected, squared, and dressed to resemble ashlar.

bastard cop (*Textiles*). A package of cotton yarn of intermediate size, larger than a pin cop and smaller than a twist cop.

bastard-cut (*Tools*). A term descriptive of file teeth of a medium degree of coarseness.

bastard flatting (*Dec.*). See **eggshell gloss.**

bastard fount (*Typog.*). Type with a larger body than is necessary for its face. It obviates the use of leads.

bastard freestone (*Build.*). A local name for a building-stone quarried from the Inferior Oölite of the Bath district; inferior in quality to the overlying Bath Oölite.

bastard size (*Paper*). Paper or board not of a standard size. Bastard sizes are listed and sold by inch measurement and not by standard names.

bastard stucco (*Build.*). The finishing coat of plaster when prepared for paint.

bastard thread (*Eng.*). A screw-thread which does not conform to any recognised standard dimensions.

bastard title (*Typog.*). The abbreviated title, or half-title, of a book, usually printed on the fly-leaf preceding the title page.

bastard tuck pointing (*Build.*). Pointing in which a slight projection is given to the stopping on each joint.

bastard wing (*Zool.*). In Birds, quill feathers, usually three in number, borne on the thumb or first digit of the wing.

Bastian lamp (*Illum.*). An old form of mercury-vapour lamp in which an electromagnetic tilting device is used to start the discharge.

Bastian meter (*Elec. Eng.*). An electrolytic supply meter, in which the ampere-hours which have passed through the circuit to which it is connected are measured by the amount of liquid that has been electrolysed. Now almost obsolete.

bastite (*Min.*). A variety of serpentine, essentially hydrated silicate of magnesium, resulting from the alteration of orthorhombic pyroxenes. It occurs in the serpentine of Baste in the Hartz mountains, also in the Cornish and other serpentines. Also known as SCHILLERSPAR.

bat (*Build.*). A half or other portion of a brick, large enough to be used in constructing a wall.

bat (*Pot.*). The slab—circular, oval, or rectangular, and of uniform thickness—of unfired clay, of fired refractory material, or of plaster, when used in firing.

batch (*Glass*). The mixture of raw materials from which glass is produced in the furnace. A proportion of cullet is either added to the mixture, or placed in the furnace previous to the charge.

batch distillation (*Chem.*). See under **continuous distillation.**

batch furnace (*Met.*). A furnace in which the charge is placed and heated to the requisite temperature, subsequently being withdrawn. The furnace may be maintained at the operating temperature, or heated and cooled with the charge. Distinguished from *continuous furnace.*

batching (*Textiles*). The addition of oil to textiles, to facilitate spinning.

bate (*Tanning*). A fermenting solution containing enzymes derived from the pancreas, or from synthetically prepared ferments; used for steeping light skins.

batea, ba-tē'a (*Mining*). A flat cone-shaped pan of wood or sheet iron, used mostly in South America for the examination and hand concentration of gold ores. See **pan.**

batement light (*Build.*). A window, or one division of a window, having vertical sides, but with the sill not horizontal, as where it follows the rake of a staircase.

Batesian mimicry, băt'si-an (*Zool.*). Convergent resemblance between two animals, advantageous in some way to one of them.

bath (*Photog.*). Any specified solution of a chemical in bulk which is not renewed for every photographic process for which it is used. See also **clearing bath.**

bath-brick. A brick made from river silt; used for scouring and, finely ground, for making liquid polishes.

bath lubrication (*Eng.*). A method of lubrication in which the part to be lubricated, such as a chain or gear-wheel, dips into an oil-bath.

Bath stone (*Build.*). A building-stone quarried from the Great Oölite near Bath. Also called BATH OÖLITE.

batho-, bathy- (Greek *bathys*, deep). Prefixes used in the construction of compound terms, esp. with relation to sea-depths; e.g. *bathophilous* (q.v.), *bathybic* (q.v.).

bath'ochrome (*Chem.*). A radical which shifts the absorption spectrum of a compound toward the red end of the spectrum.

batholith (*Geol.*). See **bathylith.**

bathom'eter or **bathym'eter** (*Ocean.*). An instrument used for deep-sea soundings; e.g. the *echo sounder* (q.v.).

Bathonian (*Geol.*). See **Bradfordian.**

bathoph'ilous (*Zool.*). Adapted to an aquatic life at great depths.

bathoton'ic (*Chem.*). Tending to diminish surface tension.

bath'yal zone (*Geol.*). The sea-floor between 600 and 3000 ft. below sea-level; characterised by muddy deposits and occasionally by organic oozes.

bath'ybic (*Biol.*). Relating to, or existing in, the deep sea; e.g. plankton floating well below the surface.

bath'ylimnet'ic (*Zool.*). Living in the depths of lakes and marshes.

bath'ylith or **bath'olith** (*Geol.*). A large body of intrusive igneous rock, frequently granite, with steeply plunging sides and no visible floor.

bathym'eter (*Ocean.*). See **bathometer.**

bathymet'ric (*Zool.*). Pertaining to the vertical distribution of animals in space.

bath'ypela'gic (*Zool.*). See **abyssopelagic.**

bathys'mal (*Zool.*). See **abyssal.**

bath'ysphere (*Ocean.*). A spherical diving-apparatus, made large enough to contain two men and instruments; capable of resisting tremendous pressure, and therefore of descending to great depths; it is used in oceanography for the investigation of deep-water faunas.

bating (*Leather*). The steeping of light skins in a fermenting solution, prior to tanning, to render them smooth and flexible.

batra'chian (*Zool.*). Relating to the *Salientia* (i.e. Frogs and Toads).

batten (*Carp.*). (1) A piece of square-sawn converted timber, between 2 and 4 inches in thickness and from 5 to 8 inches in width, used for flooring or as a support for laths. See also **slating and tiling battens.**—(2) A bar fastened across a door, or anything composed of parallel boards, to secure them and to add strength and/or reduce warping.

batten (*Illum.*). A fixed or hanging row of lamps used in stage lighting.

batten (*Textiles*). The swinging frame of a loom. It controls the reed, carries the shuttle race, and beats up each pick of weft to the fabric already formed.

batten door (*Carp.*). A door formed of battens placed side by side and secured by others fastened across them.

batten-lampholder (*Elec. Eng.*). See **back-plate lampholder.**

battened wall (*Build.*). See **strapped wall.**

batter (*Build., etc.*). Slope (e.g. of the face of a structure) from the vertical; cf. *rake.*

batter (*Typog.*). Broken or damaged type.

batter level (*Surv.*). A form of clinometer for finding the slope of cuttings and embankments.

batter pile (*Civ. Eng.*). A pile which is driven in at an angle to the vertical.

batter post (*Carp.*). One of the inclined side-timbers supporting the roof of a tunnel.

battery. A number of similar pieces of equipment grouped together; e.g. a *battery* of boilers.

battery (*Elec.*). A group of two or more primary cells or accumulators, electrically connected in series or in parallel; a single cell is not a battery.

See **A—**
anode—
B—
biasing—
C—
central—
central signalling—
common—
dry—
grid-bias—
portable—
stationary—
storage—

battery (*Met.*). See **stamp battery.**

battery booster (*Elec. Eng.*). A motor-generator set used for giving an extra voltage, to enable a battery to be charged from a circuit of a voltage equal to the normal voltage of the battery.

battery-coil ignition (*Elec. Eng., etc.*). High-tension supply for sparking-plugs in automobiles, in which the interruption of a primary current from a battery induces a high secondary e.m.f. in another winding on the same magnetic circuit, the high potential being distributed in synchronism with the contact-breaker in the primary circuit and the engine.

battery coupling (*Radio*). An inter-stage coupling in amplifiers, which is required to transmit very low frequencies or direct currents; the grid of one stage is connected to the anode of the preceding stage by a battery of the requisite voltage, to maintain the grid at its correct operating potential.

battery cut-out (*Elec. Eng.*). An automatic switch for disconnecting a battery during its charge, if the voltage of the charging circuit falls below that of the battery.

battery dialling (*Auto. Teleph.*). Dialling with a battery at the dial end of a line, the interruptions of the current being formed over an earth-return circuit, with the two legs of the line in parallel.

battery, dry (*Elec. Eng.*). See **dry cell.**

battery eliminator (*Radio*). An arrangement for supplying electrical power from supply-mains to a radio receiver which has been designed to operate with batteries.

battery-lamp (*Illum.*). An electric filament-lamp, usually of 16 volts or under, for use in conjunction with a battery.

battery regulating switch (*Elec. Eng.*). A switch for regulating the number of cells connected in series in a battery.

battery room (*Teleph.*). In a telephone exchange or repeater station, the room for housing the accumulator batteries. It must be properly ventilated and kept apart from other apparatus, because of the emitted fumes.

battery spear (*Elec. Eng.*). A special form of spike used to connect a voltmeter for battery-testing to the plates of the accumulator cells.

battery traction (*Elec. Eng.*). An electric-traction system in which the current is obtained from batteries on the vehicles (*battery vehicles*).

battlement (*Build.*). An indented parapet at the top of a wall.

baud (*Teleg.*). The unit of speed of telegraphic code transmission; equal to twice the number of dots continuously sent per second.

Baudot code, bō-dō′ (*Teleg.*). The code consisting of impulses in the time-frame of five units, devised by J. M. Baudot for mechanical transmission of signals.

Baudot system (*Teleg*). A system of telegraphy in which the transmission line is allocated, by rotating switch-arms, to a number of channels in rapid succession, thereby loading up the lines.

Baudouin reaction, bō-dwin^{g}′ (*Chem.*). A test for certain vegetable oils which give with alcoholic furfural and concentrated HCl, or with $SnCl_2$ and HCl, a characteristic red colour.

baulk (*Civ. Eng.*). See **balk.**

baulk (*Timber*). A piece of timber square-sawn from the log to a size greater than 6 in. by 6 in.

Baumé hydrometer scale, bō-mā (*Chem., Phys., etc.*). The continental Baumé hydrometer has the rational scale proposed by Lunge, in which 0° is the point to which it sinks in water and 10° the point to which it sinks in a 10% solution of sodium chloride, both liquids being at 12·5° C.

bauxite, beauxite, bawk′zīt, bōk′— (*Min.*). A residual clay, consisting essentially of aluminium hydroxides, formed in tropical regions by the chemical weathering of basic igneous rocks. It is the most important ore of aluminium, represented in Britain by the Tertiary Interbasaltic Zone in Co. Antrim and the Millstone Grit Bauxite horizon in the western parts of the Midland Valley of Scotland. In U.S.A. bauxite of commercial value is restricted to Arkansas and the southern Appalachian states, e g., at Rock Run, Alabama. Extensive deposits occur in British and Dutch Guiana, northern France, and in many other localities. See also **Alundum** and **laterite.**

bay (*Build., etc.*). Any division or compartment of an arcade, roof, building, etc. Each space from column to column in a building is called a *bay*.

bay (*Elec. Comm.*). A row of racks on which is mounted a multiplicity of apparatus.

bay-stall (*Build.*). See **carol.**

bay window (*Build*). An internal recess formed when a wall projects outside the general wall-line, for the accommodation of a window.

Bay′er process (*Met*). A process for the purification of bauxite, as the first stage in the production of aluminium. Bauxite is digested with a caustic soda solution which dissolves the alumina and precipitates oxides of iron, silicon, titanium, etc. The solution is filtered and the aluminium precipitated as the hydroxide.

bayonet cap (*Illum.*). Commonly abbreviated to **B.C.** A type of cap fitted to an electric lamp, consisting of a cylindrical outer wall fitted with two pins for engaging in slots in a lampholder. Within the wall are two contacts connected to the filament, which make contact with two pins in the lampholder. The standard size of cap has a diameter of $\frac{7}{8}$ in. See **small bayonet cap, centre-contact cap.**

bayonet holder (*Illum.*). The form of lampholder used in Great Britain; designed for receiving lamps having bayonet caps; no live parts are exposed.

Bayston Group (*Geol.*). A group of red and grey grits, with conglomerates, forming part of the Wentnor or Western Longmyndian Series of the Pre-Cambrian rocks of Shropshire.

Bazin's disease (*Med.*). A condition in which ulcers, thought to be tuberculous, appear on the skin of the calves.

B.B. (*Met.*). See **B.**

B.C. (*Illum.*). See **bayonet cap.**

BC digit selector (*Auto. Teleg.*). The selector in the director which accepts the second and third trains of impulses forming the exchange coding.

Bdelloida, del′-ō-id-a (*Zool.*). An order of *Rotifera*, in which the adults swim freely and possess a telescopic forked tail; they can also move by creeping like a leech, the dorsal proboscis being used as a sucker.

BDV (*Cables*). The abbrev. for *breakdown voltage.*

Be (*Chem.*). The symbol for *beryllium.*

Beach's developer (*Photog.*). A photographic developer based on pyrogallol.

beacon (*Hyd. Eng.*). A small tower, generally built on a submerged reef, to warn shipping of minor shoals.

beacon (*Illum.*). A light visible at a considerable distance, serving as a guide to travellers or as a warning signal. See **airway beacon.**

beacon (*Radio*). A radio transmitter in which the radiation is concentrated in one or more narrow beams, so as to act as either a guide or marker to aircraft or shipping

bead (*Join.*). A small convex moulding formed on wood or other material.

bead (*Textiles*). A yarn with a bead fastened to it at intervals.

bead-and-batten work (*Carp.*). A rough style of work used for partitions, formed of battens with a bead along one of the longitudinal edges.

bead-and-quirk (*Join.*). A bead formed with a narrow groove separating it from the surface which it is decorating. Also called a QUIRK-BEAD.

bead-butt (*Join.*). Work framed in panels flush with the framing of a door, a bead being used on two sides only of the panel, and being carried up to or butted against the rails.

bead-butt and square-work (*Join.*). Door framing formed with bead-and-butt on one side and square on the other.

bead-flush (*Join.*). Work differing from bead-butt work in that a bead is formed on the framing itself instead of on the panel, and is carried around all the sides.

bead-jointed (*Join.*). Said of that form of jointing in which one of the butting edges has a bead along it.

bead-plane (*Carp.*). A special plane for cutting beads out of the solid, or for cutting grooves into which separate beading is to be fitted.

bead router (*Carp.*). A stock or body through which passes a beading gouge, used for cutting beads.

bead-sleeker (*Build.*). A special tool used to smooth the bead-shaped portion of a moulding.

bead-tool (*Wood-turning*). A specially shaped cutting-tool used in wood-turning for forming convex mouldings.

beak (*Carp.*). The crooked end of a bench holdfast.

beak (*Zool.*). See **rostrum.**

beak iron, beck iron, bick iron, bickern (*Eng.*). (1) The pointed, or horn-shaped, end of a blacksmith's anvil; used in forging rings, bends, etc.—(2) A T-shaped stake, similarly shaped, fitting in the hardy-hole of the anvil.

beaked (*Bot.*). Bearing a beak, i.e. a long, pointed prolongation.

beaking joint (*Carp.*). The joint formed when a number of adjacent heading joints occur in the same straight line.

beam (*Cotton, etc.*). (1) A flanged wooden roller or steel tube which carries the warp threads in the loom when they are in position.—(2) The beam on which the sheet of threads is wound in beam-warping.—(3) One of the hollow metal cylinders carrying the warp threads in lace manufacture.

beam (*Eng.*). A bar which is supported at its ends and loaded transversely.

beam (*Struct.*). A structural member, usually horizontal, which is subject to flexure, combined sometimes with tension or compression.

beam antenna (*Radio*). An antenna with very marked directional properties. Also called BEAM AERIAL.

beam array (*Radio*). A beam antenna composed of a number of spaced radiators, as distinct from one dependent upon reflectors for its directional properties.

beam compasses (*Instruments*). An instrument for describing large arcs. It consists of a beam of wood or metal carrying two beam heads, adjustable for position along the beam, and serving as the marking points of the compasses. Also called TRAMMELS.

beam current (*Cathode Ray Tubes*). That portion of the gun current (see **cathode ray tube**) which passes through the aperture in the anode and impinges on the fluorescent screen.

beam effect (*Acous.*). The differential focusing of high-frequency sound radiation from an open diaphragm (such as that in a loudspeaker), on account of the dimensions of the diaphragm being comparable with or greater than the wave-length of the sound produced.

beam-engine (*Eng.*). A form of construction used in early steam-engines, now obsolete. The inverted steam-cylinder acted at one end of a pivoted beam, the flywheel or pump-cylinder being connected to the other.

beam-filling (*Build.*). Brick, masonry, or concrete work used to fill in the spaces between the ends of beams or joists carried upon a wall.

beam-forming electrode (*Thermionics*). An electrode to which a potential is applied to concentrate the electron stream into one or more beams. Used in beam and cathode ray tubes.

beam grillage (*Struct.*). A *grillage foundation* (q.v.).

beam pentode (*Thermionics*). A four-electrode screened-grid valve in which the electrodes are arranged so as to cause a concentration of space-charge near the anode; it has characteristics similar to those of a pentode. Also called a SPACE-CHARGE PENTODE.

beam relay (*Elec. Eng.*). An electromagnetic relay in which the contacts are mounted on a balanced beam, with energising coils acting on each end and tending to tilt it one way or the other.

beam-splitter or **beam-splitting camera** (*Photog.*). A camera for colour photography, in which the beam of light from the object is separated into three components by means of a complicated prism. The components are allowed to fall on three separate negative films, each one of which registers one of the three primary colours, a suitable photographic filter being placed over each.

beam suppression (*Television*). The application of a large negative potential to the control electrode of a cathode-ray tube, so as to suppress the beam, during the 'flyback' period between successive scanning lines.

beam system (*Radio*). A point-to-point radio system in which highly directive transmitting and receiving antennae are used.

beam trap (*Thermionics*). A bucket-formed electrode mounted in a cathode ray tube, to catch the electron beam when it is not required to excite fluorescence on the screen.

beam tube (*Thermionics*). A thermionic vacuum tube in which the electrodes are arranged to concentrate the electrons emitted from the cathode into one or more narrow beams, so as to obtain desirable characteristics.

beam-warping (*Cotton*). The operation of winding threads, withdrawn from bobbins, side by side in sheet form on to a warper's or back beam.

beaming (*Cotton Weaving*). The winding of yarn on to a beam in the form of a sheet of threads. The term is sometimes used for *beam-warping*.

beaming (*Silk*). The preparation of the warp threads for weaving by spreading them, in the desired order for entering, over the cane or warp roller. Also called TURNING-ON.

bear (*Furs*). The dressed skin of various kinds of bear; e.g. the brown bear (*Ursus arctos*), black bear (*U. torquatus*), polar or white bear (*U. maritimus*); the hair is long and shaggy.

beard (*Acous.*). A short wooden rod placed across the aperture where an organ pipe is actuated by the blast of air. It modifies the timbre of the sound emitted by the pipe and permits a higher wind-pressure to be used (with consequent increase in sound output), without exciting the octave of the pipe as its fundamental pitch.

beard (*Carp.*). The sharp arris of a square-edged timber.

beard (*Typog.*). The space between the foot of a letter and the bottom edge of the type-body.

Beard protective system (*Elec. Eng.*). A form of balanced protective system in which the current entering the winding of an alternator is balanced against that leaving it by passing the conductor at the two ends round the core of a single-current transformer, in opposite directions, so that there is normally no flux in the transformer core.

Beard-Hunter protective system (*Elec. Eng.*). See **compensated pilot-wire protective system.**

bearded (*Bot.*). Having an awn; bearing long hairs like a beard.

bearded needle (*Hosiery*). See **spring needle.**

bearer (*Carp.*). Any member used in a construction to support a weight above it.

bearer cable (*Elec. Eng.*). See **messenger wire.**

bearing (*Build.*). The part of a beam or girder which actually rests on the supports.

bearing (*Radio*). The angle of direction, in degrees from true north, of an arriving radio-wave as determined by a direction-finding system. Said to be a *first-class*, *second-class*, or *third-class bearing*, according to the estimated accuracy, within ±2, 5, or 10 degrees respectively.

bearing (*Surv.*). The horizontal angle between any survey line and a given reference direction.

See **grid—** **true—**
magnetic— **whole-circle—**
reduced—

bearings (*Eng.*). Supports provided to hold a revolving shaft in its correct position.

bearing bar (*Build.*). A wrought-iron bar laid on a brick course, in place of a wooden wall-plate, to provide bearing for floor joists.

bearing distance (*Build.*). The unsupported length of a beam between its bearings.

bearing metals (*Eng.*). Metals (alloys) used for that part of a bearing which is in contact with the journal; e.g. bronze or whitemetal, used on account of their low coefficient of friction when used with a steel shaft.

bearing pile (*Civ. Eng.*). A column which is sunk into the ground to support a vertical load by transmitting it to a firm foundation lower down, or by consolidating the soil so that its bearing power is increased.

bearing surface (*Eng.*). That portion of a bearing in direct contact with the journal; the surface of the journal. See **brasses.**

bearing-up stops (*Mining*). Keps or catches used to support a cage at the end of a hoist during loading or unloading.

bearing wall (*Civ. Eng.*). The supporting or abutment wall of a bridge or arch.

beat (*Horol.*). The blow given by a tooth of the escape wheel as it strikes the pallets. An escapement is said to be *in beat* when this blow is uniform on both pallets.

beats (*Acous.*). The subjective difference tone when two sound-waves of nearly equal frequencies are simultaneously applied to one ear. It appears as a regular increase and decrease of the combined intensity.

beat frequency (*Radio*). Generally, the difference frequency produced by the intermodulation of two frequencies. Specifically, the supersonic frequency employed in a superheterodyne receiver.

beat pins (*Horol.*). The pins projecting from the ends of the gravity arms of the gravity escapement. These pins, one on either side of the pendulum rod, give impulse to the pendulum and enable the pendulum to raise the gravity arms for unlocking.

beat reception (*Radio*). Another name for *heterodyne reception.*

beat screws (*Horol.*). Screws which provide for the adjustment of the relative position of the crutch and pendulum, so that the escapement may be brought 'in beat.'

beater (*Cotton Spinning*). A revolving shaft fitted with blades which break up and loosen matted lumps of cotton in the processes of opening and scutching.

beater or **beater roll** (*Paper*). A trough containing a cylinder fitted with knives which work in conjunction with similar knives in the trough; used to reduce the pulp to the required consistency.

beating (*Woollen*). A supply of threads, conveniently placed on a loom, from which threads broken during weaving may be replaced.

beating engine (*Paper*). See **hollander.**

beating oscillator (*Radio*). In a heterodyne or supersonic heterodyne receiver, the oscillator which supplies the local signal, against which the incoming signal is heterodyned. Also called LOCAL OSCILLATOR.

beating-up (*Textiles*). In weaving, movement of the reed by which each thread of weft placed in the shed is pushed against the edge of the woven fabric.

Beatrice twill (*Textiles*). A twill cotton cloth, usually made with twist way weft; used for linings.

Beaufort notation (*Meteor.*). A code of letters used for indicating the state of the weather; for example, *b* indicates *blue sky, o* stands for *overcast, r* for *rain.*

Beaufort scale (*Meteor.*). A numerical scale of wind velocity ranging from 0, for a calm, to 12, for a hurricane. If V is the velocity in miles per hour, and B is the Beaufort number, then $V = 1{\cdot}87\sqrt{B^3}$.

beaumontage, bō-mon-tajh (*Build., Eng., etc.*). A mixture used as a stopping for holes or other defects in woodwork or metal work.

beauxite (*Min.*). See **bauxite.**

beaver (*Furs*). The dressed skin of the beaver, a rodent of aquatic habits, of which there are two well-known species, the European (*Castor fiber*) and American (*C. canadensis*); the fur is chestnut in colour, with lighter underfur.

beaver board (*Build.*). A building-board made of wood-fibre material.

beaver cloth (*Textiles*). A heavy-weight woollen fabric with a pile or dress-face finish; used for overcoatings.

beaver finish (*Textiles*). The mode of finish used on woollen fabrics to produce a dress-face surface.

beaverteen (*Textiles*). A heavy cotton fabric with a weft face; it has a coarse weft and is used chiefly for trouserings.

bec carcel, bek kar-sel′ (*Illum.*). A French standard of light intensity, consisting of an Argand colza lamp giving a light equal to 9·6 international candles.

beche, besh (*Civ. Eng.*). A tool used in the process of well-boring when a rod has broken in the bore, the tool being used to grab it and remove it.

beck. See **back.**

beck iron (*Eng.*). See **beak iron.**

Beck arc-lamp (*Illum.*). A special form of high-intensity arc-lamp, in which means are adopted for enabling particularly high-current densities to be used.

beckite (*Min.*). See **beekite.**

Beckmann apparatus (*Heat*). Apparatus originally designed by Beckmann to be used for measuring the freezing and boiling points of solutions.

Beckmann molecular transformation (*Chem.*). The transformation and rearrangement of ketoxime molecules into acid amides or anilides under the influence of certain reagents, such as acetyl chloride, hydrochloric, or sulphuric acid dissolved in glacial acetic acid, benzenesulphonic chloride, etc. An important reaction for determining the configuration of stereo-isomeric ketoximes.

Beckmann thermometer (*Heat*). A special form of mercury thermometer possessing, on account of its large bulb, great sensitivity but a small range. It is used to measure small changes of temperature with great precision. It contains a mercury reservoir by means of which mercury may be added to or removed from the indicating thread in order that the thermometer may be used at different temperatures.

Beckwith Series (*Geol.*). A thick series of red beds, partly of Upper Jurassic and partly of Lower Cretaceous (Comanchean) age, which lies above the Twin Creek beds of marine origin in Wyoming.

Becquerel cell, bek′er-el (*Photo-electronics*). A *photo-chemical cell* (q.v.).

Becquerel effect (*Photo-electronics*). The flow of current between two similar metallic electrodes immersed in an electrolyte which is produced when one of the electrodes is illuminated.

Becquerel rays (*Phys.*). A term once used to include the three types of rays emitted by radioactive substances. See **alpha rays, beta rays, gamma rays.**

bed (*Build., Masonry*). The upper or the lower surface of a building-stone or ashlar when it is built into a wall: the horizontal surface upon which a course of bricks is laid in mortar.

bed (*Geol.*). A term commonly used for *stratum.*

bed (*Typog.*). The heavy steel table of a machine or press on which the forme of type is placed for printing.

bed dowel (*Masonry*). A dowel placed in the centre of a stone bed.

bed joints (*Build.*). The horizontal joints in brickwork or masonry: the radiating joints of an arch.

bed-moulding (*Build.*). Any moulding used to fill up the bare space beneath a projecting cornice.

bed plate (*Eng.*). A cast-iron or fabricated steel base, to which the frame of an engine or other machine is attached.

bedding (*Cables*). A soft layer of jute, impregnated with bitumen, which prevents the steel-wire armouring from biting into the lead sheath of a cable.

bedding (*Geol.*). A term commonly used for *stratification*.—*adj*. **bedded,** stratified.

bedding course (*Civ. Eng.*). See **cushion course.**

bedding fault (*Acous.*). A fault in pressing a disc record; caused by material (stock) being forced under the stamper, with consequent irregular pressings.

bedding-in (*Eng.*). The process of accurately fitting a bearing to its shaft by scraping the former until contact occurs uniformly over the surface.

bedding-in (*Foundry*). The preparation of the lower half of a mould in the floor-sand of the foundry instead of in a box.

bedding-stone (*Build.*). The perfectly flat marble slab used by the bricklayer to test the face of a rubbed brick for flatness.

Bedford cord (*Textiles*). A cotton fabric with ribs or cords running lengthwise in the piece; lighter weights used for summer dresses, shirts, etc.; heavier weaves for riding-breeches.

Bedford limestone (*Build.*). A well-known American building-stone, of the finest quality; named from its shipping point, Bedford (Indiana).

beech (*Timber*). A very hard, yellowish-white wood, with a close and compact grain which makes it especially suitable for wood-turning. It is also used for the wooden parts of many tools.

beekite (*Min.*). A chemically precipitated form of silica, a chalcedonic chert, commonly occurring as an incrustation showing concentric markings on pebbles, notably of limestone, in the breccio-conglomerates of E. Devonshire. Also called BECKITE.

Beekmantown Limestone (*Geol.*). A magnesian limestone, some 1800 ft. in thickness and characterised by curved nautiloid cephalopods, occurring in the Canadian Series of N. America; of Arenig age; equivalent to part of the Durness Limestone of the N.W. Highlands of Scotland. See also **Deepkill Shales.**

beer (*Brew.*). An alcoholic beverage made by the fermentation of a cereal extract, flavoured with a suitable bitter substance. The materials used are water, malt, hops, sugar, and yeast, with certain accessories, such as finings. The percentage of alcohol present in beers ranges from 1½-8½ gms. per c.c. See **ale, porter, stout, malt, hops, yeast, finings, wort.**

beer stone (*Build.*). A non-oölitic limestone resembling a hard chalk; used for interior work.

beer (*Textiles*). A unit used for warp threads. In *linen manufacture* the unit is 40 threads. In *cotton weaving* the number varies, but it is usually a group of 20 dents. In *worsted manufacture* the term indicates a group of 40 threads, or a group of 20 dents, each dent carrying two threads. Cf. *porter*.

Beer's law (*Chem.*). The intensity of a ray of light is inversely proportional to the thickness of the absorbing medium through which it has passed.

beeswax (*Chem.*). A white or yellowish plastic substance, m.p. 63°-65° C. It consists chiefly of the myricyl ester of palmitic acid $C_{15}H_{31}\cdot COOC_{30}H_{61}$, free cerotic acid $C_{25}H_{51}COOH$, and other homologues.—(*Build., etc.*) Beeswax, dissolved in turpentine, is applied to wood surfaces, in order to produce a polish on them.

beetle (*Textiles*). A machine consisting of a row of wooden hammers which fall on a roll of cloth as it revolves. The operation closes the fabric and imparts a soft glossy finish.

beetle (*Tools*). A heavy mallet, or wooden hammer, used for driving wedges, consolidating earth, etc. Also called a MALL or MAUL.

beetle-head (*Civ. Eng.*). See **monkey.**

Beetle (*Plastics*). A proprietary thermosetting plastic of the urea-formaldehyde type; tensile strength 8000-10,000 lb. per sq. in.; important dielectric qualities.

beetle (*Zool.*). A member of the insectan order *Coleoptera*.

beetle-stones (*Min.*). Coprolitic nodules akin to septaria which, when broken open, give a fancied resemblance to a fossil beetle.

be'ga (*Elec. Eng.*). A prefix used to denote 10^9 times; e.g. a *begohm* is 10^9 ohms.

beha'viourism (*Psychol.*). A school of thought, founded by J. B. Watson, which bases its doctrine solely on objective observation and experiment, denying the validity of all subjective phenomena, such as sensation, emotion, mind, consciousness, will, imagery, etc.

Beilby layer (*Chem.*). A microcrystalline or amorphous layer formed on the surface of metals by polishing.

bel (*Elec. Comm.*). A unit ten times the size of the more frequently used *decibel* (q.v.).

bel'emnite (*Geol.*). An extinct Cephalopod, similar to an Octopus in appearance. The portion commonly found as a fossil, for example in the Lias, is the 'guard,' which has the shape and often the size of a rifle bullet.

Belemnite Marls (*Geol.*). Calcareous clays characterised by the occurrence of plentiful belemnites, occurring in the English Chalk. See **Plenus Marls.**

bel'emnoid (*Zool.*). Dart-shaped.

Belfast truss (*Carp.*). A timber bowstring truss having a double bow rafter and a double tie connected by a lattice of cross-members, with a bituminous felt or corrugated iron roof-covering.

belfry (*Build.*). A tower, either detached or forming part of a building, containing suspended bells.

Belgian block pavement (*Civ. Eng.*). A *block pavement* (q.v.) formed of stones about 3 × 6 × 10 in.

Belgian truss (*Eng.*). See **French truss.**

Belitzski's reducer (*Photog.*). A simple reducer of contrast, based on ferric oxalate.

bell. A sound-emitting metal device, operated by striking. The emitted sound is characterised by overtones which vary slightly during the decay of the sound and are not exact multiples of the lowest or hum tone.

See **alarm— night—**
electric— trembler—
magneto—

bell (*Met.*). See **cone.**

bell (*Plumb.*). See **socket.**

bell, air (*Photog.*). See **air bells.**

bell-and-spigot joint (*Civ. Eng.*). The American equivalent for *spigot-and-socket joint* (q.v.).

bell centre punch (*Eng.*). A centre punch whose point is automatically located centrally on the end of circular work by a sliding hollow bell-shaped guide.

bell chuck (*Eng.*). See **cup chuck.**

bell-crank lever (*Eng.*). A lever consisting of two arms, generally at right-angles, with a common fulcrum at their junction.

bell gable (*Build.*). A gable built above the roof in a church having no belfry, and pierced to accommodate a bell.

bell metal (*Met.*). High tin bronze, containing up to 30% tin and some zinc and lead. Used in casting bells.

bell-metal ore (*Min.*). See **stannite.**

bell-push (*Elec. Eng.*). A switch, in the form of a push-button, for operating an electric bell.

bell transformer (*Elec. Eng.*). A small transformer used for obtaining, from the public power-mains, low-voltage ringing current for house trembler-bells.

Bell receiver (*Teleph.*). The normal telephone receiver, invented by Alexander Graham Bell. Its action depends on the varying pull on a magnetic diaphragm when currents are passed through windings on the pole-tips of a permanent magnet.

Bell's law (*Zool.*). Motor nerve-fibres are without sensory function, while sensory nerve-fibres are equally unable to cause action in any peripheral part.

Bell's palsy (*Med.*). Paralysis of the muscles of the face, due to an affection of the peripheral part of the seventh cranial nerve.

belladonna (*Chem.*). See **atropine.**

Bellini's ducts, bel-ē'ni (*Zool.*). In the Vertebrate kidney, ducts formed by the union of the primary collecting tubules and opening into the base of the ureter at the pelvis of the kidney.

Bellini-To'si antenna (*Radio*). A directional antenna comprising two crossed loops. The direction of maximum reception is controlled by a goniometer, which varies the relative couplings of the receiver to the two loops.

bellows (*Photog.*). The flexible connexion between parts of a camera, necessarily light-tight, to permit delicate adjustments, usually of focusing. *

belly (*Leather*). The underside of a tanned skin or hide; used for shoe-linings, straps, purses, etc.

belly (*Typog.*). That side of a type-letter which bears the nick; placed uppermost in the setting-stick by the compositor.

belt (*Eng.*). An endless strip of leather or rubber-impregnated fabric, used to transmit rotary motion from one shaft to another by running over pulleys having flat or grooved rims.

belt or **belt course** (*Masonry*). A projecting course of stones or bricks.

belt conveyor (*Eng.*). See **band conveyor.**

belt creep (*Eng.*). A gradual movement of a belt relative to the face of the pulley on which it runs; caused by the change in the stretch of the belt as it passes from the tight to the slack side of the pulley.

belt dressing (*Eng.*). Substances used to prolong the life and improve the frictional grip of belting.

belt drive (*Eng.*). The transmission of power from one shaft to another by means of an endless belt passing around a pulley on each shaft.

belt fastener (*Eng.*). A connecting piece used to join together the ends of a driving belt.

belt fork or **belt striker** (*Eng.*). Two parallel prongs attached at right-angles to a sliding rod, used to slide a flat belt from a fast to a loose pulley, or vice versa.

belt leakage (*Elec. Eng.*). A leakage flux occurring in slip-ring induction motors when a primary phase group overlaps two secondary phase groups. The term is sometimes used to include the other forms of leakage, e.g. zig-zag leakage, occurring in the air-gap.

belt slip (*Eng.*). The slipping of a driving belt on the face of a pulley, due to insufficient frictional grip to overcome the resistance to motion offered by pulley or belt.

belt striker (*Eng.*). See **belt fork.**

belt transect (*Bot.*). A rectangular strip of ground marked out more or less permanently, so that its vegetation may be mapped and studied.

Belt (or Beltian) Series (*Geol.*). A great thickness (perhaps 40,000 ft.) of younger Pre-Cambrian rocks occurring in the Little Belt Mts., Montana, Idaho, and British Columbia. Argillaceous strata predominate, accompanied by algal limestones. Comparable with the Grand Canyon Series in Colorado and the Uinta Quartzite Series in the Uinta Mts.

Belt's corpuscle or **Beltian body** (*Bot.*). A small, orange-yellow, pear-shaped body, consisting of thin-walled cells filled with protein and oil, formed on leaflets of the bull's-horn thorn, and serving as food for ants.

belted-type cable (*Cables*). In this there are three conductors, each insulated with oil-impregnated paper. The triangular interstices are filled with paper packing, and a belt of paper surrounds the whole. A lead sheath surrounds the complete assembly. Used up to 11 kV.

belting (*Eng.*). A general term descriptive of materials from which driving belts are made; e.g. leather, cotton, balata, woven hair, etc.

bel'vedere (*Build.*). A room from which to view scenery; it is built for this purpose on the top of a house, the sides being either open or glazed.

Bembridge Beds (*Geol.*). A group of cream-coloured, fresh-water limestones (the Bembridge Limestone) and greenish clays and marls (the Bembridge Marls), also of fresh-water origin in the main, of Oligocene age, occurring in the Isle of Wight.

Bence-Jones protein (*Chem.*). A peculiar protein found occasionally in the urine. It has characteristic properties in respect of its solubility, precipitation, and coagulation.

bench (*Carp., etc.*). A table for the support of material in process of being worked.

bench (*Civ. Eng.*). See **berm.**

bench or **retort bench** (*Gas*). The name applied to a complete plant for the manufacture of coal-gas.

bench (*Mining*). In a metal mine, a long horizontal face or ledge of ore in a stope or working-place.

bench hook (*Carp.*). A flat piece of wood having a wooden block at the back edge of the top and a similar block fixed on the underside along the front edge, used to steady the work and prevent injury to the bench top.

bench mark (*Surv.*). A fixed point of reference for use in levelling, the reduced level of the point with respect to some assumed datum being known. See **Ordance Bench Mark.**

bench plane (*Join.*). A plane for use on flat surfaces. See **jack plane, smoothing plane, trying plane.**

bench screw (*Carp.*). The vice fixed at one end of a bench.

bench stop (*Carp.*). A metal stop, adjustable for height, set in the top of a bench, at one end; used to hold work while it is being planed.

bench work (*Carp., Eng.*). Work executed at the bench with hand tools or small machines, as distinct from that done at the machines.—(*Eng.*) Small moulds made on a bench in the foundry.

benched foundation (*Build., Civ. Eng.*). A foundation which is stepped at the base in order to safeguard against sliding on sloping sites.

benching (*Civ. Eng.*). Concrete sloped up from the concrete-bed foundation on which a pipe-line rests; it slopes up to the sides of the pipe, and gives support along the whole of its length, and to some extent laterally.

benching iron (*Surv.*). A small steel plate sometimes used to provide a solid support for the staff at a change point. It is formed usually of a triangular plate, with the corners turned down so that they may be driven into the ground surface to fix the plate in position, while the staff rests upon a raised central portion.

bend (*Eng., Elec. Eng.*). A short length of tubing or conduit used to connect the ends of two adjacent straight lengths which are at an angle to one another.

See **half-normal—** **sharp—**
normal—

bend (*Leather*). The half of a butt which has been divided longitudinally.

bending iron (or **pin**) (*Plumb.*). A tool for straightening or expanding lead pipe.

bending moment (*Eng.*). The *bending moment* at any imaginary transverse section of a beam is equal to the algebraic sum of the moments of all the forces to either side of the section.

bending of strata (*Geol.*). See **folding** (*Geol.*).

bending test (*Eng*). (1) A test made on a beam to determine its deflection under load.—(2) A forge test in which flat bars, etc. are bent through 180° as a test of ductility.

bends, the (*Med.*). See **caisson disease.**

benitoite, ben-ĕ'tō-īt (*Min*). A strongly dichroic mineral, varying in tint from sapphire blue to colourless, discovered in San Benito Co., California. Silicate of barium and titanium.

benk (*Mining*). The place underground where coal is being broken from the face of the coal seam. Cf. *stope* in ore mining. See **stall.**

Bennettita'les (*Bot.*). A small group of extinct plants, chiefly found in Mesozoic rocks. The plants had some points of likeness to Cycads, and may have been related to the ancestors of the Angiosperms.

Benson boiler (*Eng.*). A high-pressure boiler of the once-through type in which water is pumped successively through the various elements of the heating surface, firing being by gas, oil, or pulverised coal.

bent gouge (*Carp.*). A curved gouge for hollowing out concave work.

bent knees (*Vet.*). Flexion of the carpus of horses or dogs due to permanent contraction of the flexor tendons or to chronic arthritis.

bent-tail carrier (*Eng.*). A *lathe carrier* (q.v.) having a bent shank projecting into, and engaged by, a slot in the driving plate or chuck.

benthon, benthos (*Ecol.*). Collectively, the sedentary animal and plant life living on the sea bottom; cf. *nekton, plankton.*—*adj.* **benthic.**

ben'thopot'amous (*Ecol.*). Living on the bottoms of rivers and streams.

Benton Group (*Geol.*). A series of estuarine shales with an intercalation of marine limestones, the former containing abundant fish remains from which the oil stored in the porous members of the group was probably derived. Typically developed in Colorado, Texas, and Dakota; of Coloradoan (Turonian) age.

bentonite (*Geol.*). A valuable clay, similar in its properties to fuller's earth, formed by the decomposition of volcanic glass, under water. Consists largely of montmorillonite.

benzal chloride (*Chem.*). $C_6H_5{\cdot}CHCl_2$, b.p. 207° C. A chlorination product of toluene, intermediate for the production of benzaldehyde. Synonym, BENZYLIDENE CHLORIDE.

benzal'dehyde (*Chem.*). Oil of bitter almonds. $C_6H_5{\cdot}CHO$, m.p. 13° C., b.p. 179° C., sp. gr. 1·05, a colourless liquid, with the aromatic odour of bitter almond oil, soluble in alcohol, ether, slightly in water.

benzaldox'imes (*Chem.*). $C_6H_5{\cdot}CH{:}N{\cdot}OH$, formed from benzaldehyde and hydroxylamine; there are two stereo-isomeric forms. The *alpha* or *anti*-form, m.p. 35° C., can be transformed by means of acids into the *beta* or *syn*-form, m.p. 125° C.

benzam'ide (*Chem.*). $C_6H_5{\cdot}CO{\cdot}NH_2$, the amide of benzoic acid, obtainable from benzoyl chloride and ammonia or ammonium carbonate; lustrous plates, m.p. 130° C.

benzan'ilide (*Chem.*). $C_6H_5{\cdot}CO{\cdot}NHC_6H_5$, colourless plates, m.p. 158° C.; the anilide of benzoic acid, obtained from aniline and benzoic acid or benzoyl chloride.

benzene (*Chem.*). C_6H_6, m.p. 5° C., b.p. 80° C., sp. gr. 0·879; a colourless liquid, soluble in alcohol, ether, acetone, insoluble in water. Produced from coal-tar and coke-oven gas; can also be synthesised from open-chain hydrocarbons. Basis for benzene derivatives. A solvent for fats, resins, etc.; very inflammable. Benzene is the simplest member of the aromatic series of hydrocarbons. See **benzol.**

benzene carboxylic acids (*Chem.*). Aromatic acids originating from benzene.

benzene formula (*Chem.*). The generally recognised formula for benzene, which takes account of all its characteristics, has been established by Kekulé. It represents a closed chain of six carbon atoms, to each of which a hydrogen atom is attached, the carbon atoms being linked together alternately by single and by double bonds.

benzene hydrocarbons (*Chem.*). Homologues of benzene of the general formula C_nH_{2n-6}.

benzene nucleus (*Chem.*). The group of six carbon atoms which, with the hydrogen atoms, form the benzene ring. Substituent **alkyl radicals** are spoken of as *side chains* (q.v.).

benzene ring (*Chem.*). See **benzene formula.**

benzene-sulphonic acids (*Chem*). Aromatic acids formed from compounds of the benzene series by sulphonation. The acid characteristics are given by the group $-SO_3H$. Important intermediates for dyestuffs.

ben'zidine (*Chem.*). Di-*p*-diamino-diphenyl, $NH_2{\cdot}C_6H_4\,C_6H_4{\cdot}NH_2$, m.p. 127° C. White to pinkish crystals, soluble in alcohol, ether, insoluble in water. It is a diacid base and a derivative of *diphenyl* (q.v.). Important intermediate for azo-dyestuffs.

benzidine transformation (*Chem.*). The transformation of benzene-hydrazo-compounds into benzidine derivatives by the action of strong acids.

benzil (*Chem.*). $C_6H_5{\cdot}CO{\cdot}CO{\cdot}C_6H_5$, m.p. 95° C, large six-sided prisms, a diketone of the diphenyl group. Synonyms, DIBENZOYL or DIPHENYL-GLYOXAL.

benzine (*Chem.*). Petroleum hydrocarbons.

benzo'ic acid (*Chem.*). $C_6H_5{\cdot}COOH$, m p. 121° C, b.p. 250° C., colourless glistening plates or needles, sublimes readily, volatile in steam.

benzoin (*Chem.*). $C_6H_5{\cdot}CHOH{\cdot}CO{\cdot}C_6H_5$, m.p. 137° C., colourless prisms, a condensation product of benzaldehyde. It is both a secondary alcohol and a ketone and can react accordingly.

benzol, benzole (*Fuels*). The trade name for crude *benzene* (q.v.); used as a motor spirit, generally mixed with petrol, and valued for its anti-knock properties.

benzol scrubber (*Chem.*). A device for washing gases and absorbing the benzol contained therein by means of a high-boiling mineral oil.

benzonitrile (*Chem.*). $C_6H_5{\cdot}CN$, b.p. 191° C., the *nitrile* (q.v.) of benzoic acid.

benzophenone (*Chem.*). Diphenyl ketone, $C_6H_5{\cdot}CO{\cdot}C_6H_5$, m.p. 49° C., b.p. 307° C., colourless prisms, soluble in alcohol and ether. It is dimorphous, m.p. of the unstable modification 26° C.

benzoquinones (*Chem.*). $C_6H_4O_2$, homologues of the quinone group (see **quinones**). *p*-Benzoquinone, m.p. 116° C., yellow needles of pungent odour. *o*-Benzoquinone, isomer of the *para*-compound, an unstable compound.

benzoyl chloride (*Chem.*). C_6H_5COCl, a colourless liquid, of pungent odour, b.p. 198° C., obtained by the action of PCl_5 on benzoic acid, technically prepared by chlorinating benzaldehyde.

benzyl alcohol (*Chem.*). $C_6H_5{\cdot}CH_2{\cdot}OH$, a colourless liquid, b.p. 204° C., the simplest homologue of the aromatic alcohols.

benzyl'amine (*Chem.*). $C_6H_5{\cdot}CH_2{\cdot}NH_2$, colourless liquid, b.p. 183° C., a primary amine of the aromatic series.

benzyl chloride (*Chem.*). $C_6H_5{\cdot}CH_2Cl$, colourless liquid, b.p. 178° C., obtained by the action of chlorine on boiling toluene. Intermediate for benzyl derivatives.

benzyl'idene chloride (*Chem.*). *Benzal chloride* (q.v.).

ber'berine (*Chem.*). $C_{20}H_{17}O_4N,H_2O$, chief alkaloid present in *Hydrastis*, having no marked physiological properties. Also known as XANTHOPICRITE and JAMAICIN.

Bere'a Sandstone (*Geol.*). An irregularly distributed sandstone containing brine and oil, occurring as the basal member of the Mississippian in Ohio and Michigan; replaced southwards in Kentucky by the Chattanooga Shale.

Bergmann's law (*Zool.*). In warm-blooded animals, southern forms are smaller than closely-related northern forms.

ber'iber'i (*Med.*). A disease due to deficiency of vitamin B_1 in the diet; characterised by neuritis and by oedema of the heart.

Berkefeld filter (*San. Eng.*). An apparatus for the domestic filtering of water; the latter is passed through a special diatomaceous earth called kieselguhr.

Berlese's organ, bār-lā'ze (*Zool.*). In some *Hemiptera*, a small hollow rounded body opening by a longitudinal incision on the fourth sternum, and functioning as a copulatory pouch to receive spermatozoa discharged during coition.

Berlin blue (*Dec.*). Prussian Blue.

Berlin wool (*Woollen*). Soft bright-coloured yarns used for hand-knitting; generally made in 4- and 8-ply.

berm (*Civ. Eng.*). A horizontal ledge on the side of an embankment or cutting, to intercept earth rolling down the slopes, or to add strength to the construction. Also called a BENCH.

berm ditch (*Civ. Eng.*). A channel cut along a berm to drain off excess water.

Bernoulli's theorem, ber-noo'lē (*Phys.*). Along any one streamline in a moving fluid, the total energy per unit mass is constant, being made up of P, the potential energy, $\frac{p}{\rho}$, the pressure energy (p being the pressure and ρ the density), and $\frac{1}{2}v^2$, the kinetic energy (v being the velocity).

Beroidea, ber-ō-id'e-a (*Zool*). An order of *Nuda*, having a conical or ovoid body, compressed in the stomodaeal plane, and a large mouth and stomach.

berry (*Bot.*). A fleshy fruit, without a stone, usually containing many seeds embedded in pulp. It is called *bacca* when formed from an inferior ovary, *uva* when formed from a superior ovary.

berry (*Zool.*). (1) The eggs of Lobster, Crayfish, and other macruran *Crustacea*.—(2) Part of the bill in Swans.

Berry transformer (*Elec. Eng.*). A form of shell-type transformer, in which the iron core is designed in roughly cylindrical shape.

Berthelot's calorimeter, bert'lō (*Heat*). An instrument used by Berthelot for measuring the latent heat of vaporisation of liquids. The liquid was boiled in a vessel fitted with an outlet tube, which passed vertically down through the liquid and was connected to a condensing spiral immersed in water in the calorimeter.

bert'randite (*Min.*). A rare hydrated silicate of beryllium, described (from a locality near Nantes, France) by E. Bertrand.

Berycomor'phi (*Zool.*). An order of *Neopterygii* possessing spiny finrays, with the pelvic fins placed far forward on the body and provided with unusually numerous rays. Soldier-fish, Pine-cone-fish, etc.

beryl (*Min.*). A silicate of beryllium and aluminium, occurring in pegmatites as beautiful hexagonal crystals of blue, yellow, or pink colour. Used as gemstones.

beryl'lium or **glu'cinum** (*Chem.*). Symbol, Be. A light steely metallic element in the second group of the periodic system. At. no. 4, at. wt. 9·0, m.p. 1280°-1300°, Brinell hardness 55-60; the pure metal is difficult to prepare. Used as windows in X-ray tubes and in copper alloys where high elasticity and resistance to stresses are required.

beryllium bronze (*Met.*). A copper-base alloy containing 2·25% of beryllium. Develops great hardness (i.e. 300-400 Brinell) after quenching from 800° C. followed by heating to 300° C. (see **temper-hardening**).

beryl'lonite (*Min*). A rare mineral, found at Stoneham, Maine, in decomposed granite, occurring as orthorhombic crystals. Phosphate of beryllium and sodium.

B.E.S.A. Abbrev. for *British Engineering Standards Association*, now *British Standards Institution* (q.v).

Bessemer converter (*Met.*). A barrel-like steel vessel, lined with refractory material and fitted with tuyères through which air may be blown in at the bottom. Used in the Bessemer process.

Bessemer pig (*Met.*). Pig-iron suitable for manufacture of steel by the Bessemer process.

Bessemer process (*Met.*). A process of making steel by blowing air through molten pig-iron and thus oxidising the carbon, manganese, silicon, and phosphorus. See **Bessemer converter, acid process, basic process.**

Best and **Best Best** (*Met.*). See **B, B.B.**

best cokes (*Met.*). A grade of tinplates intermediate between 'coke' plates and common charcoal plates; more heavily tinned than 'coke' plates.

best selected copper (*Met.*). Metal of a lower purity than high-conductivity copper. Generally contains over 99·75% of copper.

beta brass (*Met.*). Copper-zinc alloys, containing 46-49% of zinc, which consist (at room-temperature) of the intermediate constituent (or intermetallic compound) known as β.

beta-ell (*Elec. Comm.*). See **βl.**

beta female (*Zool.*). An abnormal queen ant, with excessively long legs and antennae.

beta iron (*Met.*). A designation (now out of use) previously given to non-magnetic α-iron which exists between 768° and 906° C.

beta particle (*Phys.*). One of the products emitted from the atomic nuclei of radioactive substances during their spontaneous disintegration. β particles have been shown to be electrons moving with velocities up to 99% of the velocity of light.

beta rays (*Phys.*). Streams of beta particles.

be'tafite (*Min.*). A hydrous columbate, niobate, and titanate of uranium; a radioactive mineral, described from Betafo in Madagascar.

betaine, bē'ta-ēn (*Chem.*). Trimethyl-glycocoll, crystallises with 1 molecule of H_2O in large crystals; m.p. of the anhydrous betaine 293° C. with decomposition.

betaine formula (*Chem.*). The betaine formula of amino-acids signifies a cyclic ammonium salt in which the carboxyl of an amino-acid is attached to the trivalent nitrogen of the amino-group.

Bethell's process (*Build.*). A process for preserving timber, which is first dried, then subjected to a partial vacuum within a special cylinder, and finally impregnated with creosote under pressure.

Bethenod-Latour alternator (*Radio*). A high-frequency alternator in which alternating currents in the stator generate currents of higher frequency in the rotor. By repeating the process, frequencies of the order of one hundred kilocycles can be attained in a single machine.

béton, bā-ton^{g} (*Civ. Eng.*). A French term, originally applied to lime concrete, but now used for any kind of concrete.

Betts process (*Met.*). An electrolytic process for refining lead after drossing. The electrolyte is a solution of lead silica fluoride and hydrofluorsilicic acid. Impurities are all more noble than lead and remain on the anode. Gold and silver are recovered from anode sponge.

between perpendiculars (*Ship Constr.*). See **B.P.**

between race (*Bot.*). A race of plants which is intermediate in character between the typical species and one of its well-marked subspecies or varieties.

bevel (*Carp., Join., etc.*). The sloping surface formed when two surfaces meet at an angle which is not a right-angle. See **chamfer.**

bevel (*Elec. Eng.*). See **pole bevel.**

bevel (*Tools*). A light hardwood stock, slotted at one end to take the blade, which is fastened by a clamping screw passing through the stock and the slot in the blade, enabling the latter to be set at any desired angle to the former.

bevel gear (*Eng.*). A system of toothed wheels connecting shafts whose axes are at an angle to one another but in the same plane.

bevelled boards (*Bind.*). Boards intended for covers, with the edges at the head, foot, and fore-edge cut at an angle.

bevelled halving (*Carp.*). A halving joint in which the meeting surfaces are not cut parallel to the plane of the timbers but at an angle, so that when they are forced together, the timbers may not be pulled apart by a force in their own plane.

Beverage antenna (*Radio*). See **wave antenna.**

Bexoid (*Plastics*). A non-thermo-setting plastic of the cellulose acetate type. See **Celastoid.**

bez'el (*Jewel.*). (1) The crown of a finger ring.—(2) The engraved stone in a finger ring.—(*Horol.*) The grooved ring holding the glass of a watch.

bezel (*Tools*). The sloped cutting-edge of a chisel or other cutting tool.

bezoar' (*Vet.*). A ball of hair and vegetable fibre mixed with lime salts and mucus, formed in the stomach of animals; formerly esteemed as a medicine.

B/H curve (*Elec. Eng.*). See **magnetisation curve.**

B/H loop (*Elec. Eng.*). See **magnetic hysteresis loop.**

B.H.P. (*Eng.*). Abbrev. for *brake horse-power* (q.v.).

Bi (*Chem.*). The symbol for *bismuth.*

bi-, bis- (Latin *bis*, twice). A prefix used in the construction of compound terms; e.g. *bicarpellary, biflagellate.*

bi-band (*Teleph.*). A system of telephony using the normal telephone frequency band for transmission in one direction, the corresponding return speech being modulated up to occupy the band next above the normal band.

bi-cable (*Civ. Eng.*). The type of *aerial ropeway* (q.v.) in which there are one or more supporting ropes to carry the loads, and an endless hauling rope to move them.

biartic'ulate (*Bot.*). Having two nodes or joints.

bias (*Teleg.*). The adjustment of a telegraph relay so that it operates for currents greater than a given current (against which it is *biased*), or for a current of one polarity.

See **electrical—** **mechanical—**

bias voltage (*Thermionics*). Generally, the mean potential of any electrode in a thermionic tube, measured with respect to the cathode. Specially applied to that of the control grid.

biased protective system (*Elec. Eng.*). A modification of a balanced protective system, in which the amount of out-of-balance necessary to produce relay operation is increased as the current in the circuit being protected is increased.

biasing transformer (*Elec. Eng.*). A special form of transformer used in one form of biased protective system.

biax'ial crystal (*Crystal.*). A crystal having two optic axes. Minerals crystallising in the orthorhombic, monoclinic, and triclinic systems are *biaxial.* Cf. *uniaxial.*

bib-cock (*Eng.*). A draw-off tap for water-supply, consisting of a plug-cock having a downward curved extension for discharge.—(*Plumb.*) A cock fitted with a nozzle curving downwards, used as a draw-off tap.

bib-valve (*Eng., etc.*). A draw-off tap of the kind used for domestic water-supply; closed by screwing down a leather-washered disc on to a seating in the valve body.

bibrac'teate (*Bot.*). Bearing two bracts.

bical'carate (*Bot.*). Two-spurred.

bicap'sular (*Bot.*). Bearing a capsule consisting of two chambers.

bicar'bonates (*Chem.*). The acid salts of carbonic acid; their aqueous solutions presumably contain the ion HCO'_3.

bicarpel'lary, bicar'pellate (*Bot.*). Said of a gynaeceum made up of two carpels.

bi'ceps (*Zool.*). A muscle with two insertions.—*adj.* **bicip'ital.**

bichro'mate cell (*Elec. Eng.*). A primary cell with a zinc negative and one or more carbon positive electrodes; the electrolyte is dilute sulphuric acid, with potassium bichromate as a depolariser. See **bottle-battery.**

bichromate, potassium (*Chem.*). See **potassium dichromate.**

bichromated gelatine (*Photog.*). Gelatine sensitised with ammonium or potassium bichromate.

bicil'iate (*Bot.*). Bearing two flagella; a better term is *biflagellate.*

bicip'ital (*Zool.*). See **biceps.**

bickern, bick iron (*Eng.*). See **beak iron.**

Bicknell Sandstone (*Geol.*). A sandstone, varying from 500 to 1000 ft. in thickness, occurring in the marine Jurassic succession of the Cordilleran geosyncline; equivalent to the British Bajocian.

bicollat'eral (*Bot.*). Said of a vascular bundle with two strands of phloem, one internal to and one external to the single strand of xylem.

bicol'ligate (*Zool.*). (Of Birds) having the feet provided with two stretches of web.

bicon'ic (*Bot.*). Having the form of two cones placed base to base.

bicon'jugate (*Bot.*). Said of a compound leaf when each of the two main ribs bears a pair of leaflets.

bicre'nate (*Bot.*). Bearing two rounded teeth; not the same as *doubly crenate.*

bicus'pid, bicus'pidate (*Bot.*). Having two short horn-like points.—(*Zool.*) Having two cusps, as the premolar teeth of some Mammals.

Bidder's ganglion (*Zool.*). In some *Salientia*, a nerve-ganglion near the auriculo-ventricular groove.

Bidder's organ (*Zool.*). In some *Salientia*, an aggregation of immature ova, attached to the anterior end of the gonad.

bident'ate (*Bot.*). Having two teeth.

bien'nial (*Bot.*). A plant which arises from seed one year, lives to the next season, and then flowers, sets seed, and dies.

Bier's hyperaemia (*Med.*). Induction of venous congestion of a part by application of an elastic bandage above it.

bifa'cial (*Bot.*). Flattened, and having the upper and lower faces of different structure.

bifa'rious (*Bot.*). Arranged in two rows, one on each side of an axis.

bi'fid (*Bot., Zool.*). Divided half-way down into two lobes: forked.

bifi'lar pendulum (*Phys.*). See **bifilar suspension.**

bifilar suspension (*Phys.*). The suspension of a body by two parallel vertical wires or threads which give a considerable controlling torque. If the threads are of length *l* and are distance *d* apart, the period of torsional vibration of a suspended body of moment of inertia I and mass m is

$$T=4\pi\sqrt{\frac{Il}{mgd^2}}.$$

bifilar winding (*Elec. Eng.*). A form of winding used for making non-inductive resistances; in it two wires carrying current in opposite directions are wound together as a single wire.

biflagellate, bī-flaj′— (*Bot*). Bearing two flagella.

bifo′liate, bifo′liolate (*Bot.*). Said of a compound leaf with two leaflets.

bifur′cate (*Bot., Zool.*). Twice-forked: forked.—*v.* **bi′furcate.**—*n.* **bifurca′tion.**

bifurcated rivet (*Eng.*). A rivet with a split shank, used for holding together sheets of light material; it is closed by opening and tapping down the two halves of the shank.

bifurcating box (*Cables*). A box containing the joints between a twin-core or concentric cable and two single-core cables.

big-end bolts (*Eng.*). See **connecting-rod bolts.**

big head (*Vet.*). Osteomalacia affecting the skull of a horse.

bigem′inal pulse (*Med.*). A pulse in which the beats occur in pairs, each pair being separated from the other by an interval; due to a disturbed action of the heart.

bigem′inate (*Bot.*). In two pairs.

bigener′ic (*Zool.*). (Of hybrids) produced by crossing two distinct genera.

bight (*Naut.*). A loop formed in a rope or chain.

bi′grid valve (*Thermionics*). A four-electrode thermionic tube with two control grids, each having approximately the same control on the anode current. Used as a modulating or mixing valve, or as an amplifier operating with low anode-voltages. See also **space-charge grid.**

bigut′tulate (*Bot.*). Containing two vacuoles or two oil drops.

bila′biate (*Bot.*). With two lips.

bilabiate dehis′cence (*Bot.*). Opening by a transverse split across the top.

bilam′inar (*Zool.*). See **diploblastic.**

bilat′eral (*Med.*). Having, or pertaining to, two sides.

bilateral ′impedance (*Elec. Comm.*). Any electrical or electro-mechanical device in which power can be transmitted in both directions.

bilateral symmetry (*Biol.*). The condition when an organism is divisible into similar halves by one plane only.

bile (*Physiol.*). A viscous liquid produced by the liver. Human bile has an alkaline reaction and possesses a green or golden-yellow colour and a bitter taste. It consists of water, bile salts, mucin and pigments, cholesterol, fats and fatty acids, soaps, lecithin, and inorganic compounds.

bile-ducts (*Zool.*). The excretory ducts of the liver and gall-bladder.

bile pigments (*Physiol.*). The chief are bilirubin (reddish-yellow) and its oxidation product biliverdin (green). Produced by the breakdown of haemoglobin, they consist of an open chain of four substituted pyrrole nuclei joined by two methene ($=$CH—) and one methylene (—CH$_2$—) bridges.

bile salts (*Physiol.*). Sodium salts of the bile acids, a group of hydroxy steroid acids, some unsaturated, condensed with taurine or glycine; commonest are the salts of taurocholic and glycocholic acids; secreted in the bile; very important in aiding absorption of fats from intestine.

bilge (*Ship Constr.*). The space above the double bottom of a ship, into which waste water from the holds and engine-room is drained.

Bilgram valve diagram (*Eng.*). See **valve diagram.**

bilharzi′asis (*Med., Vet.*). Disease due to presence in the body of blood flukes of the family *Schistosomidae*. It affects man, horses, asses, camels, cattle, and sheep.

biliary fever (*Vet.*). A febrile infection of the red blood corpuscles of horses, due to the protozoa *Babesia equi* or *Nuttalia equi.*

bi′licy′anin (*Physiol.*). An oxidation product of bilirubin. It is of a blue colour.

bi′liru′bin (*Physiol.*). A reddish pigment occurring in bile; believed to be formed as a breakdown product of haemoglobin.

bi′liver′din (*Physiol.*). A green pigment occurring in bile. It is an oxidation product of bilirubin.

bill (*Typog.*). A detailed inventory of a fount of type made up to a specified weight, showing the proportionate weights of the letters.

bill of quantities (*Build., Civ. Eng.*). A list of items giving the quantities of material and brief descriptions of work comprised in an engineering or building works contract; it forms the basis for a comparison of tenders.

bill (*Zool.*). In Birds, the beak or rostrum.

billet (*Carp.*). A piece of timber which has three sides sawn and the fourth left round.

billet (*Met.*). An intermediate product in the rolling of steel. It is larger than a *bar* and smaller than a *bloom.* The term is also applied to non-ferrous metals; sometimes means ingots of certain shapes.

billet mills (*Met.*). The rolling-mills used in reducing steel ingots to billets.

billi-condenser (*Radio*). A variable condenser, having a maximum capacity of a few micro-microfarads, used for fine tuning adjustments.

billiard cloth (*Textiles*). Woollen cloth manufactured from finest quality Merino wool, with a special dress-face finish to render it perfectly smooth.

billing (*Build., Civ. Eng.*). The final process in drawing up a bill of quantities, the items abstracted (see **abstracting**) being entered on the *bill of quantities*, together with description.

billion. In America and France, a thousand million, or 10^9. Elsewhere, a million million, or 10^{12}.

bil′litonites (*Min.*). See **tektites.**

biloc′ular (*Bot.*). Consisting of two loculi or chambers.

bilo′phodont (*Zool.*). Having the two anterior and the two posterior cusps of the grinding teeth joined by ridges.

bi′manous (*Zool.*). Having the distal part of the two fore-limbs modified as hands, as in some Primates.

biman′ual (*Med.*). Performed with both hands; e.g. *bimanual* examination of the female genital organs.

bimas′tic (*Zool.*). Having two nipples.

bimetal-fuse (*Elec. Eng.*). A fuse element composed of two different metals; e.g. a copper wire coated with tin or lead.

bimetallic strip (*Elec. Eng., Heat*). A strip made up of two metals having different temperature coefficients, so arranged that the strip deflects when subjected to a change in temperature.

bimolec′ular reaction (*Chem.*). A reaction in which two molecules interact.

bi′morph (*Acous.*). A rigid combination of two Rochelle salt crystals, so arranged that they act as a mechanical transformer between the mechanical force accompanying electrostatic excitation and the lower mechanical impedances, such as telephone diaphragms and loudspeaker mechanisms, which are driven by the device.

bi′nary (*Astron.*). ECLIPSING BINARY, a *double star* (q.v.) whose orbital plane lies so nearly in the line of sight that the components pass in front of each other in the course of their mutual revolution.—SPECTROSCOPIC BINARY, a *double star* (q.v.) whose components are too close to be resolved visually, but which is detected by the mutual shift of their spectral lines owing to their varying velocity in the line of sight.—VISUAL BINARY, a *double star* (q.v.) whose two components may be seen as separate in a telescope of sufficient resolving power.

binary (*Chem.*). Consisting of two components, etc.

binary converter (*Elec. Eng.*). An a.c.-to-d.c. converter in which the stator carries both a 3-phase winding and a d c. exciting winding, while the rotor carries an ordinary commutator winding supplying the d c. terminals.

binary fission (*Biol*) Division of the nucleus into two daughter nuclei, followed by similar division of the cell-body.

binary stars (*Astron.*). See **double stars.**

binary system and **diagram** (*Met.*). The alloys formed by two metals constitute a *binary alloy system*, which is represented by the *binary constitutional diagram* for the system.

binary vapour-engine (*Eng.*). A heat-engine using two separate working fluids, generally mercury vapour and steam, for the high and low temperature portions of the cycle respectively, thus enabling a large temperature range to be used, with improved thermal efficiency.

bi'nate (*Bot.*). Occurring in pairs.

binaur'al (*Acous.*). Pertaining to the use of two ears instead of one. For perception of direction and acoustic perspective the use of two ears is essential, the faculties being lost in a monaural or single-channel system.—(*Med.*) Concerning or using both ears; e.g. *binaural* stethoscope.

binder (*Acous.*). See **binding agent.**

binder (*Agric. Mach.*). A horse-drawn or tractor machine which, in addition to cutting standing corn, gathers it, and forms it into sheaves, which it ties.

binder (*Carp.*). A timber or steel beam supporting the bridging joists in a double or framed floor. Also called a BINDING JOIST.

binder (*Textiles*). In silk-weaving, the tie or stitch used for long floating weft.

binding agent or **binder** (*Acous.*). The basic material of disc records, chiefly shellac, which causes the various materials to adhere together and form, after heating, a solid mass.

binding-beam (*Carp.*). A timber tie serving to bind together portions of a frame.

binding energy (*Chem.*). The energy required to separate the positively and negatively charged parts of an atom or molecule.

binding joist (*Carp.*). See **binder.**

binding screw (*Eng.*). The general name for a set-screw used for clamping two parts together.

binding wire (*Elec. Eng.*). See **tie wire.**

Binet's test, bē-nā (*Psychol.*). A method of testing a child's intelligence by asking standard questions adapted to the intelligence of normal children at various ages. More fully **Binet-Simon test.** (Named from its originators, Alfred Binet and Théodore Simon.) See also **intelligence quotient.**

binocular camera (*Photog.*). A camera with two matched lenses, for making stereoscopic images.

bi'node (*Thermionics*). A three-electrode thermionic tube having one cathode and two anodes. Used for full-wave rectification. Also called DOUBLE-DIODE.

bi'nograph (*Photog.*). The combination of two images in order to obtain an approximation of what the two eyes see together, so giving a pseudo-stereoscopic image.

binomial (or **binominal**) **nomenclature** (*Biol.*). The system (introduced by Linnaeus) of denoting an organism by two Latin words, the first the name of the genus, the second the specific epithet. The two words constitute the name of the species; e.g. *Homo sapiens*; *Bellis perennis*. See **species.**

bino'vular twins (*Med.*). Twins resulting from the fertilisation of two separate ova.

binu'cleolate (*Bot.*). Said of an ascospore containing two oil drops.

bio-aeration (*Sewage*). A system of sewage purification by oxidation; aeration of the crude sewage is effected by passing it through specially designed centrifugal pumps. See also **activated sludge, activation.**

bio-assay (*Pharmacol.*). Determination of the power of a drug or of a biological product by testing its effect on an animal of standard size and weight.

bi'oblast (*Bot.*). A chondriosome.

biocoenosis, —sē-nō'sis (*Ecol.*). The association of animals and plants together, especially in relation to any given feeding area.

biocoeno'sium (*Ecol.*). A community comprising both animals and plants, as in a pond.

biocoenotic, —sē-not'ik (*Ecol.*). Ecological; pertaining to the inter-relationship between the organisms in a community.

bi'ogen (*Bot.*). A hypothetical protein molecule of instable nature which is assumed to be primarily responsible for the phenomena of life.

biogenet'ic law (*Biol.*). The hypothesis that each individual, during its development (ontogeny), repeats in an abbreviated form the history of the development of its race (phylogeny).

bi'ogen'ous (*Bot*). Parasitic.

biological barrier (*Bot.*). Anything due to the activity of organisms which prevents the occupation of an area by plants. Plant communities already present may act as a biological barrier; town-building by man is an extreme example.

biological form, biologic form, biologic species (*Bot.*). A race of a parasitic fungus, quite normal in morphology, but restricted for some physiological reason to one species of host plant, or to a strain of that host plant, which then is also a biologic form of its species.

biological race (*Zool.*). A race occurring within a taxonomic species; distinguished from the rest of the species by slight or no morphological differences, but by evident differences of habitat, food-preference, or occupation.

biological spectrum (*Bot.*) A tabular statement of the percentage frequencies of the various life forms of plants in any given region.

biological type (*Bot.*). See **life form.**

bioluminesc'ence (*Biol.*). The production of light by living organisms, as glow-worms, some deep-sea fish, some bacteria, some fungi.

biom'eter (*Biol.*). An instrument for measuring the amount of life by assessing the respiration.

biom'etry (*Biol.*). Statistical methods applied to biological problems.

bi'on, bi'ont (*Bot.*). An individual plant, independent and capable of separate existence.

bionom'ic (*Biol.*). Relating to the environment; ecological.

bi'ophore (*Bot.*). A hypothetical particle of minute size, assumed to be capable of growth and reproduction.

bi'oplasm (*Biol.*). See **protoplasm.**

bi'opsy (*Med.*). Diagnostic examination of tissue (e.g. tumour) removed from the living body.

bi'os (*Chem.*). A group of substances which act as a growth promoter for yeast. Three components (bios I, IIA, and IIB) are known. See Supplement.

bioscope (*Cinema.*). The early name for *news-reel*, later applied to any film.

bi'ose'ries (*Bot.*, *Zool.*). In evolution, a historical sequence formed by the changes in any one single heritable character.

bio'ta (*Biol.*). The fauna and flora of a given region.

biot'ic (*Biol.*). Relating to life.

biotic adaptation (*Bot.*). A change in form or in habits, presumed to have arisen as a result of competition with other plants.

biotic climax (*Bot.*). A climax community maintained in a stable condition by some biotic factor, e.g. much grassland, which is prevented by grazing from passing into woodland.

biotic factor (*Bot.*). Any activity of living animals or plants which influences the occurrence of plants.

bi'otite (*Min.*). A form of black mica widely distributed in igneous rocks (particularly in granites) as lustrous black crystals, with a singularly perfect cleavage. In composition, it is a complex silicate, chiefly of iron and magnesium, together with potassium and hydroxyl.

biotron (*Radio*). A two-tube amplifying circuit, in which high amplification is obtained by the use of aperiodic regeneration.

bi'otype (*Biol.*). One individual of a population composed of organisms which are genotypically identical, i.e. alike in their inheritable characters.

bi'pack (*Photog*). Two adjacent films with adjacent emulsions, sensitive to different colours and intended to be exposed one through the other.

bip'arous (*Bot.*). Dichasial (see **dichasium**).—(*Zool.*) Giving birth to two young at a time.

bipar'tite (*Bot.*). Divided nearly to the base into two parts.

bipe'dal (*Zool.*). Employing only two limbs for walking.

bipen'niform (*Zool.*). Having the form of a feather of which the sides of the vane are equal in size.

bi-phase— (*Elec. Eng.*). See **two-phase—**.

bipinna'ria (*Zool.*). A pelagic larva of *Asteroidea*, having a ciliated band separated into pre-oral and post-oral loops, and possessing a large pre-oral lobe.

bipin'nate (*Bot.*). Said of a compound pinnate leaf with its main segments pinnately divided.

bipinnat'ifid (*Bot.*). Said of a pinnatifid leaf when its parts are themselves pinnatifid.

bipo'lar (*Zool.*). Having two poles: having an axon at each end, as some nerve cells.

bipolar electrode (*Elec. Eng.*). An electrode in an electro-plating bath which has no connexion to either the anode or cathode; sometimes called a SECONDARY ELECTRODE.

bipolar germination (*Bot.*). Germination of a spore by the formation of two germ tubes, one from each end.

bipp (*Med.*). A paste consisting of one part of bismuth subnitrate, two parts of iodoform, and paraffin; used for dressing wounds.

bi'prism (*Photog.*). A prism with a very obtuse angle, used for beam-splitting.

biprism, Fresnel's *Light*). See **Fresnel's biprism.**

bipyramid (*Crystal.*). A crystal form consisting of two pyramids on a common base, the one being the mirror-image of the other. Each pyramid is built of triangular faces, three, four, six, eight, or twelve in number. See **pyramid.**

bira'dial symmetry (*Zool.*). The condition in which part of the body shows radial, part bilateral symmetry; as in *Pleurobrachia* and other *Ctenophora.*

bira'mous (*Zool.*). Having two branches; forked, as some Crustacean limbs.

birch (*Timber*). A close-grained hard-wood from the birch tree. It takes a high polish, and is much favoured by cabinet-makers.

bird fever (*Vet.*) See **cholera (fowl, duck).**

bird pest (*Vet.*). See **fowl plague.**

birdseye (*Mining*). Mixed screened anthracite passing a half-inch, but retained on an eighth-inch screen. May be subdivided into *buckwheat*, *rice*, and *barley*.

bird's-eye grain (*Bot.*). The appearance when worked timber shows large numbers of small circular areas dotted about the wood; the rings are due to small almost dormant buds, which give rise to thin cylindrical strands of soft tissue lying almost horizontally in the trunk, appearing circular when cut across.

bird's-eye view (*Surv.*). An oblique *aerial photograph* (q.v.) taken for purposes of topographical survey or town-planning work.

bird's-mouth (*Carp.*). A re-entrant angle cut into the end of a timber, so as to allow it to rest over the arris of a cross timber.

bi'refrin'gence (*Min.*). Literally, the double bending of light by crystalline minerals, causing in extreme cases (e.g. calcite) two images of any object viewed through the mineral. The difference between the greatest and the least refractive index for light passing through a mineral is a measure of its birefringence.

Birkeland and Eyde furnace (*Elec. Eng.*). An electric-arc furnace used for the fixation of nitrogen; the arc, between water-cooled copper electrodes, is drawn out to a circular shape by an arrangement of electromagnets.

Birkhill Shales (*Geol.*). A division of the Moffat Shales, of Lower Silurian age; characterised by a fauna of graptolites. So named (by Prof. C. Lapworth) from a locality in the Southern Uplands of Scotland.

Birmingham Wire Gauge. A system of designating the diameters of rods and wires by numbers, ranging from 4/0 (0·454 in.) to 36 (0·004 in.).

birotation (*Chem.*). See **mutarotation.**

birth control (*Sociology*). The regulation of offspring by any of several methods, viz., abstinence from or incompletion of intercourse, mechanical or chemical contraception, sterilisation, abortion, exposure, infanticide, hormone control.

birth-mark (*Med.*). See **naevus.**

birth pore (*Zool.*). In some *Platyhelminthes*, the uterine opening when that is distinct from the vaginal opening: in rediae of *Trematoda*, the opening by which daughter rediae escape.

bi'sac'cate (*Bot.*). Having two sepals each with a small pouch at the base.

bis-azo dyes (*Chem.*). See **disazo dyes.**

Bischof process (*Chem.*). A process of making white lead by a quicker method than the stack process.

biscuit (*Acous.*). The unit size of record stock, which is heated and placed between two stampers in the pressing machine, two biscuits for a ten-inch record and three for a twelve-inch record.

biscuit (*Pot.*). The term applied to pottery, after firing in a biscuit-oven but before glazing.

biscuit-oven (*Pot.*). A kiln in which clay articles are baked before glazing.

bise, bēz (*Meteor.*). A dry winter wind blowing from the northern sector in the mountains of southern France.

bi'sect (*Bot.*). A drawing showing the profiles of the shoots and roots of plants growing in their natural positions.

bise'riate (*Bot.*). (1) In two rows.—(2) In a double series, as the ascospores in many asci.—(3) A vascular ray two cells wide.

bisex'ual (*Bot., Zool.*). Possessing both male and female sexual organs. See **hermaphrodite.**

Bismarck brown (*Chem.*). A brown dye stuff obtained by the action of nitrous acid on *m*-phenylenediamine. It contains triamino-azobenzene, $H_2N{\cdot}C_6H_4{\cdot}N{:}N{\cdot}C_6H_3(NH_2)_2$, and a more complex disazo compound, $C_6H_4{:}[N{:}N{\cdot}C_6H_3(NH_2)]_2$.—(*Paint.*) A mixture of six parts of black, one of orange and one of yellow.

bismite (*Min.*). See **bismuth ochre.**

bismuth (*Chem.*). Symbol, Bi. A grey-white metallic element in the fifth group of the periodic system. At. no. 83, at. wt. 209·0, sp. gr. 9·72-9·83, m.p. 271°. The metal is used as a component of fusible alloys with lead.

bismuth glance (*Min.*). See **bismuthinite.**

bismuth hydride (*Chem.*). BiH_3. Volatile, unstable compound. Also called BISMUTHINE.

bismuth ochre (*Min.*). Trioxide of bismuth, occurring as shapeless masses or as an earthy deposit. Also called BISMITE.

bismuth spiral (*Elec. Eng.*). A flat coil of bismuth wire used in magnetic flux measurements; the change of flux is measured by observing the change in resistance of the bismuth wire, which increases with increasing fields.

bismuth trichloride (*Chem.*). $BiCl_3$. Formed by the direct combination of chlorine and bismuth. Treated with an excess of water, it forms bismuth oxychloride, BiOCl, sometimes used as a pigment under the name of PEARL WHITE.

bismuth trioxide (*Chem.*). Bi_2O_3. Formed when bismuth is heated in air or when the hydroxide, carbonate, or nitrate is calcined. Forms three hydrates which have no acidic properties and do not combine with bases to form salts. It has marked basic properties.

bis'muthine (*Chem*). See **bismuth hydride.**

bismuth'inite (*Min.*). Sulphide of bismuth, rarely forming crystals, commonly occurring in shapeless lead-grey masses with a yellowish tarnish. Also called BISMUTH GLANCE.

bis'mutite (*Min.*). An amorphous form of bismuth carbonate, occurring as a rare natural mineral.

bi'sphe'noid (*Min.*). A crystal form consisting of four faces of triangular shape, two meeting at the top and two at the base in chisel-like edges, at right-angles to one another; hence the name, meaning 'double edged.'

bisporan'giate (*Bot.*). Said of a strobilus which consists of megasporophylls and microsporophylls, with megasporangia and microsporangia.

bisque oven, bisk (*Pot.*). The same as ***biscuit-oven.***

bis'sagen'ous (*Zool.*). Pertaining to, or occurring in, the byssus gland of Molluscs.

bis'tournage (*Vet.*). The castration of bulls by torsion of the spermatic cord.

bis'toury (*Med.*). A long, narrow surgical knife for cutting abscesses, etc.

bistre (*Dec.*). A pigment consisting of wood-soot ground in oil; or five parts of black, one of red, tinged with green.

bisul'cate (*Bot.*). Marked by two furrows.

bisul'phites (*Chem.*). Acid salts of sulphurous acid. Used as preservatives and as a source of sulphur dioxide. See also **sulphurous acid.**

bisymmet'ric (*Bot.*). Symmetrical in two planes at right-angles to one another.

bisyn'chronous motor (*Elec. Eng.*). A motor similar to an ordinary synchronous motor but capable of being made to run at twice synchronous speed.

bit (*Mining*). (1) In Britain, the cutting edge of a length of steel (the borer) used in rock drilling.—(2) In America, the entire length of the borer, including shank, steel, and bit.

bit (*Tools*). (1) A boring tool which fits into the socket of a brace, by which it is rotated.—(2) The cutting-iron of a plane.—(3) The copper head of a soldering iron.

bit gauge (*Tools*). See **bit stop.**

bit-stock (*Carp.*). See **brace.**

bit stop (*Tools*). An attachment to a bit which limits drilling or boring to a given depth. More correctly BIT GAUGE.

bitch (*Build., Carp., etc.*). A kind of *dog* (q.v.) in which the ends are bent so as to point in opposite directions.

biter'nate (*Bot.*). Divided into three parts, themselves divided ternately.

bitter almond oil (*Chem.*). *Benzaldehyde* (q.v.); also occurs naturally in *almond oil* (q.v.).

bitter spar (*Min.*). The name sometimes applied to the mineral dolomite, the carbonate of calcium and magnesium.

bittern (*Chem.*). The residual liquor remaining from the evaporation of sea water, after the removal of the salt crystals.

bitty (*Paint.*). Paint or varnish containing small pieces of skin, or lumpy, insufficiently ground material.

bit'umen (*Chem.*). The non-mineralised substances of coal, lignite, etc., and their distillation residues.

bitumen process (*Photog.*). See **asphalt process.**

bitumen varnishes (*Diel.*). These contain asphalts, driers, benzine.

bitu'minous carpeting (*Civ. Eng.*). A road surface formed of stone chippings bound together with bitumen.

bituminous coals (*Fuels*). Long-flame coals, containing a high proportion of volatile hydrocarbons; generally classed as *caking* and *non-caking.*

bituminous paint (*Paint.*). Paint in which the base is bitumen instead of the more common lead- or zinc-oxides.

bituminous plastics (*Plastics*). Compositions made from natural bitumens (e.g. Trinidad and gilsonite), petroleum pitches, or certain types of coal-tar pitch, along with a suitable filler; used for accumulator cases, where non-absorbent acid-resisting material is required, door furniture, and electrical accessories. Cold-moulded plastics are made by adding a drying oil, e.g. linseed oil.

bituminous shale (*Mining*). Shaly sandstone or *blaes* (q.v.).

bi'uret' (*Chem.*). $NH_2{\cdot}CO{\cdot}NH{\cdot}CO{\cdot}NH_2$, colourless needles, crystallises with 1 molecule of H_2O; m.p. of the anhydrous compound 190° C. It is formed from urea at 150°-170° C. with liberation of NH_3.

biuret reaction (*Chem.*). The alkaline solution of biuret gives a reddish-violet coloration on the addition of cupric sulphate. As biuret is readily formed from urea, this reaction serves to identify the latter.

biva'lent, bi— (*Cyt.*). One of the pairs of homologous chromosomes present during meiosis.

bivalent (*Chem.*). See **divalent.**

bi'valve (*Zool.*). Having the shell in the form of two plates, as *Pelecypoda.*

biva'riant (*Chem.*). Having two degrees of freedom.

biven'tral (*Zool.*). (Of muscles) having the ends broad and contractile and joined by a narrow tendon in the middle.

biv'ium (*Zool.*). In *Echinodermata,* the two rays between which the madreporite occurs.

bivol'tine (*Zool.*). Having two broods in each year.

B.L. guns (*Artillery*). Breech-loading guns. These may be either guns or howitzers. The propellant charge is usually contained in a bag of shalloon or silk cloth. See **Q.F. guns.**

black.

See **bone—** **ivory—**
carbon— **lamp—**
gas— **platinum—**

black (*Eng.*). Of parts of castings and forgings not finished by machining; it refers to the dark coating of iron-oxide retained by the surface.

black (*Photog.*). Incapable of reflecting light, and therefore not causing the perception of colour.

black (*Typog.*). A blemish on a printed sheet caused by a space or lead which has risen to the height of type.

black-band iron-ore (*Met., Min.*). A carbonaceous variety of clay-ironstone, the iron being present as carbonate, chalybite (or siderite); occurs in the English Coal Measures.

black body (*Phys.*). A body which, when raised to incandescence, emits a continuous spectrum of light rays, approximated to by carbon and tungsten.

black-body radiation (*Phys.*). The quality and quantity of the radiation, depending solely on its temperature, which is emitted by an ideal 'black body,' that is, one which has no reflecting power but an absorptive power of unity. Such radiation is also emitted from the inside of a cavity. See **Stefan-Boltzmann law, Wien's displacement law.**

black-body temperature (*Phys.*). The temperature at which a 'black body' would emit the same radiation as is emitted by a given radiator at a given temperature. The *black-body temperature* of a carbon-arc crater is about 3500° C., whereas its true temperature is about 4000° C.

black concentrate (*Mining*). The mixture of amalgam gold and magnetite obtained from behind the riffles in a gold sluice.

black copper (*Met.*) The product of the direct reduction of oxidised copper ores in the blast-furnace.

black damp (*Mining*). Carbon dioxide. Actually, air in which the oxygen has been replaced by carbon dioxide as the result of explosion or combustion. Invisible; causes suffocation. See **firedamp.**

black diamond (*Min.*). A variety of crystalline carbon, related to diamond, but showing no crystal form. Highly prized, on account of its hardness, as an abrasive. Occurs only in Brazil. Also called CARBONADO.

black Egyptian ware (*Pot.*). See **basalte.**

black fever (*Med.*). See **kala-azar, Rocky Mountain fever.**

black glass (*Photog.*). An opaque glass, the absorption being due to compounds of manganese and iron.

blackhead (*Vet.*). See **trichomoniasis.**

black-heart malleable cast-iron (*Met.*). See **malleable cast-iron.**

black jack (*Min.*). A popular name for the mineral sphalerite or zinc-blende. See **blende.**

black japan (*Dec.*). A semi-transparent, quick-drying black varnish.

black lava glass (*Min.*). Massive natural glass of volcanic origin occurring at Mt. Hecla, Iceland, Lipari Is., Yellowstone Park, and elsewhere. Jet-black in colour, and vitreous in lustre like glass.

black lead. A commercial form of *graphite* (q.v.).

blackleg (*Vet.*). An acute infection of cattle and sheep due to *Clostridium chauvei* or *Clostridium septique*; usually characterised by crepitant swelling in the muscles of the infected part.

black letter (*Typog.*) A term including Old English, Gothic, and **Tudor Black.**

black-level (*Television*). That percentage of the maximum amplitude possible in a television signal which corresponds to black in the transmitted picture, a less amplitude being concerned with synchronising. Usually between 30% and 40% in a positive video-signal.

black malt (*Brew.*). Malt that has been coloured by the special method of kilning; the colour of stout is due to the proportion of black malt forming the grist.

black mortar (*Build.*). Mortar containing smith's ashes in place of sand; used for pointing walls.

black opal (*Min.*). All opals of dark tint are termed *black opal*, although the colour is rarely black; the fine Australian blue opal, with flame-coloured flashes, is typical.

blackquarter (*Vet.*). See **blackleg.**

black sand (*Foundry*). A mixture of sand and powdered coal forming the floor of an iron foundry.

black tellurium (*Min.*). A rare grey metallic mineral, a sulpho-telluride of gold and lead with some antimony.

black tongue (*Vet.*). A nutritional disease of dogs, similar to human pellagra.

blackwater (*Vet.*). See **Texas fever.**

Black amplifier (*Elec. Comm.*). An amplifier (invented by Black) with reversed retroaction for degeneration.

Black's test (*Chem.*). A test for β-hydroxybutyric acid in urine, based upon the oxidation of this acid to diacetic acid, which can be recognised by the ferric chloride test.

Blackdown Beds (*Geol.*). Coarse sands, with concretions of sandstone, capping the Blackdown Hills to the south of Wellington, Somerset. They belong to the Upper Greensand and are famous for the beautifully preserved silicified fossils they contain.

blackening (*Illum.*). A phenomenon which occurs with electric filament lamps and results in a blackening of the inside of the bulb, owing to particles being shot off the filament as it disintegrates.

blacking (*Foundry*). Carbonaceous material applied as a powder or wash to the internal surface of a mould to protect the sand and improve the finish of the casting.

blacking (*Photog.*). The painting of all interior surfaces of photographic apparatus with dull black paint or varnish, to avoid spurious reflections of light.

blacking mill (*Foundry*). A small mill in which graphite or other carbonaceous material is ground for the preparation of blacking.

bladder (*Bot.*). A device which catches small aquatic animals; present in the bladderwort, and regarded as a modified leaf.

bladder (*Zool.*). Any membranous sac containing gas or fluid; especially the urinary sac of Mammals.

bladderworm (*Med., Zool.*). A form of larval tapeworm or metacestode. See **cysticercus.**

blade (*Bot.*). The flattened part of a leaf, sepal, or petal.

blade (*Elec. Eng.*). The moving part of a knife-switch which carries the current and makes contact with the fixed jaws.

blaes or **blaze** (*Mining*). A Scottish term for the poorly bituminous sandstone, shale, or fireclay in the Coal Measures.

Blagden's law (*Chem.*). For a given salt, the depression of freezing-point is proportional to the concentration of the solution.

Blake-sewn or **McKay-sewn** (*Boots and Shoes*). The name often applied to machine-sewn boots and shoes; after the chain-stitch sewing-machine invented by Lyman Blake *c.* 1850, and improved by McKay.

blanc de chine, blahn^g de shēn' (*Pot.*). A brilliant-white glaze, over a fine white porcelain body.

blanc fixe, blahn^g fēx (*Dec., etc.*). An artificial sulphate of barium.

Blanchard brush (*Photog.*). A smoothing device of calico fixed over glass, for spreading coatings on plates or paper.

blank (*Acous.*). The shaved wax ready for placing on a recording machine for making wax-records with a stylus.

blank (*Eng.*). A piece of metal, shaped roughly to the required size, on which finishing processes are carried out.

blank door (or **window**) (*Build.*). A bricked-up imitation door (or window), used for effect or for symmetry of design.

blank flange (*Eng.*). A disc, or solid flange, used to blank off the end of a pipe.

blank wall (*Build.*). A wall having no opening in it.

blanket (*Textiles*). A thick fabric with fibrous surfaces produced by milling and raising. *Woollen blankets* consist entirely of wool; *union blankets* have a cotton warp, with weft consisting of wool or shoddy, or of wool and cotton scribbled.

blanket (*Print.*). The material covering the impression surface on a rotary press.

blanket pile (*Textiles*). A fairly long nap or pile produced on cloths for bed-covers.

blanket strake (*Mining*). A shallow trough a little less than the width of the ordinary blanket with which it is completely lined. Used, as was Jason's fleece, for catching fine gold or platinum and their associated heavy minerals.

blast. The ignition or detonation of an explosive charge, especially one fired for disintegrating large masses of rock. *

blast (*Met.*). Air under pressure, blown into a furnace.

blast-furnace (*Met.*). A type of smelting furnace in which an air blast is used. Most frequently it means the furnace in which iron-ore is smelted to produce pig-iron, but similar furnaces are used in smelting copper, lead, antimony, tin, cobalt, and nickel ores.

blast-furnace gas (*Fuels*). A gas of low calorific value, a by-product in iron-smelting; used for pre-heating the blast, for steam raising, etc. It may contain up to 30% of carbon monoxide, and have a calorific value of about 90 C.H.V. per cubic foot.

blast main (*Eng*) The main blast air-pipe supplying air to a furnace.

blast pipe (*Eng.*). The exhaust steam pipe in the smokebox of a locomotive, which terminates in a nozzle to provide draught by entraining the flue gases in the steam-jet and exhausting them through the chimney. See **jumper-top blast pipe.**

blast-roasting (*Met.*). Roasting conducted in a Dwight-Lloyd machine, in which roasting is accompanied by sintering. The charge is placed in small boxes, ignited, and air drawn through to burn off sulphur.

blaste'ma (*Bot.*). The axial part of an embryo, but not the cotyledons.

blastema (*Zool.*). Anlage; the protoplasmic part of an egg as distinguished from the yolk.

blaste'niospore (*Bot.*). See **polarilocular spore.**

blast'ic action (*Bot.*). A catalytic action exerted by light on a plant, stimulating the division and enlargement of cells.

blasting (*Acous.*). A marked increase in amplitude distortion due to overloading the capacity of some part of a sound-reproducing system; e.g. attempt to exceed 100% depth of modulation in a radio transmitter, or break of continuity in carbon granules in a carbon transmitter.

blasting (*Civ. Eng., etc.*). The operation of disintegrating rock, etc. by boring a hole in it, filling with gunpowder or other explosive charge, and firing it.

blasting fuse (*Civ. Eng.*). A device consisting of a length of slow-burning composition which delays the firing of an explosive charge sufficiently to allow the person firing it time to get out of danger.

blasto- (Greek *blastos*, bud). A prefix used in the construction of compound terms; e.g. *blastogenesis*, reproduction by budding.

blast'ochyle, —kīl (*Zool.*). Fluid contained in the blastocoel.

blast'ocoel, —sēl (*Zool.*). The cavity formed within a segmenting ovum: cavity within a blastula: primary body cavity: segmentation cavity.

blast'ocyst (*Zool.*). In Mammalian development, a structure resulting from the cleavage of the ovum; it consists of an outer hollow sphere and an inner solid mass of cells; germinal vesicle.

blast'oderm (*Zool.*). In eggs with much yolk, the disc of cells formed on top of the yolk by cleavage.

blastodermic vesicle (*Zool.*). See **blastula.**

blast'odisc (*Zool.*). In a developing ovum, the germinal area.

blastogen'esis (*Gen.*). Transmission of inherited characters by means of germ-plasm only. See also **budding.**

blastogen'ic (*Biol.*). Occurring in, arising from, or pertaining to the germ-plasm: pertaining to hereditary characteristics due to the constitution of the germ-plasm.

blastoid (*Geol.*). An extinct echinoderm, somewhat resembling a crinoid, restricted to rocks of Devonian and Carboniferous age.

blast'okine'sis (*Zool.*). Migration of the embryo in heavily-yolked Insect eggs.

blast'omere (*Zool.*). One of the cells formed during the early stages of cleavage of the ovum.

blastomyco'sis (*Med.*). A term applied to a group of diseases due to infection with different species of blastomycoides.

blast'oparenchy'matous (*Bot.*). Said of an algal thallus which consists of filaments united side by side, and not recognisable as separate filaments.

blast'ophore (*Zool.*). In Birds, the anlage of a plumule: in *Oligochaeta*, central part of spermocyte mass which remains unchanged during the development of the spermatozoa.

blast'opore (*Zool.*). The aperture by which the cavity of the gastrula retains communication with the exterior.

blast'osphere (*Zool.*). See **blastula.**

blast'ostyle (*Zool.*). In *Hydrozoa*, a zooid bearing gonophores, and having the tentacles and mouth reduced or absent.

blastozo'ite (*Zool.*). See **blastozooid.**

blastozo'oid (*Zool.*). In *Urochorda*, a zooid which arises by budding. Cf. *oözooid*. See also **blastostyle.**

blast'ula (*Zool.*). A hollow sphere, the wall of which is composed of a single layer of cells, produced as a result of the cleavage of an ovum.

blastulation (*Zool.*). A form of cleavage resulting in the production of a blastula.

Blatt'haller loudspeaker (*Acous.*). A loudspeaking receiver using a zig-zag ribbon-drive behind a flat surface, which generates a sound-wave of high intensity.

Blat'tnerphone (*Acous.*). An immediate-reproducing recording system using modulation in the magnetisation of a steel tape, which is passed at high speed between pole tips carrying magnetising and reproducing coils. Also called STILLE MACHINE.

Blavier's text (*Elec. Eng.*). A method of locating a fault on an electric cable; resistance measurements are taken with the far end of the cable free, and again with it earthed.

blazing-off (*Eng.*). A rough workshop method of tempering hardened steel by dipping in oil, which on ignition heats the piece to the appropriate tempering temperature.

bleach-out process (*Photog.*). A system of colour printing involving the decolourising of dyes by exposing them through transparencies.

bleached cotton cloths (*Textiles*). Cloths which have been finished white by a bleaching process, the natural or grey colour being changed by oxidation.

bleaching (*Paper*). The use of chlorine gas or bleaching powder (chloride of lime) to bring raw materials to the desired whiteness.

bleaching (*Photog.*). The removal of reduced silver after development, so that the remaining silver halide, which has not been developed because of its insufficient exposure to light, can be further developed. The resulting image is a positive of the original object. See **reversal process.**

bleaching (*Textiles*). The process of removing impurities and the natural colour from fibres, yarns, and fabrics, by chloride of lime or bleaching powder, so as to render them white.

bleaching of the visual purple (*Optics*). The whitening of the visual purple of the retina when subjected to the incidence of strong light.

bleaching powder (*Chem.*). Commercial bleaching powder consists of calcium hydroxide saturated with chlorine. The commercial value depends on the amount of available chlorine.

bleb (*Med.*). A small blister or vesicle containing clear fluid.

bleed (*Typog.*). When illustrations are arranged in a page so that the outside edges are guillotined in binding, they are said to *bleed off*. In ordinary book-binding the term is used when margins are unintentionally overcut and the text mutilated.—*adj.* **bled.**

bleeder (*Med*). One afflicted with haemophilia.

bleeder resistance (*Elec. Comm.*). A resistance placed across the secondary of a transformer to regulate its response curve, especially when the transformer is not loaded with a proper terminating resistance.

bleeding (*Bot.*). The exudation of sap from wounds.

bleeding (*Civ. Eng.*). The oozing to the surface of the grouting medium used in some road surfacings to fill the interstices between the stones; it forms gummy patches in hot weather.

bleeding (*Eng.*). A method of improving the thermal efficiency of a steam plant by withdrawing a small part of the steam from the higher-pressure stages of a turbine in order to heat the feed-water.

bleeding (*Paint.*). A defect in a painted or varnished surface, resulting from an under coat of a different colour working through the upper coat, owing to the latter's having partially dissolved the under coat.

bleeding (*Photog.*). Diffusion of dye from an image.

bleeding (*Textiles*). In a yarn or fabric composed of two or more colours, a defect due to the running of the darker colours, and consequent staining of the lighter colours, during finishing or washing.

bleeding pressure (*Bot.*). See **root pressure.**

blemmat'ogen (*Bot.*). A layer of hyphae, usually with thickened walls, forming the outer covering of the button of an agaric.

blend (*Paint.*). (1) To mix two pigments in order to produce a desired shade.—(2) To spray, stipple, sponge, or otherwise apply paint so that one shade gradually passes into another.

blend (*Woollen*). A mixture consisting of different qualities or of different kinds of fibrous materials, either raw or partly processed.

blende or **zinc blende** (*Min.*). Zinc sulphide, the chief ore of zinc, occurring in metalliferous veins in association with galena, etc. Crystallises in cubic system. Also called BLACK JACK, SPHALERITE (esp. U.S.).

blended inheritance (*Gen.*). Inheritance in which the characters of two dissimilar parents appear to be blended in their offspring; e.g. skin colour in mulattoes.

blender (*Woollen*). The person responsible for the production of blends.

blennorrha'gia (*Med.*). Discharge of mucus, usually from the genital organs, due to gonorrhoea.

blennorrhoea, —rē'a (*Med.*). See **blennorrhagia.** —ACUTE BLENNORRHOEA, purulent conjunctivitis, due usually to infection with the gonococcus.

blephar-, blepharo- (Greek *blepharon*, eyelid). A prefix used in the construction of compound terms; e.g. *blepharoptosis*.

bleph'arism (*Med.*). Spasm of the eyelids.

blephari'tis (*Med.*). Chronic inflammation of the eyelids.

blepharochal'asis (*Med.*). Laxity of the skin of the eyelid.

blepharoconjunctivitis (*Med.*). Inflammation of the eyelids and of the conjunctiva.

blepharophimo'sis (*Med.*). Narrowing of the palpebral fissure.

bleph'aroplast (*Bot., Zool.*). A deeply staining granule, possibly a centrosome, having a direct connexion with the base of a locomotor organelle, usually a flagellum. See also **basal body.**

blepharople'gia (*Med.*). Paralysis of the muscles of the eyelid.

blepharopto'sis (*Med.*). Drooping of the upper eyelid, due to paralysis of its muscles.

bleph'arospasm (*Med.*). Spasm of the orbicular muscle of the eyelid.

blimp (*Aero.*). Colloquial for *non-rigid airship.*

blimp (*Cinema.*). A temporary cover for apparatus, such as cameras in sound-film studios, to mitigate the effect of noise.

blind (*Build.*). A shade for a window.

blinds (*Vet.*). Two leather or cloth fittings of the headstall, which are united across the eyes of horses as a means of restraint preceding operation.

blind apex (*Mining*). The upper edge of a vein reef or lode, near the surface but overlain by other formations; a 'sub-outcrop.'

blind arcade (*Build.*). See **arcade.**

blind arch (*Build., Civ. Eng.*). A closed arch which does not penetrate the structure; used for ornamentation, to make one face of a building harmonise with another in which there are actual arched openings.

blind area (*Build.*). A sunken space round the basement of a building, broken up into lengths by small cross-walls, which support the earth-retaining wall but restrict ventilation.

blind current, blind power or volt-amperes (*Elec. Eng.*). See **reactive current, reactive power or volt-amperes.**

blind drift (*Mining*). (1) A drift, heading, or level not connected with other workings.—(2) An inverted syphon for water in a mine.

blind-landing system (*Radio*). A system for indicating, by radio, to the pilot of an airplane his position relative to the ground, whilst landing. In one form, it consists of a short-wave directional transmitter, whose contours of constant field-strength lie along the glide paths.

blind lode, blind vein (*Mining*). A lode with a sub-outcrop, i.e. no outcrop to the surface.

blind monitoring (*Elec. Comm.*). The control of microphone outputs in broadcasting, particularly in outside broadcasts, when the operator is out of sight of the persons originating the transmission.

blind mortise (*Join.*). A mortise which does not pass right through the piece in which it is cut.

blind P (*Typog.*). The paragraph mark ¶. Sometimes used for decorative effect at the beginning of paragraphs. The sixth in order of the reference marks directing the reader's attention to a footnote.

blind spot (*Radio*). A point within the normal range of a transmitter, at which the field strength is abnormally small. Usually due to the interference pattern produced by surrounding objects.

blind spot (*Zool.*). In Vertebrates, an area of the retina where there are no visual cells (due to the exit of the optic nerve), and over which no external image is perceived.

blinding, blind tooling (*Bind.*). The operation of impressing on a book-cover design or lettering which is not to be gilt or otherwise filled in.

blinding (*Civ. Eng.*). The process of sprinkling small chippings of stone over a tar-dressed road surface.

blindness. See **colour blindness, nyctalopia.**

blink microscope (*Astron.*). An instrument in which two photographic plates of the same region are viewed simultaneously, one with each eye, any difference being detected by a device which alternately conceals each plate in rapid succession.

blister (*Acous.*). A defect in a gramophone record consequent on the release of gases (e.g. water vapour) during pressing.

blister (*Med.*). A thin-walled circumscribed swelling in the skin containing clear or blood-stained serum; caused by irritation.

blister (*Met.*). A raised area on the surface of solid metal produced by the formation of gas within the metal while it is hot and plastic.

blister (*Paint.*). See under **blistering.**

blister (*Photog.*). A defect in photography, arising from the detachment of the emulsion layer from the vehicle or support.

blister bar (*Met.*). Wrought-iron bars impregnated with carbon by heating in charcoal. Used in making crucible steel.

blister cloth (*Textiles*). A worsted fabric designed to present a raised and irregular surface, as in crepons and crimps.

blister copper (*Met.*). An intermediate product in the manufacture of copper. It is produced in a converter, contains 98·5-99·5% of copper, and is subsequently refined to give commercial varieties; e.g. *tough pitch, deoxidised,* and *O F.H.C.*

blister steel (*Met.*). Wrought-iron bars impregnated with carbon by heating in charcoal. Before 1740 this was the only steel available. Since then, most blister steel has been melted to give crucible steel, most of which is now made, however, from other materials.

blistering (*Paint.*). A paintwork defect arising when the painted surface is subjected to direct heating, and due to one of a number of different causes. The painted surface swells up locally to form *blisters.*

bloating (*Vet.*). Acute indigestion of ruminating animals resulting in the rapid dilatation of the rumen and reticulum with gas.

Blochmann's corpuscles (*Zool.*). Minute greenish bodies occurring in many Insect eggs, and representing independent organisms capable of cultivation in artificial media.

block (*Carp.*). A small piece of wood glued into the interior angle between two jointing pieces of board, in order to make the joint more rigid.

block (*Eng., etc.*). The housing holding the pulley or pulleys over which the rope or chain passes in a lifting tackle.

block (*Med.*). See **heart-block, nerve-block.**

block (*Mining*). A stop used at the top of an incline to prevent the return of wagons.

block (*Print.*). A term applied to any letterpress printing plate, usually of copper, zinc, or stereotype metal, brought to type height by mounting on wood. *Process blocks* (q.v.) may be classed as half-tone, line, or combined line and tone.

block brake (*Eng.*). A vehicle brake in which a block of cast-iron is forced against the rim of the revolving wheel, either by hand-power, electromagnetic mechanism, or fluid-pressure acting on a piston. See **air brake, electromagnetic brake.**

block clutch (*Eng.*). A friction clutch in which friction blocks or shoes are forced inwards into the grooved rim of the driving member, or expanded into contact with the internal surface of a drum. See **friction clutch.**

block coal (*Mining*). A special type of coal which breaks into cubical blocks.

block gauge (*Eng.*). A block of hardened steel having its opposite faces accurately ground flat and parallel and separated by a definite distance—the *gauge distance.* It is used for checking the accuracy of other gauges and measuring instruments.

block grease (*Lubricants*). See **greases.**

block-holing (*Mining*). The operation of bull-dozing, popping, or breaking up large boulders or pieces of rock by means of explosive.

block-in-course (*Masonry*). A type of masonry, used for heavy engineering construction, in which the stones are carefully squared and finished to make close joints, and the faces are hammer-dressed.

block lava (*Geol.*). See under **ropy lava.**

block pavement (*Civ. Eng.*). A road surfacing formed of blocks of stone or wood or other material quite or nearly rectangular in shape, as distinct from a *sheet pavement* (q.v.).

block plan (*Build.*). A plan of a building site, showing the outlines of existing and proposed buildings.

block plane (*Carp.*). A small plane about 6 in. long which has no cap iron and has the cutting-bevel reversed; used for planing end grain.

block prism (*Photog.*). A cube of glass, slit along its diagonal and half-silvered, for splitting the beam in a three-colour beam-splitting camera.

block tin (*Plumb.*). Pure tin.

blocked impedance (*Elec. Comm.*). The input electrical impedance of an electro-mechanical transducer, when the mechanical system is prevented from moving. See **motional impedance.**

blocked-out ore (*Mining*). Ore that has been exposed and sampled on four sides.

blocking (*Bind.*). The process of stamping a design on a book-cover by means of heated tools or a die.

blocking (*Carp.*). The operation of securing together two pieces of board by gluing blocks of wood in the interior angle.

blocking condensers (*Teleg.*). Large condensers placed in series with the ends of a submarine cable, to improve the definition of arriving signals. See **double block, single block.**

blocking course (*Masonry*). A course of stones laid on the top of a cornice.

blocking of heads (*Furs*). Shaping the damped head-skins on a model block.

blocking-out (*Photog.*). The use of Indian ink or other opaque pigment for covering parts of negatives so that they print white.

blocking press (*Bind.*). A press for impressing, by means of heated blocks, designs and lettering on book covers and cases; used chiefly for publishers' case work. A blocking machine carries out the process mechanically.

Blondel arc-lamp (*Illum.*). An enclosed-flame arc-lamp in which a special chamber is provided for the condensation of the fumes.

Blondel oscillograph (*Elec. Eng.*). The earliest form of moving-coil oscillograph, subsequently perfected by Duddell.

blondin (*Civ. Eng., etc.*). See **cable-way.**

blood (*Physiol.*). A fluid circulating through the tissues of the body, performing the functions of transporting oxygen, nutrients, and hormones and carrying waste products to the organs of excretion. It plays an important rôle in maintaining a uniform temperature in the body in warm-blooded organisms. Its specific gravity in Man is about 1·054-1·060, and it has an alkaline reaction. Its chief constituents are: water (77·5-79%), solids including proteins, lipins, nitrogenous and non-nitrogenous extractives, enzymes, hormones and immune bodies, blood sugar, vitamins, and inorganic substances (the chlorides of sodium, potassium, magnesium, calcium), organic and inorganic phosphoric acid, organic iron compounds, and gases (oxygen, carbon dioxide, nitrogen). See **blood groups***.

blood albumin (*Chem.*). An albuminous product prepared from blood serum; brown amorphous lumps, soluble in water and alcohol.

blood cell (*Physiol.*). See **haematoblast.**

blood corpuscle (*Physiol.*). A cell normally contained in suspension in the blood. See **erythrocyte, leucocyte.**

blood crystals (*Physiol.*). Crystals of haemoglobin, or one of its derivatives, which can be obtained by extracting blood with chloroform or ether, or by treating it with glacial acetic acid.

blood dust (*Physiol.*). Neutral fats carried by the blood-plasma in the form of very fine globules.

blood gills (*Zool.*). In some aquatic Insects, respiratory outgrowths of the body-wall containing blood, but not, as a rule, tracheae.

blood islands (*Zool.*). In developing Vertebrates, isolated syncytial accumulations of reddish mesoderm cells containing primitive erythroblasts, which give rise respectively to the walls of the blood-vessels and to the red corpuscles.

blood plasma (*Physiol.*). The fluid part of the blood, under normal conditions.

blood platelet (*Physiol.*). See **thrombocyte.**

blood serum (*Physiol.*). The fluid part of the blood remaining after the fibrin and the corpuscles have been removed.

blood stick (*Vet.*). A wooden instrument for striking a fleam during the operation of phlebotomy on horses or cattle.

bloodstone (*Min.*). Cryptocrystalline silica, a variety of chalcedony, coloured deep-green, with flecks of red jasper; often used in signet rings. Also called HELIOTROPE.

blood transfusion (*Med.*). See **transfusion.**

blood-vessel (*Physiol.*). An enclosed space, with well-defined walls, through which blood passes. See **artery, vein, capillary.**

bloom (*Bot.*). A covering of grains, short rods, or crusts of waxy material occurring on the surface of some leaves and fruits.

bloom (*Build.*). Efflorescence on a brick wall.

bloom (*Leather*). A deposit, of greyish colour, formed (by ellagic acid) on the fibres of leather during tanning.

bloom (*Met.*). An intermediate product in the rolling of steel. The term is correctly applied when the cross-section is more than 36 sq. in., smaller sizes being called *billets*, but the distinction is not always observed. See also **ball** (*Met.*), **billet** (*Met.*).

bloom (*Paint.*). See **blooming.**

bloom (*Photog.*). A film of moisture on the surface of a lens, film, or glass plate.

bloom side (*Leather*). The hair side of a hide.

bloomary or **bloomery** (*Met.*). The furnace used in the extraction of iron from its ores by the direct process. Now of historical interest.

blooming (*Paint.*). A varnishing defect in which a bloom or cloudy film appears on a newly varnished surface; due usually to a damp atmosphere.

blooming mills (*Met.*). The rolling mills used in reducing steel ingots to blooms. Called *cogging mills* in England, and not always distinguished from *billet* (or *slab*) *mills.*

bloop (*Cinema.*). A dull thud sometimes heard in sound-film reproduction; caused by joints made in the negative sound-track before printing the positive projection prints.

blooping patch (*Cinema.*). A black patch painted on the negative sound-track to give a gradual change in the exposure area and so prevent a bloop on projecting the positive print.

blotting-paper (*Paper*). Unsized absorbent rag paper. The cheaper grades are printings which have not been sized.

blow (*Mining*). (1) A sudden inrush of gas from a coal-seam or from a fissure in the strata.—(2) An improperly charged or fired hole in a rock face which fails to break its proper load; a *blow-out.*

blow-and-blow machines (*Glass*). Machines in which the glass is shaped in two stages, but each time by blowing, as opposed, for example, to pressing or sucking.

blow back (*I C. Engs.*). The return, at low speeds, of some of the induced mixture through the carburettor of a petrol-engine; due to late closing of the inlet valve during compression.

blow-by (*I.C. Engs.*). The gas which leaks past the piston of an internal-combustion engine during the period of maximum pressure.

blow-down plant (*Eng.*). An arrangement for the continuous *blowing-down* (q.v.) of a steam-boiler, as distinct from the intermittent use of a blow-down valve.

blow-down valve (*Eng.*). A valve fitted at the bottom of a boiler for the purpose of *blowing-down* (q.v.).

blow-hole (*Geol.*). An aperture near a cliff-top through which air, compressed in a sea-cave by breaking waves, is forcibly expelled.

blow-holes (*Met.*). Gas-filled cavities in solid metals. They are usually formed by the trapping of bubbles of gas evolved during solidification (see **gas evolution**), but may also be caused by steam generated at the mould surface, air entrapped by the incoming metal, or gas given off by inflammable mould dressings.

blowlamp (*Build.*). A portable apparatus for applying intense local heat, used by painters, electricians, and plumbers. Called in America a BLOWTORCH.

blow-out coil (*Elec. Eng.*). See **magnetic blow-out.**

blowpipe (*Chem.*). A small laboratory apparatus using a mixture of air under pressure and coal gas in order to give a hot localised flame. It is much used for laboratory glass blowing and glass bending and also in blowpipe analysis. See also **borax bead.**—(*Glass*) A metal tube, some 4-5 ft. long, with a bore of ¼-⅜ in. and a thickened nose which is dipped into molten glass and withdrawn from the furnace. The glass is subsequently manipulated on the end of the blowpipe and blown out to shape. Also called BLOWING-IRON.

blowtorch (*Build.*). See **blowlamp.**

blower (*Eng.*). A rotary air-compressor for supplying a relatively large volume of air at low pressure. See **air-compressor, supercharger.**

blower (*Locomotives*). A ring-shaped perforated pipe, encircling the top of the *blast-pipe* (q.v.) in the smokebox, to which steam is supplied while the engine is standing, the jets providing sufficient draught to keep the fire going. See **blast-pipe.**

blower (*Mining*). (1) A fissure or thin seam which discharges a quantity of coal-gas.—(2) An auxiliary ventilating appliance, e.g. a fan or venturi tube, for supplying air to subsidiary working places or to dead-ends.

blowing (*Build.*). A plastering defect in which a conical piece may be blown out of a finished plastered surface owing to moisture getting to an imperfectly slaked particle of quicklime in the work. Also called PITTING.

blowing current (*Elec. Eng.*). A term used in connexion with fuse links to denote the current (d.c. or r.m.s.) which will cause the link to melt.

blowing-down (*Eng.*). The operation of opening a valve in the lowest part of a steam-boiler in order to eject sludge.

blowing engine (*Eng.*). The combined steam- or gas-engine and large reciprocating air-blower for supplying air to a blast-furnace.

blowing-in (*Met.*). The operation of starting up a blast-furnace.

blowing-iron (*Glass*). See **blowpipe.**

blowing machines (*Glass*). Machines for forming molten glass into articles by the use of air under pressure.

blowing-out (*Met.*). The operation of stopping down a blast-furnace.

blowing room (*Textiles*). In a cotton-spinning mill, the room containing the bale breakers, openers, and scutchers, in which air currents are an important factor in removing dust and impurities.

blown (*I.C. Engs.*). A colloquial term applied to a supercharged petrol-engine. See **boost.**

blown casting (*Foundry*). A casting spoilt by the inclusion of blow-holes.

blown oil (*Eng.*). Oil of vegetable origin subjected to partial oxidation by blowing air through it, to increase its viscosity for purposes of lubrication.

blown sand (*Geol.*). Sand which has suffered transportation by wind, the grains in transit developing a perfectly spherical form (*millet-seed sand*); grain-size is dependent upon the wind velocity. See also **sand dunes.**

blub (*Build.*). A swelling on the surface of newly plastered work.

blubber (*Zool.*). In marine Mammals, a thick fatty layer of the dermis.

blubbering (*Leather*). The process of drumming seal and similar skins in warm water, after soaking, to liquefy the fat so that it may be expressed.

blue (*Paint.*). A primary colour. Blue pigments are obtained from vegetable, mineral, and artificial substances.

blue asbestos (*Min.*). A form of crocidolite, silicate of sodium and iron, occurring in the Asbestos Mountains (Griqualandwest, S. Africa) and (rarely) elsewhere.

blue billy (*Met.*). The residue left after burning off the sulphur from iron sulphide ores.

blue black (*Paint.*). An alternative name for *ivory black.*

blue bricks (*Build.*). Bricks (made chiefly in Staffordshire and North Wales) which are famous for their strength and durability, and form the best quality engineering bricks.

blue brittleness (*Eng.*, *Met.*). Lack of malleability in iron and steel between 200° and 400° C. The term is derived from the fact that in this range a blue oxide film forms on the surface.

blue disease (*Med.*). See **Rocky Mountain fever.**

blue-glow (*Thermionics*). The visible evidence of ionisation in a thermionic tube, due to the presence of gas.

blue-green algae (*Bot.*). See **Myxophyceae.**

blue ground (*Min.*). Decomposed agglomerate, occurring in volcanic pipes in S. Africa and Brazil; it contains a remarkable assemblage of ultra-basic plutonic rock-fragments (many of large size) and diamonds.

blue gum (*Timber*). A strong, brownish-coloured wood from Australia, used for piles, heavy framing, and wood paving blocks.

blue john (*Min.*). A massive, frequently banded, variety of the mineral fluorite, occurring typically in Derbyshire.

blue lead (*Chem.*). A name used in the industry for metallic lead, to distinguish it from other lead products such as white lead, orange lead, red lead, etc.

Blue Lias (*Geol.*). A formation of Lower Jurassic age, consisting essentially of interbedded bluish clays and thin limestones. Approximately the lower half of the Lower Lias is of this type.

blue metal (*Met.*). A powder, consisting of particles of zinc coated with oxide, which constitutes a portion of the product obtained in the extraction of zinc by distillation.

blue of the sky (*Meteor.*). Sunlight is 'scattered' by molecules of the gases in the atmosphere and by dust particles. Since this scattering is greater for short waves than for long waves, there is a predominance of the shorter waves of visible light (that is blue and violet) in the scattered light which we see as the blue of the sky.

blue-print paper (*Paper*). A paper made from pure rags, coated with a solution of ammonium chloride and white of egg. Sometimes used by blockmakers to supply a rough blue-on-white or white-on-blue proof before blocks are finished.

blue printing (*Photog.*). See **negative cyanotype.**

blue stain (*Timber*). A form of sapstain producing a bluish discoloration; caused by the growth of fungi which, however, do not greatly affect the strength of the wood.

blue-tongue (*Vet.*). See **malarial catarrhal fever of sheep.**

blue vitriol (*Min.*). A popular name for the hydrous sulphate of copper, which is a decomposition product of chalcopyrite. It occurs in solution in the waters issuing from copper mines; by reason of its presence, iron is dissolved, and copper is deposited. See **chalcanthite.**

blue water gas (*Fuels*). A mixture of approximately equal proportions of carbon monoxide and hydrogen made by passing steam over incandescent coke in special generators; calorific value per cu. ft. at 60° F., 300-310 B.Th.U. gross, 280-290 net. Usually converted into *carburetted water gas* (q.v.).

blueing (*Eng.*). The production of a blue oxide film on polished steel by heating in contact with saltpetre or wood ash; either to form a protective coating, or incidental to annealing.—(*Horol.*) For hands, screws, etc., it is used for the purpose of appearance, but for springs, where it is necessary to obtain the desired elastic properties, it must be produced by thermal treatment.

blueing (*Paint.*). White or light-blue patches appearing on surfaces covered with paint containing Prussian blue, or in varnish over Prussian blue or Brunswick green.

blueing (*Pot.*). A process for whitening yellow lead glazes by adding a small quantity of cobalt.

blueing (*Worsted*). The process of neutralising a yellowish tint in wool by tinting it with a pale-blue colour, in order to obtain a better white appearance.

blunger (*Pot.*). A cylindrical vessel containing a rotating shaft with fixed knives, used for amalgamating clay with water in making slips.

blur (*Acous.*). The introduction of alien frequencies into reproduced sound, so that the sounds are no longer distinct and easily recognisable.

blur factor (*Acous.*). The measure of acoustic blur. It is the root of the ratio of the power of the unwanted tones to the power of the wanted tones in the output of the system.

blur level (*Acous.*). The relative power level, in decibels, of the alien tones to the wanted tones, as a consequence of non-linear distortion in a sound-reproducing system.

blurb (*Print.*). A short note by the publisher recommending a book or its author. Usually printed on the dust-jacket or at the beginning of the preliminary matter.

blushing (*Paint.*). A condition in which a cloudy film appears on a newly lacquered surface; due usually to too rapid drying or to a damp atmosphere.

B.M. (*Surv.*). The common abbrev. for *bench mark.*

B.M.E.P. (*Eng.*). Abbrev. for *brake mean effective pressure.*

board (*Elec. Eng.*). See **control-board, distribution-board.**

board (*Timber*). Timber cut to a thickness of less than 2 in., and to any width from 4 in. upwards.

boards (*Bind.*). A general term for mill-boards, strawboards, etc. used for book-covers.

boards (*Paper*). Pasteboards or pulp boards in folio.

board-and-brace work (*Carp.*). Work consisting of boards grooved along both edges, alternating with thinner boards fitting into the grooves.

board, cordless (*Teleph.*). See **cordless board.**

board drop stamp (*Eng*). A stamping machine in which the frictional grip of opposed rollers on either side of a vertical board lifts a tup, which falls when the roller pressure is released.

board foot (*Build.*). The unit of measurement in the board-measure system, being a piece of timber of 1 in. thickness by 12 in. square. A *standard* contains 1980 board feet.

board-measure (*Timber*). A method of measuring timber in quantity, the unit being a piece 1 in. thick by 12 in. square, i.e. one-twelfth of a cubic foot. Cf. *surface-measure.*

board stretcher (*Furs*). A light-wood board on which skins, when being dried, are stretched by means of rivets.

Board of Trade panel (*Elec. Eng.*). This is the panel on a traction switchboard which contains the switches and instruments for ascertaining whether the Board of Trade requirements regarding earth-leakage currents, etc. are being carried out.

Board of Trade Unit (*Elec.*). The commercial unit of electrical energy, equal to one kilowatt-hour. Abbrev. **B.T.U.** (Abbrev. B.O.T. is obsolete.)

boarding (*Leather*). A process for accentuating the natural grain marks on tanned hides. See **graining.**

boarding joists (*Carp.*). Joists to which boards are fixed.

boardy feel (*Textiles*). A term used to indicate the feel or handle of a fabric that is exceptionally hard. This may be due to oversetting, or to a finishing process.

Boas' test (*Chem.*). A test for the detection of free hydrochloric acid in gastric juices, consisting in the formation of a carmine colour in the presence of an alcoholic solution of resorcinol and sucrose.

boasted ashlar (*Masonry*). See **chiselled ashlar.**

boasted joint surface (*Masonry*). The surface of a stone which has been worked over with a boasting chisel until it is covered with a series of small parallel grooves, thus forming a key for the mortar at the joint.

boasted work (*Masonry*). See **drove work.**

boaster (*Masonry*). A steel chisel having a cutting edge 2 in. wide; used by masons for dressing stone.

boasting (*Masonry*). The operation of dressing stone with a broad chisel and mallet.

boasting chisel (*Masonry*). . A steel chisel having a fine broad cutting edge; used by masons for preparing a stone surface prior to finish-dressing with a broad tool.

boat (*Illum.*). A structure, extended and suspended, containing a number of lights the illumination from which is diffused through glass panels.

boat deck (*Ship Constr.*). A deck provided on some ships for the sole purpose of housing life-boats, although it may be used for additional purposes when so provided.

boat scaffold (*Build.*). See **cradle scaffold.**

bob. The hanging weight at the end of a plumb-line.—Specifically (*Horol.*) the weighted mass at the end of a pendulum. For the ordinary pendulum-clock, with a lenticular bob, the length of the equivalent simple pendulum is approximately at the centre of the bob.

bob-weight (*Eng.*). A weight used to counter-balance some moving part of a machine. See **balance weight.**

bobbin (*Elec. Eng.*). A flanged structure intended for the winding of a coil. Also called a SPOOL.

bobbin (*Textiles*). In weaving, a wooden spool on which yarn is wound. Spools for holding warp yarn have flanges; those for holding weft are without flanges.

bobbin net (*Textiles*). A fine quality of machine-made lace, with a twisted and traversed mesh.

bobbin width (*Worsted*). The length of fabric that can be produced from a bobbin of weft.

bobbin winding (*Elec. Eng.*). A term used in connexion with the windings of transformers to denote a winding in which all the turns are arranged on a bobbin, as opposed to a winding in which the turns are in the form of a disc. It is generally used for the high-voltage windings of small transformers.

Bobrovs'ka garnet (*Min.*). See **Uralian emerald.**

B.O.D. (*San. Eng.*). Abbrev. for *bio-chemical oxygen demand.* The amount of oxygen absorbed in purifying trade wastes, sewage, etc.

bod (*Foundry*). A ball of clay used to close the tap-hole of a furnace or cupola.

Bode's law (*Astron.*). A purely empirical numerical relation, discovered by Bode, which expresses with fair approximation the relative mean distances of the planets from the sun, starting with Mercury. It is obtained by adding 4 to each of the series, 0, 3, 6, 12, 24, 48, 96, 192, giving the resulting sequence, 4, 7, 10, 16, 28, 52, 100, 196.

bodkin (*Typog*). A small steel spike set in a wooden handle. Used to raise individual type letters from the forme when correcting.

body (*Paint.*). The degree of opacity possessed by a pigment.

body (*Typog.*). (1) The measurement from top to bottom of a type, rule, etc. The unit is the *point,* 72 points amounting to one inch. Thus 12-point gives six lines to the inch.—(2) BODY OF A WORK, the text of a volume, distinguished from the preliminary matter, such as title and contents, and the appendices and indexes.

body cavity (*Zool.*). The perivisceral space, or cavity, in which the viscera lie; a vague term, sometimes used incorrectly to mean *coelom* (q.v.).

body cell (*Bot.*). A cell in a pollen grain of *Gymnospermae,* from which the male nuclei are set free.

body cell (*Zool.*). Somatic cell. Cf. *germ cells.*

body-central cubic structure (*Met., Min.*). In crystals, an arrangement of atoms which may be imitated by packing spheres; fairly common in metal crystals. The atomic centres are disposed in space in such a way that they may be supposed to be situated at the corners and centres of a set of cubic cells.

body-centred lattice (*Chem.*). One in which lattice-points are situated at the centres of unit cells.

body stalk (*Zool.*). In some Mammals, a band of mesoderm connecting the chorion with the embryo posteriorly, and representing the commencement of the allantois.

body wall (*Zool.*). The wall of the perivisceral cavity, comprising the skin and muscle layers.

B.O.E. sill (*Build.*). Abbrev. for *brick-on-edge sill* (q.v.).

Boettger's test, bĕt′ger *Chem.*). A test for the presence of saccharoses, based upon the reduction of bismuth subnitrate to metallic bismuth in alkaline solution.

Boffle (*Acous.*). A box baffle in which the loud-speaking diaphragm is mounted in the centre of one face of the box, the opposite side being open and the interior accommodating acoustic absorbing material. (Trade-name.)

bog iron-ore (*Min.*). Hydrated iron-oxide deposited in marshy places, perhaps by the action of iron bacteria.

bog spavin (*Vet.*). Dilatation of the capsule of the tibio-tarsal joint of the horse.

Boghead Coal (*Min*). A type of coal consisting largely of resins, waxes, wind-borne spores, and pollen cases. Originated in deeper, more open parts of the coal swamps than ordinary household coals. Essentially a spore-coal. See also **tasmanite.**

bogie or **bogie truck** (*Eng.*). A four- or six-wheel truck of short wheelbase, which forms a pivoted support at one or both ends of a long rigid vehicle such as a locomotive or coach.

Bohemian garnet (*Min.*). Yellowish-red crystals of the garnet *pyrope,* occurring in large numbers in the Mittelgebirge in Bohemia, and cut and sold at Bilin.

Bohemian ruby (*Min.*). Not ruby at all but the much less valuable mineral *rose quartz.*

Bohemian topaz (*Min.*). See **citrine.**

Bohr atom (*Phys.*). See **Bohr theory.**

Bohr theory (*Phys.*). A combination of the Rutherford conception of the atom as a central, positively-charged nucleus surrounded by planetary electrons, with the quantum theory, which restricts the permissible orbits in which the electrons can revolve. The jump of an electron to an orbit of smaller radius is accompanied by the emission of monochromatic radiation.

boil (*Acous.*). Extraneous sound accidentally added to the sounds recorded on a wax-blank, before processing.

boil (*Med.*). A deep-seated infection (with the *Staphylococcus aureus*) of a hair follicle, resulting in a painful, red swelling, which eventually suppurates.

boiled oil (*Paint.*). Linseed-oil raised to a temperature of from 400-600° F. and admixed with driers.

boiler (*Eng.*). A steam-generator consisting of water-drums and tubes which are exposed to the heat of a furnace and arranged so as to promote rapid circulation.

See **Cornish—**
flash—
forced-circulation—
Lancashire—
locomotive—
marine—
Scotch—
water-tube—

boiler capacity (*Eng.*). The weight of steam, usually expressed in pounds per hour, which a boiler can evaporate when steaming at full load output.

boiler compositions (*Eng.*). Chemicals introduced into boiler feed-water in order to inhibit scale-formation and corrosion, or to prevent priming or foaming. Examples are sodium compounds (such as soda ash), organic matter, and barium compounds.

boiler covering (*Eng.*). See **lagging.**

boiler cradles (*Ship Constr.*). See **keelson.**

boiler crown (*Eng.*). The upper rounded plates of a boiler of the shell type.

boiler efficiency (*Eng.*). The ratio of the heat actually supplied by a boiler in heating and evaporating the feed water to the heat supplied to the boiler in the fuel. It may vary from 60% to 90%.

boiler feed-water (*Eng.*). The water pumped into a boiler for conversion into steam, usually consisting of condensed exhaust steam and 'make-up' fresh water treated to remove air and impurities.

boiler fittings and mountings (*Eng.*). See **blow-down valve, feed check-valve, pressure gauge, safety valve, stop valve, water gauge.**

boilermaker's hammer (*Eng.*). One with ball or straight and cross panes; used for caulking, fullering, and scaling boilers.

boiler plate (*Eng.*). Mild steel plate, generally produced by the open-hearth process; used for the shells and drums of steam-boilers.

boiler pressure (*Eng.*). The pressure at which steam is generated in a boiler. It may vary from little over atmospheric pressure, for heating purposes, to 1500 lbs. per sq. in. and over for high-pressure turbines.

boiler scale (*Eng.*). A hard coating, chiefly calcium sulphate, deposited on the surfaces of plates and tubes in contact with the water in a steam-boiler. If excessive, it leads to overheating of the metal and ultimate failure.

boiler setting (*Eng.*). The supporting structure on which a boiler rests; usually of brick for land boilers and of steel for marine boilers.

boiler stays (*Eng.*). Screwed rods or tubes provided to support the flat surfaces of a boiler against the bursting effect of internal pressure.

boiler test (*Eng.*). (1) A hydraulic-pressure test applied to check water-tightness under pressure greater than the working pressure.—(2) An efficiency test carried out to determine evaporative capacity and the magnitude of losses.

boiler trial (*Eng.*). An efficiency test of a steam-boiler, in which the weight of feed-water and of fuel burnt are measured, and various sources of loss assessed.

boiler tubes (*Eng.*). Steel tubes forming part of the heating surface in a boiler. In water-tube boilers the hot gases surround the tubes; in locomotive and some marine boilers the gases pass through the tubes.

boiling (*Heat*). The very rapid conversion of a liquid into vapour by the violent evolution of bubbles; it occurs when the temperature reaches such a value that the saturated vapour pressure of the liquid equals the pressure of the atmosphere.

boiling-off (*Textiles*). The removal of the sericin, or natural gum, from silk yarn by a method of scouring. This adds to the lustre and softness of the silk but entails loss of weight. Silk lightly scoured is termed *souple* silk.

boiling plate (*Elec. Eng.*). An appliance fitted with electric heating elements for the purpose of boiling liquids or cooking food. See **open-type boiling plate.**

boiling-point (*Heat*). The temperature at which a liquid boils when exposed to the atmosphere. Since, at the boiling-point, the saturated vapour pressure of a liquid equals the pressure of the atmosphere, the boiling-point varies with pressure; it is usual, therefore, to state its value at the standard pressure of 76 cm. of mercury. Abbrev. **b.p.**

boiling-point elevation (*Chem.*). See **elevation of boiling-point.**

boiling table (*Elec. Eng.*). A table incorporating in its construction two or more boiling plates.

Bojanus' organ, bō-jā′nus, *Ger.* bō-ya′noos (*Zool.*). In *Pelecypoda,* the excretory organ or kidney.

bole (*Bind.*). A compact clay, a reddish variety of which is used in powdered form (with water and a small quantity of gilding size as a foundation) for gilt edges.

bole (*Bot.*). The trunk of a tree.

bolection (or **balection**) **moulding** (*Join.*). A moulding fixed round the edge of a panel and projecting beyond the surface of the framing in which the panel is held.

bo′lide (*Astron.*). A large *meteor* (q.v.), generally one that explodes: a fire-ball.

boll (*Bot.*). The fruit of the cotton plant.

boll weevil (*Cotton*). A weevil (***Anthonomus grandis***) that infests the flowers and the bolls of cotton plants.

boll worm (*Cotton*). The larva of a noctuid moth (*Heliothis armigera*) that feeds on the bolls of the cotton plant.

bollard (*Ships, etc.*). On a quay or vessel, a short upright post round which ropes are secured for purposes of mooring.

Bollman truss (*Struct.*). A braced girder consisting of a horizontal member *AB*, connected to two inclined members *BC* and *CA*, braced by a vertical connecting member *CD*; or of a number of such triangular units connected to the same horizontal member, the girder being supported at the ends.

bolom′eter (*Elec. Eng., Heat*). An instrument for measuring radiant energy. A fine wire or strip is exposed to the radiation and its change of resistance determined.—(*Radio*) An early form of detector consisting of a fine platinum wire enclosed in an evacuated bulb, and forming one arm of a Wheatstone bridge. The passage of high-frequency currents causes a change in resistance of the wire, and alters the balance of the bridge.

Bolsover Moor stone (*Build.*). A dolomite of a warm yellowish-brown colour, which is easily worked but is not particularly durable; employed as a building-stone; of Permian (Magnesian Limestone) age.

bolster (*Carp.*). (1) A short piece of timber capping a pillar or post and offering larger bearing to the supported beam. Also called a CORBEL-PIECE.—(2) A synonym for *lagging* (q.v.).—(*Civ. Eng*) The actual support for a truss-bridge, at its abutment.

bolster (*Eng.*). (1) A steel block which supports the lower part of the die in a pressing or punching machine.—(2) The rocking steel frame by which the bogie of a locomotive supports the load imposed by the weight of the engine.

bolt (*Eng., etc.*). A cylindrical, screwed metal bar provided with a head. In conjunction with a nut, it affords the commonest means of fastening two parts together.

bolts (*Bind.*). The folded edges at the head and fore-edge of a sheet in an uncut volume.

bolt-making machine (*Eng.*). A machine which forges bolts by forming a head on a round bar.

bolted sectional dock (*Civ. Eng.*). A form of *self-docking dock* (q.v.), usually built in three sections of approximately equal length, the two end sections being stepped so as to provide landings for use when carrying out a self-docking operation.

bolting-silk (*Ocean.*). A silk cloth of very fine and regular mesh, used in the construction of tow-nets for the smaller members of the surface fauna.

bolting-silk (or **cloth**) (*Photog.*). Fine-woven cloth for obtaining diffusion effects when stretched in front of a lens.

Boltzmann's constant (*Phys.*). The ratio of the mean total energy of a molecule to its absolute temperature. Its value is $1{\cdot}375 \times 10^{-16}$ ergs per degree. Symbol, **k.**

Boltzmann's law (*Phys.*). See **principle of the equipartition of energy.**

bolus (*Vet.*). See **ball.**

bomb (*Ammunition*). A high-explosive, smoke, or gas projectile which is fired by a smooth-bored weapon, thrown or deposited by hand, or dropped from an aeroplane. It may explode by percussion or by time mechanism.

bomb (*Geol.*). A spherical or ovoid mass of lava, in some cases hollow, formed by the disruption of molten lava by explosions in an active volcanic vent. See *also* **bread-crust bomb.**

bomb calorimeter (*Heat*). A form of apparatus used for determining the calorific values of fuels. The *bomb* consists of a thick-walled steel vessel in which a weighed quantity of the fuel is ignited in an atmosphere of compressed oxygen. The bomb is immersed in a known volume of water, from the rise of temperature of which the calorific value is calculated.

Bonawe granite, bon-aw′ (*Build.*). Fine-grained granite-porphyry quarried at Bonawe near Oban, Scotland. It is a hard, tough, and durable stone, much used for paving purposes.

bond (*Build.*). The system under which bricks or stones are laid in overlapping courses in a wall in such a way that vertical joints in any one course are not immediately above the vertical joints of an adjacent course.

bond (*Chem.*). See **chemical bond.**

bond (*Civ. Eng*). The adhesion between concrete and its reinforcing steel, due partly to the shrinkage of the concrete in setting and partly to the natural adhesion between the surface particles of steel and concrete. See **mechanical bond.**

bond (*Elec. Eng*).

See **conductor-rail—**
continuity—
cross—
impedance—
rail—
track-rail—

bondstone (*Masonry*). A long stone laid as a header through a wall. Also called a BONDER.

bond-timber (*Build.*). A horizontal large-section timber built into a brick wall and serving as a bond-course.

bonder (*Masonry*). See **bondstone.**

bonding (*Aero.*). Electrical connexion of all available metal on an aircraft, in order to give earth-capacity for wireless purposes.

bonding (*Cables*). An electrical connexion between adjacent lengths of armouring or lead sheath, or across a joint. See also **cross bonding.**

bonding clip (*Elec. Eng.*). A clip used in wiring systems to make connexion between the earthed metal sheath of different parts of the wiring, in order to ensure continuity of the sheath.

bone (*Zool.*). A variety of connective tissue in which the matrix is impregnated with salts of lime, chiefly phosphate and carbonate.

bone (*Mining*). Coal containing **ash** (*bone*) in very fine layers along the cleavage planes. Also called BONY COAL.

bone beds (*Geol.*). Strata, often sands, gravels, or their indurated equivalents, characterised by an extremely high content of fossil remains. Examples are the Ludlow Bone Bed and the Rhaetic Bone Bed, the former consisting largely of the fragmental remains of primitive fossil fishes, and the latter of reptilian bone-fragments. Such abnormal concentration of fossils is due to some sudden change in conditions adversely affecting the fauna, or to the washing together, by wave- or current-action, of scattered bones, shells, etc. into a back-water or sheltered region.

bone black (*Chem., Paint.*). A term for finely ground animal charcoal. Used as a pigment, and for the decolorisation and filtration of liquids and the absorption of gases.

bone conduction (*Med.*). The conduction of sound-waves from the bones of the skull to the inner ear, rather than through the ossicles from the outer ear.

bone oil (*Chem.*). See **Dippel's oil.**

bone porcelain (*Pot.*). A body formed of china-stone, china-clay, and bone ash.

bone-setter (*Med.*). A medically unqualified person who treats disorders of joints by manipulation.

bone turquoise (*Min.*). Fossil bone or tooth, coloured blue with phosphate of iron; widely used in the past and at present as a gemstone. It is not true turquoise, and loses its colour in the course of time. Also called ODONTOLITE.

Bonetti machine (*Elec. Eng.*). A type of influence machine somewhat similar to the Wimshurst machine but having no sectors and a larger number of brushes. It is not self-starting.

boning-in (*Surv.*). The process of locating and driving in pegs so that they are in line and have their tops also in line; carried out by sighting between a near and a far peg previously set in the gradient desired.

boning-rods (*Surv.*). T-shaped rods used, in sets of three, to facilitate the process of boning-in; two of the rods are held on the near and far pegs to establish a line of sight between them in the desired gradient, while the third is used to fix intermediate pegs in line.

bonnet (*Build.*). A wire-netting cowl covering the top of a ventilating pipe or a chimney.

bonnet (*Eng., etc.*). A movable protecting cover; e.g. (1) the cap of the valve-box of a pump; (2) the cover plate of a valve chamber, (3) the hood of a forge; (4) the cover over the engine of a motor vehicle.

bonnet (*Plumb.*). A cover serving as a guide for a valve spindle, and enclosing the valve.

bonnet tiles (*Build.*). Special rounded tiles used to cover the external angles at hips and ridges on tiled roofs. See **arris tiles.**

bony coal (*Mining*). See **bone.**

book gill (*Zool.*). See **gill book.**

book lung (*Zool.*). See **lung book.**

bookbinding. The art of arranging in consecutive order the sections, etc. forming a book, and of sewing them together and preparing them for casing-in and finishing. See **full-bound, half-bound, quarter-bound.**

booking (*Surv.*). A term used by surveyors to describe the operation of recording field observations.

boom (*Acous.*). Enhanced reverberation or resonance in an enclosed space at low frequencies, due to reduced acoustic absorption of the surfaces for low frequencies.

boom (*Eng., Ships, etc.*). Any long beam; more especially—(1) the upper or lower flange of a built-up girder; (2) the main spar of a lifting-tackle; (3) the spar holding the lower part of a fore-and-aft sail; (4) a spar attached to a yard to lengthen it; (5) a barrier of logs to prevent the passage of a vessel; (6) a line of floating timbers used to form a floating harbour; (7) a pole marking a channel.

boom (*Struct.*). A *chord* (q.v.).

boom, microphone (*Cinema.*). See **microphone boom.**

boost (*I.C. Engs.*). The amount by which the induction pressure of a supercharged internal-combustion engine exceeds atmospheric pressure; expressed in lbs. per sq. in.

boost gauge (*I.C. Engs.*). A sensitive pressure-gauge for indicating the degree of *boost* (q.v.) in the induction-pipe of a supercharged aero-engine.

booster (*Elec. Eng.*). A generator or transformer connected in series with a circuit in order to raise or lower the voltage of that circuit.

See **battery— negative—**
differential— transformer—
milking—

booster fan (*Eng.*). A fan for increasing the pressure of air or gas; used for restoring the pressure drop in transmission pipes, and for supplying air to furnaces.

booster pump (*Eng.*). A pump which is inserted in a closed-pipe system to increase the pressure of the liquid in some part of the circuit.

boot-boiler (*Build.*). An angle-shaped boiler with vertical and horizontal branches, fitted in a kitchener to supply the hot-water system.

booted (*Zool.*). Having the feet protected by horny scales, as some Birds.

booth (*Cinema.*). See **camera booth, monitoring booth.**

bora (*Meteor.*). A squally winter wind blowing down upon the northern shores of the Aegean and Adriatic seas.

boracic acid (*Chem.*). See **boric acid.**

bo'racite (*Min.*). The cubic, or pseudocubic, form of magnesium borate, together with magnesium chloride, found in beds of gypsum and anhydrite, e.g. at Stassfurt in Germany.

borates (*Chem.*). See **boric oxide.**

borax (*Min.*). A mineral deposited by evaporation of the waters of alkaline lakes, notably in California, Nevada, and Tibet. Borax, which is hydrated sodium borate, occurs as a surface efflorescence, or as monoclinic crystals embedded in the lacustrine mud.

borax bead (*Chem.*). Borax, when heated, fuses to a clear glass. Fused borax dissolves many colouring oxides giving glasses with a characteristic colour. The borax bead used in chemical analysis is based on this fact.

borboryg'mus (*Med.*). The noise made by gas in the bowels.

bord-and-pillar (*Mining*). A method of mining coal which consists in excavating a series of chambers, rooms, or stalls, leaving pillars of coal in between to support the roof.

bordroom-man (*Mining*). A man who removes debris and timbers the roof in old roadways when using the bord-and-pillar method of mining coal.

Bordeaux B (*Chem.*). An azo-dyestuff derived from α-naphthylamine coupled with *R-acid* (q.v.).

border-line case (*Psychol.*). An individual whose mental state is on the border-line between that of true organic insanity and functional nervous disorder, who is difficult to certify as insane, and therefore usually just manages to keep out of mental hospitals.

border parenchyma (*Bot.*). A sheath of one or more layers of parenchymatous cells surrounding a vascular bundle.

border-pile (*Civ. Eng.*). A pile driven to support the sides of a coffer-dam.

border plane (*Join.*). A plane for cutting rebates or grooves along the edge of a piece of timber.

border stone (*Build.*). A kerbstone for a road.

border tie (*Textiles*). A jacquard-loom harness used in cloth manufacture. The arrangement allows one section to weave the centre of the fabric and the other to weave the border or borders.

bordered pit (*Bot.*). A thin area in the wall between two vessels or tracheides, surrounded by overhanging rims of wall thickening.

bore (*Artillery*). The interior of a piece of ordnance or small-arm, including both the chamber and rifled portion. See **chamber.**

bore (*Eng.*). The circular hole along the axis of a pipe: the internal wall of an engine- or pump-cylinder.

borehole (*Civ. Eng.*). A sinking made in the ground by the process of *boring* (q.v.).

bore (*Hyd. Eng.*). A great tide-wave, with crested front, travelling rapidly up a river; it occurs on certain rivers having obstructed channels.

boric acid (*Chem.*). H_3BO_3. Boric acid is a tribasic acid. On heating it loses water and forms metaboric acid, $H_2B_2O_4$, and on further heating it forms tetraboric acid, or the so-called pyroboric acid, $H_2B_4O_7$. On heating at a still higher temperature it forms anhydrous boron trioxide, or boric oxide. It occurs as tabular triclinic crystals deposited in the neighbourhood of fumaroles, and known also in solution in the hot lagoons of Tuscany and elsewhere. Also called BORACIC ACID, SASSOLITE.

boric oxide (*Chem.*). B_2O_3. An 'intermediate oxide' like aluminium oxide, for it has feeble acidic and feeble basic properties. As a weak acid it forms a series of borates. See also **boric acid.**

boring (*Civ. Eng.*). The process of drilling holes into ground or rock for the insertion of blasting charges, or to obtain information as to thickness and position of strata.—(*Mining, etc.*) The drilling of deep holes for the exploitation or exploration of oil fields. The term *drilling* is used similarly in connexion with metalliferous deposits.

boring (*Eng.*). The process of machining a cylindrical hole, performed in a lathe or boring mill; for large holes, or when great accuracy is required, it is preferable to drilling.

boring bar (*Eng.*). A bar driven by the spindle of a boring machine, and carrying the boring tool. It is supported at the machine-table, so providing the requisite rigidity for boring long holes.

boring-bit (*Tools*). See **bit.**

boring machine (*Eng.*). A machine on which boring operations are performed, comprising a head, carrying a driving-spindle, and a table to support the work.

boring mill (*Eng.*). A vertical boring machine in which the boring bar is fixed, the work being carried by the rotating table.

boring tool (*Eng.*). The cutting tool used in boring operations, resembling a lathe tool used for internal turning. It is held in a boring bar.

Borna disease (*Vet.*). A contagious infection of horses, cattle, and sheep due to a filterable virus.

Borneo camphor (*Chem.*). *Borneol* (q.v.).

borneol (*Chem.*). $C_{10}H_{17}\cdot OH$, m.p. 203°, b.p. 212° C., crystallises in hexagonal plates; it has the character of a secondary alcohol, and yields on oxidation camphor; it forms with PCl_5 bornyl chloride, which is identical with pinene hydrochloride. Borneol occurs naturally in a *d*-, *l*-, and an inactive form.

bornite (*Min.*). A valuable copper ore, a sulphide of copper and iron, crystallising in the cubic system; occurs in Cornwall and many other localities. Also called ERUBESCITE, HORSE-FLESH ORE, PEACOCK ORE (q.v.), VARIEGATED COPPER ORE (q.v.).

bornite detector (*Radio*). A crystal detector consisting of a steel point in contact with a bornite crystal; it has marked rectifying properties.

bornyl chloride (*Chem.*). $C_{10}H_{17}Cl$, m.p. 148° C., white crystals, identical with pinene hydrochloride, obtained from *borneol* (q.v.) by treatment with PCl_5.

boroethane, bō-rō-eth′— (*Chem.*). See **hydroborons.**

borofluʹorides (*Chem.*). See **fluoboric acid.**

borʹolanite (*Geol.*). A basic igneous rock occurring near Loch Borolan, Assynt, in the N.W. Highlands; it consists essentially of feldspar, green mica, garnet, together with conspicuous rounded white aggregates thought to be pseudo-leucites.

boʹron (*Chem.*). Symbol, B. A non-metallic element in the third group of the periodic system. At. no. 5, at. wt. 10·82, valency 3. Metallic boron conducts electricity; its sp. gr. is 2·535; the amorphous form is a chestnut-brown powder, sp. gr. 2·45. M.p. 2300° C., b.p. 2550° C. It occurs in nature as boric acid and borax, and may be prepared by reducing the trioxide or chloride.

boron carbide (*Chem.*). B_4C. A new boron carbide obtained from B_2O_3 and coke at about 2500° C. Very hard material, and for this reason used as an abrasive in cutting tools where extreme hardness is required. Extremely resistant to chemical reagents at ordinary temperatures.

boron hydrides (*Chem.*). See **hydroborons.**

boron nitride (*Chem.*). BN. When heated in an atmosphere of nitrogen or ammonia, boron forms *boron nitride.*

boron trihalides (*Chem.*). All the four halogens unite with boron to form trihalides as follows:—BF_3, BCl_3, BBr_3, BI_3.

borrow pit (*Civ. Eng.*). When, on any given construction, there is a deficiency of cutting, extra material to serve as fill is taken from a site outside the works, this being known as a *borrow pit.*

bort (*Min.*). A finely crystalline form of carbon, occurring in small spherical bodies showing an internal radiating structure. Possessing the hardness of diamond, bort is exceedingly tough, and is used as the cutting agent in rock drills.

bosh (*Foundry*). A limp brush used for wetting moulds round the edges of patterns. Also called SWAB.

bosh or **boshes** (*Met.*). The tapering portion of a blast-furnace, between the largest diameter (at the bottom of the stack) and the smaller diameter (at the top of the hearth).

boss (*Eng.*). A projection, usually cylindrical, on a machine part in which a shaft or pin is to be supported; e.g. the thickened part at the end of a lever, provided to give a longer bearing to the pin.

boss (*Geol.*). An igneous intrusion of cylindrical form, less than 40 sq. m. in area; otherwise like a bathylith.

bossage (*Masonry*). Roughly dressed stones, such as quoins and corbels, which are built in so as to project, and are finish-dressed in position.

bosset (*Zool.*). In Deer, the rudiment of the horns in the first year.

bossing (*Plumb.*). The operation of shaping malleable metal, particularly sheet-lead, to make it conform to irregularities of the surface it is covering, the operation being accomplished by tapping with special mallets.

bossing mallet (*Plumb.*). A specially shaped mallet used in the operation of dressing sheet-lead to required form by 'bossing.'

bossing stick (*Plumb.*). A wooden tool used to shape sheet-lead into a lining for a tank.

bossing-up (*Eng.*). The process of forming a boss on a forging.

bosʹtonite (*Geol.*). A fine-grained intrusive igneous rock allied in composition to syenite; essentially feldspathic, and deficient in coloured silicates; type locality, Boston, Mass.

bosʹtryx (*Bot.*). A cymose inflorescence in which the lateral axes always arise on the same side of the parent axis.

bot (*Vet.*). The larva of flies of the genus *Gastrophilus*; bots parasitise the membrane of the stomach of horses, rarely of other animals.

B.O.T. ohm (*Elec. Eng.*). Board of Trade ohm; a term sometimes used to denote the international ohm.

Botall's duct (*Zool.*). In some Vertebrates, a small blood-vessel representing the sixth gill arch dorsal to the origin of the pulmonary arteries, and connecting the systemic with the pulmonary arch; important in the embryonic circulation of *Amniotes* and functional in some *Urodeles*, otherwise vestigial or absent.

Botany (*Worsted*). A term applied to the wool of the Merino sheep, and to fabrics made from such wool. See **quality terms.**

Botany twill (*Worsted*). A twilled cloth manufactured from Botany yarns; generally made in the grey state and piece-dyed.

bothridʹium (*Zool.*). In *Cestoda*, a thin folded flap projecting from the scolex and used as an organ of fixation. Also called PHYLLIDIUM.

bothʹrium (*Zool.*). In *Cestoda*, a groove-shaped sucker with loose weak musculature.

bothway (*Teleph.*). Said of a junction or trunk when traffic can be originated in both directions.

botryoi'dal (*Zool.*). Shaped like a bunch of grapes; in some *Hirudinea*, said of a tissue surrounding the gut and composed of branched canals, the walls of which are formed of large cells containing black pigment; of unknown function.

botryomyco'sis (*Vet.*). A chronic purulent inflammation of horses, characterised by excessive growth of fibrous tissue due to infection by *Staphylococci*. Also called SCIRRHUS CORD.

bot'ryose, bot'ryoid, botryt'ic (*Bot.*, *Zool*). Branched; like a bunch of grapes. See **racemose.**—(*Geol.*) Said of mineral aggregates resembling a bunch of grapes.

bottle (*Elec. Comm.*). A colloquialism for *thermionic valve.*

bottle-battery (*Elec. Eng.*). A term used to denote a bichromate cell when the electrodes and electrolyte are placed in a glass bottle-shaped container.

bottle glass (*Glass*). Glass used for the manufacture of common bottles, made from a batch comprising essentially sand, limestone, and alkali. A typical percentage glass composition may be taken as SiO_2 74·0, Al_2O_3 0·6, CaO 9·0, Na_2O 16 3.

bottle jack (*Eng.*). A screw-jack in which the lower part is shaped like a bottle.

bottle-making machines (*Glass*). These may operate in various ways, the bottle being formed in two stages, i.e. the parison and the finished bottle. Wide-mouth ware may be formed by pressing the parison and then blowing, narrow-mouth by blowing and blowing or sucking and blowing. In the last method, the glass is gathered by suction into the parison mould, in the other two it is dropped by hand or more probably by a mechanical-feeding device, hence the terms suction-fed and feeder-fed machines.

bottle-nose drip (*Plumb.*). The shaped edge formed in sheet-lead work at a step on a roof, when jointing the lead across the direction of fall.

bottle-nosed step (*Build*). A step which has the edge and ends rounded.

bottle-stone (*Min.*). A mineral of problematical origin, possessing the characters of ordinary bottle-glass, occurring in Bohemia and Moldavia. Used as a gemstone. Also called MOLDAVITE, WATER-CHRYSOLITE.

bottom (*Acous.*). A colloquialism for the lower range of audio-frequencies in sounds for recording, which contribute mainly to the loudness and fullness of these sounds.

bottom (*Mining*). The floor of the workings in a colliery.

bottoms (*Met.*). A term used in connexion with the Orford process for separating nickel and copper as sulphides. When the mixed sulphides are fused with sodium sulphide, the nickel sulphide separates to the bottom. Hence *bottoms* as distinct from *tops*.

bottom bars (*Lace*). Thin perforated steel strips which function in producing variations in the ground.

bottom bend (*Thermionics*). See **anode bend.**

bottom board (*Foundry*). A board placed on the underside of a mould during ramming.

bottom dead-centre (*Eng.*). See **outer dead-centre.**

bottom gate (*Foundry*). An *in-gate* (q.v.) leading from the runner into the bottom of a mould.

bottom plate (*Horol.*). In a watch, the plate to which the pillars are fixed, generally referred to as the *dial plate*.

bottom rail (*Carp.*, *Join.*). The lowest horizontal member in a door or other framing.

bottom-samplers (*Ocean.*). Various types of apparatus which, when lowered, are capable of piercing the sea-bottom and retaining a sample of the deposit. See **ocean depths,** etc.

bottom shore (*Carp.*). One of the members of an arrangement of raking shores to support temporarily the side of a building; it is the one nearest the wall face.

bottom-stock department (*Boots and Shoes*). The department in which the soles, inner soles, counters, and other small fittings are cut.

bottom yeast (*Bot.*). The yeast that collects at the bottom of a vessel in which alcoholic fermentation is proceeding.

bottoming (*Civ. Eng.*). The lowest layer of foundation material for a road.—(*Rail.*) Ballast in permanent-way.

bottoming tap (*Eng.*). See **plug tap.**

botu'liform (*Bot.*). Sausage-shaped.

bot'ulism (*Med.*, *Vet*). Poisoning due to eating flesh, carrion, or decaying vegetation which has been infected with *Bacillus botulinus* (*Clostridium botulinum*).

Boucherot circuit, boosh-er-ō (*Elec. Eng*). An arrangement of inductances and capacitances, whereby a constant-current supply may be obtained from an ordinary constant-voltage circuit.

Boucherot motor (*Elec. Eng.*). A name sometimes given to the double-cage induction motor.

bouchon, boosh'on^{g} (*Horol.*). A hollow plug, or bush, inserted in watch or clock plates to form the pivot holes. To repair a worn hole, the hole is enlarged and a bouchon pressed in. In certain cases the jewels are held in bouchons which are a press fit in the plates

bouchon wire (*Horol*). Hollow wire, generally of hard brass, which is cut off to the required lengths to form bouchons.

bouclé, book'lā (*Worsted*). A term applied to a fabric characterised by effects of a curled or looped nature.

bougie, boo'jē (*Med.*). A tube or a rod for dilating narrowed passages in the body.

bougie decimale or **decimal candle** (*Illum.*). The French legal unit of luminosity. It is defined as one-twentieth of the luminous intensity, viewed normally, of a sq. cm. of molten platinum at the temperature of solidification. Often abbreviated to **b.d.**

boulder (*Geol.*). The unit of largest size occurring in sediments and sedimentary rocks, the limit between pebble and boulder being placed at 100 mm., though some authorities recognise 'cobbles' between pebbles and boulders. Boulders may consist of any kind of rock, may be sub-angular or well rounded, may have originated in place or have been transported by running water or ice. Accumulations of boulders are *boulder beds*.

boulder clay (*Geol.*). The characteristic product of glaciation, consisting of stones to the size of boulders, sometimes facetted and striated, embedded in a clay matrix which is essentially rock powder produced by abrasion of the floor over which the glacier moved.

boulder paving (*Build.*). Paving constructed with rounded boulders laid on a gravel foundation.

boulder wall (*Build.*). A wall built of boulders or flints set in mortar.

boule (*Jewel.*, *Min.*). A small pear-shaped mass of synthetic sapphire, ruby, etc., produced by the fusion of alumina, suitably tinted, in a furnace of special design.

boulevard, bool'var. A broad street with rows of trees along the sides.

boulle (*Furn.*). A complicated form of inlay, gold, silver, or brass and pewter, ivory and mother-of-pearl in tortoiseshell, forming panels for furniture decoration. Also spelt BUHL—erroneously, since it is named from its originator Boulle.

bounce (*Cinema.*). A colloquial attribute of sound for recording, implying that reverberation is relatively high for high-frequency components.

bouncing-pin detonation meter (*Eng.*). An apparatus for determining quantitatively the degree of detonation occurring in the cylinder of a petrol-engine; used for fuel testing.

bound charge (*Elec. Eng.*). An induced electrostatic charge which is 'bound' by the presence of the charge of opposite polarity which induced it.

bound water (*Bot.*). Water held in organic substances by adsorptive or other physical forces.

boundary films (*Met.*). Films of one constituent of an alloy surrounding the crystals of another constituent.

boundary lubrication (*Eng., Phys.*). A state of partial lubrication which may exist between two surfaces in the absence of a fluid oil film, due to the existence of adsorbed mono-molecular layers of lubricant on the surfaces.

bouquet stage (*Biol.*). See **pachytene.**

Bourdon gauge (*Eng.*). See **pressure-gauge.**

bourette (*Textiles*). A heavy yarn made chiefly from waste silk but having tufts of wool twisted with it at intervals.

bourgeois, ber-jois' (*Typog.*). The old name of a size of type, now standardised as 9-point.

Bournemouth Beds (*Geol.*). A division of the Bracklesham Beds, of Eocene age, occurring in the Hampshire Basin; it comprises some 450 ft. of fresh-water beds with plant remains, together with shell-bearing marine beds at the top.

bour'nonite (*Min.*). See **wheel-ore.**

Bovey Tracey Beds or **Bovey Beds** (*Geol.*). A series of fresh-water clays, sands, and lignites, some 600 ft. in thickness, occupying a depression near Bovey Tracey in Devonshire; regarded as the site of a lake in Pliocene times, receiving detritus from the surrounding high ground, including Dartmoor.

bow, bō (*Elec. Eng.*). A sliding type of current collector, used on electric vehicles to collect the current from an overhead contact-wire. It consists of a bow-shaped contact strip, mounted on a hinged framework.

bow (*Horol.*). (1) The ring, generally circular, of a pocket-watch case, to which the watch or fob chain is attached.—(2) A flexible strip of whalebone or cane, the ends of which are drawn together to give tension to a thread or line which is given a single turn round a pulley of a pair of turns, drill, or mandrel. It is used as a sensitive drive for these tools, and by many it is considered to be the best way to produce very fine accurate pivots.

bows or **bow compasses** (*Instruments*). See **spring bows.**

bow drill (*Eng.*). A drill rotated by the frictional grip of a string wound round it and held at the requisite tension by a bow, which is given a sawing motion by the operator.

bow-saw (*Tools*). A thin-bladed saw which is kept taut by a bow or special frame.

bow stretcher (*Furs*). Strips of elastic wood, birch or hickory, bent in bow form, on which small skins are stretched.

bowstring bridge (*Civ. Eng.*). An arched bridge in which the horizontal thrust on the arch is taken by a horizontal tie joining the two ends of the arch.

bowstring girder (*Struct.*). A built-up girder having a horizontal lower boom, and a curved upper boom intercepting a segment of a circle and connected by lattice bars for added strength.

bowstring suspension (*Elec. Eng.*). A form of suspension for the overhead contact-wire of an electric-tramway system, in which the contact-wire is suspended from a short cross-wire attached to the bracket-arm of the pole.

bow strip (*Elec. Eng.*). See **contact strip.**

bow-window (*Build.*). An internal recess formed when a wall projects outside the general wall-line and has, or approximates to, the plan form of a segment.

bow sheaves, bow (*Elec. Comm.*). The sheaves at the bow of a cable-laying ship over which the cable passes when it is being laid in the sea or raised for repair.

Bow's notation (*Eng.*). A method of notation for forces acting at a point, the spaces between the forces being lettered in order, so that any force is described in terms of the letters referring to the two adjacent spaces. By this device the force polygon can be lettered correspondingly. Also called HENRICI'S NOTATION.

Bowden-Thomson protective system (*Elec. Eng.*). A form of protective system for feeders, in which special cables, with the cores surrounded by metallic sheaths, are employed; a fault causes current to flow in the sheath and operate a relay to trip the circuit.

Bowditch's rule (*Surv.*). A rule for the adjustment of closed compass traverses, in which it may reasonably be assumed that angles and sides are equally liable to error in measurement. According to this rule, the correction in latitude (or departure) of any line is:

$$\frac{\textit{Length of that line}}{\textit{Perimeter of traverse}} \times \textit{Total error in latitude (or departure)}.$$

bowed (*Furn.*). Said of cupboards, cabinets, etc., with curved front.

bowenite (*Min.*). A compact, finely granular, massive form of serpentine, formerly thought to be nephrite, and used for the same purposes.

bower anchor (*Ships*). One of the anchors carried at the bow of a ship; used for anchoring and mooring.

Bower-Barffing (*San. Eng.*). An anti-corrosion process applied to sanitary ironwork; this, when red-hot, has superheated steam passed over it in a closed space, so that a protective layer of black magnetic oxide is formed on the ironwork. See **Angus-Smith process.**

bowk (*Mining*). A large iron barrel used for men's tools and debris when sinking a shaft.

bow'lingite (*Min.*). See **saponite.**

Bowman's capsule (*Zool.*). In the Vertebrate kidney, the dilated commencement of a uriniferous tubule.

Bowman's glands (*Zool.*). In some Vertebrates, serous glands of the mucous membrane of the olfactory organs.

Bowman's membrane (*Zool.*). In Vertebrates, a lamina of homogenous connective tissue upon which rests the stratified epithelium of the cornea.

bows. See **spring bows.**

box (*Cables, Elec. Eng.*).

See **bifurcating—**
brush—
conduit—
connecting (or **connexion**)**—**
dividing—
junction—
sealing—
switch—
trifurcating—

See also **distribution board, draw-in system, feeder, joint.**

box (*Photog.*). See **changing— drying—**

box (*Timber*). See **boxwood.**

box annealing (*Met.*). See **close annealing.**

box baffle (*Acous.*). A baffle in the form of a box, with the reproducing diaphragm mounted in the centre of a face, the opposite face being open or closed, the effect being the same as a much larger plane baffle.

boxboard (*Paper*). Thin board used in the manufacture of cartons. Made from mechanical woodpulp and waste.

box calf (*Leather*). Calf skins which have been chrome-tanned, dyed black, and subjected to boarding to produce the box grain.

box car (*Rail.*). A closed car used for the transport of goods.

box chronometer (*Ships*). The marine chronometer. The chronometer is normally supported on gimbals, inside a wooden box with a hinged lid.

box cloth (*Textiles*). A woollen fabric, heavily milled and finished with a smooth surface like felt; manufactured from fine wools.

box column (*Build.*). A built-up hollow column of square or rectangular section.

box coupling (*Eng.*). See **muff coupling.**

box culvert (*Civ. Eng.*). A culvert having a rectangular opening.

box dam (*Civ. Eng.*). A coffer-dam built to surround an area in which works are to proceed.

box dock (*Civ. Eng.*). A double-sided floating-dock of channel section.

box drain (*San. Eng.*). A small rectangular section drain, usually built in brickwork or concrete.

box-frame motor (*Elec. Eng.*). A traction motor in which the frame is cast in one piece instead of being split.

box girder (*Struct.*). A cast-iron girder of hollow rectangular section. See **box plate girder.**

box grain (*Leather*). A small square produced on box calf by treatment while it is in a damp state.

box gutter (*Build.*). A wooden gutter, lined with sheet-lead, zinc, or asphalt, and having upright sides; used along roof valleys or parapets.

box-in (*Typog.*). To surround type with rule, the printed matter appearing in a rectangular frame.

box loom (*Textiles*). A loom provided with several shuttle boxes so that different colours, qualities, or types of material can be inserted in the material as weft.

box nut (*Eng.*). A nut whose outer end is closed, so protecting the end of the screw, and giving a neat appearance.

box of tricks (*Cotton Spinning*). The building motion of a fly frame. It regulates the speed of the bobbin, reverses the traverse of the lifting rail and reduces this as each layer of roving is laid on the bobbin. Also called ESCAPE MOTION.

box plate girder (*Struct.*). A built-up steel girder, similar to the plate girder, but having two web plates at a distance apart, so that flanges and webs enclose a rectangular space.

box sextant (*Surv.*). A compact form of the sextant, contained in a small metal box.

box slip (*Carp.*). A hard boxwood slip secured to the beechwood stock of a tonguing or grooving plane and forming a durable facing at the rubbing surface.

box spanner (*Eng.*). A hollow tubular spanner shaped at the end or ends to fit the nut, and turned by a tommy bar inserted through a transverse hole. It is used for nuts inaccessible to an ordinary spanner.

box-staple (*Carp.*). The part on a door-post into which the bolt of a lock engages.

Box Stone of East Anglia (*Geol.*). A thin stratum, of Older Pliocene age, consisting of derived material underlying the Crag where the latter rests on London Clay in Suffolk. It contains nodules of sandstone (*box-stones*) many of which contain molluscan casts.

box-type brush-holder (*Elec. Eng.*). See **brush box.**

box-type (or cage-type) negative plate (*Elec. Eng.*). A form of negative plate for an accumulator which is made up by riveting two lead grids together and placing the active material in the spaces between them.

boxed frame (*Join.*). A *cased frame* (q.v.).

boxed mullion (*Join.*). A hollow mullion in a sash window-frame, arranged to accommodate the counterweights connected to the vertically moving sashes.

boxing (*Join.*). The part of a window-frame which receives the folded shutter.

boxing (*Civ. Eng.*). A layer of small ballast packed between the sleepers of a railway track.

boxing shutters (*Join.*). Shutters at the interior side of a window, hung so as to fold back into a recess in the jambs. Also called FOLDING SHUTTERS.

boxwood (*Timber*). The pale-yellow, close-grained, hard and tough wood of the box tree, used for drawing scales, tool handles, etc.; it requires several years of seasoning.

Boyle's law (*Phys.*). The volume of a given mass of gas kept at one uniform temperature varies inversely as the pressure. There are deviations from this law at low and high pressures and according to the nature of the gas.

b.p. (*Chem.*). An abbrev. for *boiling-point.*

B.P. (*Chem.*). An abbrev. for *British Pharmacopoeia.*

B.P. (*Ship Constr.*). An abbreviation for *between perpendiculars*, i.e. the length between the forward perpendicular (the forward side of a ship's stem) and the after perpendicular (the after side of the stern-post).

Br (*Chem.*). The symbol for *bromine.*

braccate (*Zool.*). (Of Birds) having feathered legs or feet.

brace (*Carp., Eng., etc.*). A tool used to hold a bit and give it rotary motion. The bit is secured axially in a socket at one end, the other end (to which pressure is applied) being in line with it, while the middle part of the brace is cranked out so that the whole may be rotated. Also called a BIT-STOCK.

brace (*Eng., etc.*). A rod or bar connecting two parts of a structure for stiffening purposes; it is always subjected to a tensile force.

brace (*Typog.*). ⏞ Usually cast to a definite em measurement; sectional braces are built up to the required length; should point towards the lesser number of lines.

brace bit (*Tools*). The actual boring tool used in the socket of a brace.

brace jaws (*Tools*). The parts of the socket of a brace which clamp upon the shank of the brace bit to secure it while drilling.

braced girder (*Struct.*). A girder formed of two flanges connected by a web consisting of a number of bars dividing the girder into triangles or trapeziums and transmitting the horizontal forces from one flange to another.

brachely'trous (*Zool.*). Said of Insects having short truncate elytra which do not completely cover the abdomen.

brachi-, brachio- (Latin *brachium*, arm). A prefix used in the construction of compound terms; e.g. *brachiocephalic*, pertaining to the arm and head.

bra'chial (*Zool.*). See **brachium.**

brachial disc (*Zool.*). In certain *Discomedusae*, a horizontal disc formed by the union of the larval arms, and occupying the centre of the subumbrellar surface.

brachial ossicles (*Zool.*). In *Crinoidea*, the ossicles supporting the arms.

bra'chiate, brachif'erous (*Bot., Zool.*). Branched: having widely spreading branches: bearing arms.

brachiola'ria (*Zool.*). A larval stage of some *Asteroidea*, differing from the *Bipinnaria* (q.v.) in having three adhesive papillae, and a sucker developed on the pre-oral lobe.

Brachiop'oda (*Zool.*). A phylum of solitary non-metameric *Metazoa*, with a well-developed coelom; sessile marine forms, with a lophophore in the form of a double vertical spiral, and usually with a bivalve shell. Brachiopods range from early geological periods up to the present time; they occur in all seas, often at great depths.

bra'chium (*Zool.*). The proximal region of the fore-limb in land Vertebrates: a tract of nerve-fibres in the brain: more generally, any arm-like structure, as the rays of Starfishes.—*adj.* **brachial.**

brachy- (Greek *brachus*, short). A prefix used in the construction of compound terms; e.g. *brachydactylous*, having short digits.

brach'yblast (*Bot.*). A short branch of limited growth, bearing leaves and, sometimes, flowers and fruit; a *spur* (q.v.).

brach'ycephal'ic (*Anat.*). Short-headed; said of skulls whose breadth is at least four-fifths of the length.

brachycerous, —is'er-us (*Zool.*). Having short antennae, as some *Diptera*.

brach'ycla'dous (*Bot.*). Having very short branches.

brachydac'tyly, brachydacty'lia (*Med.*). Abnormal shortness of fingers or toes.

brach'yform (*Bot.*). A species of rust fungus in which the aecidium is omitted from the life history, or is replaced by a primary uredosorus.

brach'ymeio'sis (*Cyt.*). A simplified form of meiosis, completed in one division.

brach'yodont (*Zool.*). Said of Mammals having low-crowned grinding teeth in which the bases of the infoldings of the enamel are exposed: used also of the teeth. Also BRACHYDONT. Cf. *hypsodont*.

brachyp'terism (*Zool.*). In Insects, the condition of having the wings reduced in length.—*adj.* **brachypterous.**

brachysclereide, —skler'id (*Bot.*). See **stone cell.**

brachysto'matous (*Zool.*). (Of Insects) having the proboscis reduced in length.

brachyu'rous, brachyu'ral (*Zool.*). Said of decapodan *Crustacea*, in which the abdomen is reduced and bent forward underneath the thorax, by which it is completely hidden.

bracing (*Civ. Eng.*). The staying or supporting rods or ties which are used in the strengthening of a structure.

bracket (*Build.*). A projecting support for a shelf or other part.

bracket (*Typog.*). A mark of punctuation [ ] used to include comments, corrections, explanations, etc., not in the original work, but added by subsequent authors or editors. The term is often loosely used for *parentheses* (q.v.).

bracket arms (*Elec. Eng.*). The transverse projecting arms on the poles, for supporting the overhead contact wire equipment for a tramway or railway system.

bracket baluster (*Build.*). An iron baluster, bent at its foot and fixed into the side of the step, usually when the latter is made of stone or of concrete.

bracket clock (*Horol.*). A clock designed originally to stand on its own bracket secured to a wall. The term is now applied to moderate-sized clocks to stand on the mantelpiece or table.

bracket fungus (*Bot.*). One of a number of species belonging to the *Basidiomycetes*, occurring on tree stumps and trunks, and projecting in the form of a rounded bracket.

bracket scaffold (*Build.*). A scaffold supported on framed brackets carried by *grapplers* (q.v.).

bracketed step (*Join.*). A step supported by a *cut string* (q.v.) which is shaped on its lower edge to form an ornamental bracket.

bracketing (*Build.*). The shaped timber supports forming a basis for plasterwork and mouldings of ceilings and parts near ceilings.

Brackett series (*Light*). A series of lines in the hydrogen spectrum occurring in the far infra-red. The wave-numbers of the series are represented by the formula:

$$\nu = N\left(\frac{1}{4^2} - \frac{1}{n^2}\right).$$

Bracklesham Beds (*Geol.*). A series of variable sands and clays of Eocene age occurring above the Lower Bagshot Beds in the Hampshire Basin; of marine origin in the east, but fresh-water in the west.

bract (*Bot.*). The leaf which subtends an inflorescence or a flower.

bract (*Zool.*). In *Siphonophora*, a hydrophyllium: in some *Branchiopoda*, a lobe on the side of a trunk outer limb.

bract scale (*Bot.*). The small outer scale at the base of the large cone scale in conifers.

bract'eal leaf (*Bot.*). A general term for bracts and bracteoles.

bract'eate (*Bot.*). Having bracts.

bract'eody (*Bot.*). The replacement of other members of the flower by bracts.

bract'eole (*Bot.*). A leaf, generally very small, borne on the stalk of a flower.—*adj.* **bracteolate.**

bracteoma'nia (*Bot.*). An abnormal condition in which a plant forms an enormous number of bracts, and sometimes fails to form normal flowers.

bract'eose (*Bot.*). Having conspicuous bracts.

brad. A nail with a small head projecting on one side, or with the head flush with the sides.

brad (*Foundry*). See **sprig.**

bradawl (*Join.*). A small chisel-edged tool, used to make holes for the insertion of nails and screws.

brad setter (*Join.*). A tool for holding a brad by its head and driving it into position.

Bradford Clay (*Geol.*). A subdivision of the Middle Jurassic, lying between the Great Oölite and the Forest Marble; occurs typically at Bradford-on-Avon, Wilts.

Bradfordian (*Geol.*). A group of strata of Middle Jurassic age between the Vesulian below and the Callovian above, and including the Bradford Clay and its equivalents elsewhere. Also known as BATHONIAN.

bradsot (*Vet.*). See **braxy.**

brad'y- (Greek *bradys*, slow). A prefix used in the construction of compound terms; e.g. *bradyacousia*, slowness (dullness) of hearing.

bradyar'thria (*Med.*). Abnormally slow delivery of speech.

bradycar'dia (*Med.*). Slowness of the beating of the heart.

bradykine'sia (*Med.*). Abnormal slowness of the movements of the body.

bradyphre'nia (*Med.*). Slowness of mental processes.

brad'yspore (*Bot.*). A plant from which the seeds are liberated slowly.

Bragg method (*Min.*). A method of investigating crystal structure by means of X-rays, used successfully by Sir Wm. Bragg and latterly by many other workers.

Bragstad convertor (*Elec. Eng.*). See **motor convertor.**

braid (*Textiles*). A narrow ribbon used as a trimming for dress material and upholstery.

brain (*Zool.*). A term used loosely to describe the principal ganglionic mass of the central nervous system: in Invertebrates, the pre-oral ganglia: in Vertebrates, the expanded and specialised region at the anterior end of the spinal cord, developed from the three primary cerebral vesicles of the embryo.

brain-sand (*Zool.*). In higher Vertebrates, calcareous nodules occurring within the pineal gland, and in the pia mater and its extensions as age advances.

brain stem (*Zool.*). In Vertebrates, regions of the brain conforming to the organisation of the spinal cord, as distinct from such suprasegmental structures as the cerebral cortex and the cerebellum.

brake (*Eng., etc.*). A device for applying resistance to the motion of a body, either (1) in order to retard it, as with a vehicle brake, or (2) to absorb and measure the power developed by an engine or motor.

See **air—**
band—
block—
Froude—
hydraulic—
rope—
also **absorption dynamometer.**

brake drum (*Eng.*). A steel or cast-iron drum attached to a wheel or shaft so that its motion may be retarded by the application of an external band or internal brake shoes. See **band brake, internal expanding brake.**

brake field (*Thermionics*). See **retarding field.**

brake horse-power (*Eng.*). The effective or useful horse-power developed by a prime-mover or electric motor, as measured by a brake applied to the driving shaft. Abbrev. **B.H.P.**

brake incline (*Mining*). An incline in which the full trucks descend by gravity and pull up the empty ones.

brake lining (*Eng.*). Strips of asbestos-base friction fabric riveted to the shoes of internal expanding brakes in order to increase the friction between them and the drum and provide a renewable surface. See **brake shoe.**

brake magnet (*Elec. Eng*). A permanent magnet or electromagnet which produces a braking effect, either by inducing eddy currents in a moving conductor or by operating a mechanical brake by means of a solenoid.

brake mean effective pressure (*Eng.*). That part of the *indicated mean effective pressure* (q.v.) developed in an engine cylinder which would result in a cylinder output equal to the brake horse-power of the engine; the product of I.M E.P. and mechanical efficiency. Abbrev. **B.M.E.P.**

brake shoe (*Eng.*). The renewable rubbing surface of a block brake: the segmental member which is pressed against the inner surface of a brake drum.

brake thermal efficiency (*Eng.*). The efficiency of an engine reckoned in terms of the brake horse-power; given by the ratio of the heat equivalent of the brake output to the heat supplied to the engine in the fuel or steam.

brake-wheel arc lamp (*Illum.*). A form of arc lamp in which the carbons are automatically fed towards the arc, as the current through the arc drops, by the releasing of an electromagnetic brake.

braking (*Elec. Eng.*).

See **electric—**
magnetic—
regenerative—
rheostatic—

braking notches (*Elec. Eng.*). Positions of the handle of a drum-type controller which apply some form of electric braking.

Bramah's press (*Hyd.*). See **hydrostatic press.**

Bramley Fall stone (*Build.*). A durable dark-brown coarse-grained sandstone quarried from the Millstone Grit of Yorkshire; used for general building, paving, and stone steps, and also for heavy work such as foundations for machinery, piers, and bridges.

branch abscission (*Bot.*). The shedding of branches by plants, by means of an organised separation layer.

branch circuit (*Elec. Eng.*). A term commonly used in electric installation work to denote a circuit branched off a main circuit.

branch drain (*San. Eng.*). The communicating drain between a gulley, soil pipe, or sanitary fitting and the main drain.

branch exchange (*Teleph.*). See **private branch exchange.**

branch gap (*Bot.*). An interruption in the vascular cylinder at the point of origin of a branch; characteristic of stems containing pith.

branch pipe (*Plumb.*). A special pipe having one or more branches.

branch switch (*Elec. Eng.*). A term used in connexion with electrical installation work to denote a switch of any type for controlling the current in a branch circuit.

branch tendril (*Bot.*). A tendril formed from a modified branch.

branch trace (*Bot.*). The primary vascular supply to a lateral branch.

branchi-, branchio- (Greek *branchia,* gills). A prefix used in Zoology in the construction of compound terms; e.g. *branchiopallial,* pertaining to the gills and the mantle (in Molluscs).

bran'chia (*Zool.*). In aquatic animals, a respiratory organ consisting of a series of lamellar or filamentous outgrowths; a gill.—*adj.* **branchial.**

branchial arch (*Zool.*). In Vertebrates, one of a series of bony or cartilaginous structures lying in the pharyngeal wall posterior to the hyoid arch; it prevents the gill-slits from collapsing.

branchial basket (*Zool.*). (1) In *Cyclostomata* and cartilaginous Fish, the skeletal framework supporting the gills.—(2) In the larvae of certain Dragonflies (*Anisoptera*), an elaborate modification of the rectum associated with respiration.

branchial clefts (*Zool.*). See **gill-slits.**

branchial duct (*Zool.*). In some *Cyclostomata,* the ventral respiratory tube or bronchus.

branchial formula (*Zool.*). A table showing the number and arrangement of the gills.

branchial heart (*Zool.*). In Vertebrates, a heart such as that of Cyclostomes, in which all the blood entering the heart is deoxygenated and passes thence directly to the respiratory organs: in *Cephalopoda,* special muscular dilatations which pump blood through the capillaries of the ctenidia.

branchial rays (*Zool.*). Branches of the hyoid and branchial arches which support the gills and gill-septa.

branchic'olous (*Zool.*). Parasitic on the gills of Fish.

bran'chihy'al (*Zool.*). One of the skeletal elements composing a branchial arch.

branching jack (*Teleph.*). A jack without breaking contacts.

branchio-. Prefix. See **branchi-.**

bran'chiomere (*Zool.*). In metameric animals, a somite bearing branchiae.

branchiom'erism (*Zool.*). Serial repetition of gill-clefts or gills.

Branchiop'oda (*Zool.*). A subclass of *Crustacea,* the members of which are distinguished by the possession of numerous pairs of flattened, leaf-like, lobed swimming feet which also serve as respiratory organs; the mandible is without a palp in the adult; mainly fresh-water forms including the Fairy Shrimps, Brine Shrimps, Tadpole Shrimps, Clam Shrimps, and Water Fleas.

branchios'tegal (*Zool.*). Pertaining to the gill-covers.

branchiostegal membrane (*Zool.*). In Fish, the lower part of the opercular fold below the operculum.

branchiostegal rays (*Zool.*). Skeletal supporting structures of the branchiostegal membrane.

branchiostege, —os'teg-e (*Zool.*). See **branchiostegal membrane.**

branchios'tegite (*Zool.*). In some *Crustacea,* a lateral extension of the carapace covering the gill-chamber.

bran'chireme (*Zool.*). An appendage having both locomotor and respiratory functions, as in *Branchiopoda.*

Branchiu'ra (*Zool.*). An order of *Copepoda* in which paired compound eyes occur; the genital openings occur on the fifth trunk somite and the thoracic limbs sometimes possess a flagellum. Fish Lice.

brand fungi (*Bot.*). See **Ustilaginales.**

brand spore (*Bot*) The thick-walled resting spore of the brand fungi; it is black or brown, and forms sooty masses.

brandering (*Plast.*). The operation of nailing small fillets of wood to timber beams more than 8 in. wide, to take the plastering laths and provide a key for the plaster. Also called COUNTER-LATHING.

branding iron (*Civ. Eng.*). See **indenter.**

Branly coherer (*Radio*). One of the original forms of coherer, consisting of two electrodes immersed in iron filings contained in a glass tube.

brass (*Met.*). Primarily an alloy of copper and zinc, but other elements such as aluminium, iron, manganese, nickel, tin, and lead are frequently added. There are numerous varieties.

See **alpha—**
alpha-beta—
aluminium—
cartridge—
commercial—
delta—
high—
high-strength—
naval—
gilding metal
manganese bronze.

brass or **brasses** (*Mining*). A coal-miner's term for iron pyrites or 'Welsh gold'—a brassy-looking compound of iron and sulphur.

brasses (*Eng.*). Those parts of a bearing which provide a renewable wearing surface; they consist of a sleeve or bored block of brass split diametrally, the two halves being clamped into the bearing block by a cap.

brasses (*Lace*). Brass plates in the form of a parallelogram with rows of holes through which the warp threads pass.

brass bobbins (*Lace*). Two discs of thin brass, dished and riveted together so as to hold a supply of thread.

brass furnace. A small furnace, usually gas-fired, used by the brass-founder to melt brass for castings.

brass-winding (*Lace*). The operation of filling brass bobbins collectively from a jack of wood bobbins.

Brathay Flags (*Geol.*). These occur in the Lake District and are equivalent to the Wenlock Series of the Silurian System.

brattice or **brattice cloth** (*Mining*). A partition for diverting air, for the purpose of ventilation, into a particular working place or section of a mine.

bratticing, brattishing (*Build.*). See **cresting.**

Braun tube, brown (*Phys.*). An evacuated glass vessel fitted with electrodes for producing a narrow beam of cathode rays that form a bright spot on a fluorescent screen placed at the end of the tube. By measuring the deflection of this spot under the action of a known magnetic field the value of e/m for the electrons may be found. See **cathode ray oscillograph.**

braunite, brown'it (*Min.*). A massive, or occasionally well-crystallised, cubic ore of manganese, occurring in India, New South Wales, and several European localities. Composition $3Mn_2O_3 \cdot MnSiO_3$.

braxy (*Vet.*). An acute toxaemia of sheep due to infection by *Clostridium septique.*

brayer (*Typog.*). A hand ink-roller.

brasier (*Build.*). A portable iron container for a lighted fire, used to dry off building work in a room, or as a source of warmth for outside night-watchmen.

Brazil resistance (*Elec. Eng.*). See **carbon-dust resistance.**

Brazil wax (*Chem.*). *Carnauba wax* (q.v.).

Brazilian aquamarines (*Min.*). Fine large blue aquamarines obtained from Minas Novas in the state of Minas Geraes in Brazil.

Brazilian emerald (*Min.*). A pure-green, deeply coloured variety of tourmaline, occurring in Brazil; used as a gemstone.

Brazilian pebble (*Min.*). The name applied to Brazilian quartz or rock-crystal, used in the manufacture of spheres for crystal-gazing, lenses, etc.

Brazilian peridot (*Min.*). Green crystals from Brazil having the typical colour of peridot (olivine); they are probably specimens of chrysoberyl.

Brazilian ruby (*Min.*). Among the many coloured topaz crystals mined in Brazil some are pink (rose topaz), others deep red; these latter are termed *Brazilian ruby.*

Brazilian sapphire (*Min.*). A trade name for the beautiful clear blue variety of tourmaline mined in Brazil; used as a gemstone.

Brazilian topaz (*Min.*). True topaz varying in colour from pure white to blue and yellow; mined chiefly in the state of Minas Geraes, Brazil.

brazing (*Eng*). The process of joining two pieces of metal by fusing a layer of brass or spelter between the adjoining surfaces.

brazing solders (*Met.*). Alloys used for brazing. They include copper-zinc (50-55% copper), copper-zinc-silver (16-52% copper, 4-38% zinc, and 10-80% silver), also nickel-silver alloys.

B.R.C. fabric (*Build., Civ. Eng.*). A very open, electrically welded, wire mesh with apertures about 3 by 12 in., used as a reinforcing medium for concrete roads, floor slabs, etc. B.R.C.= *British Reinforced Concrete.*

bread-crust bomb (*Geol.*). A type of *bomb* (q.v.) having a compact outer crust and a spongy vesicular interior.

breadth (*Photog.*). The element in pictorial composition which describes elimination of detail.

breadths (*Lace*). Narrow lace, made in tubular form, the edges being held together by draw-threads which are afterwards withdrawn.

breadth coefficient (*Elec. Eng.*). See **distribution factor.**

breadth extreme (*Ship Constr.*). The maximum breadth of a ship, over the shell plating.

breadth factor (*Elec. Eng.*). See **distribution factor.**

breadth, moulded (*Ship Constr.*). The breadth over the frames of a ship, i.e. heel of frame to heel of frame. It is the breadth termed B by Lloyd's Register, and is the line faired in the moulding loft.

break (*Build.*). Any projection from, or recess into, the surface of a wall.

break (*Elec. Eng.*). The shortest distance between the contacts of a switch, circuit-breaker, or similar apparatus, when the contacts are in the fully open position.

break (*Mining*). A jointing plane in a coal-seam.

break (*Plast.*). To nail the laths so that the joints are staggered, i.e. not in the same vertical line. See also **break-joint** and **breaking joint** below.

break (*Teleph.*). The cessation of operation of a telephone relay, because of reduction or stoppage or reversal of current which has operated it.

breakaway (*Cinema.*). Any construction in sound-film production which is made so that it can fall to pieces easily. See **float.**

breakbone fever (*Med.*). See **dengue.**

break contact (*Teleph.*). The pair of contacts in a relay assembly which separate when the relay is operated and so interrupt a circuit.

breakdown (*Elec. Eng.*). A term used to signify the sudden passage of current through an insulating material, as soon as the voltage exceeds a certain definite value (the *breakdown voltage*, q.v.).

breakdown crane (*Eng.*). A portable jib crane carried on a railway truck or motor lorry, for rapid transit to the scene of an accident.

breakdown voltage (*Cables*). The voltage required to break down a cable or insulating material. It depends upon the time of application. See **VTB curve.**

break impulse (*Elec. Comm.*). An impulse formed by interrupting a current in a circuit; e.g. by dialling.

break iron (*Carp.*). The iron which is screwed to the cutting iron of a plane, to bend and break the shavings.

break jack (*Teleph.*). A jack with springs so arranged that, on the insertion of a plug, the apparatus terminated by the plug is inserted into the circuit which, normally, is kept continuous by the jack contacts.

break-joint (*Build.*). A term applied to the principle of locating adjacent parts in a structure so that joints shall not be in line.

break line (*Typog.*). A *club line* (q.v.).

break-out or **run-out** (*Foundry*). Rupture of a mould through insufficient weight or clamping, permitting metal to flow out at the joint.

break, stratigraphical (*Geol.*). The geological record is incomplete, the succession of strata being broken by unconformities and non-sequences, these representing longer or shorter periods of time during which no sediment was deposited in the area where such breaks occur.

breakwater (*Civ. Eng.*). A natural or artificial coastal barrier serving to break the force of the waves so as to provide safe harbourage behind; it differs from the bulwark in that it has the sea on both sides of it.

breakwater-glacis (*Civ. Eng.*). An inclined stone paving on piers and breakwaters, designed to take the force of impact of the waves.

breaker (*Elec. Eng.*). A term commonly used to denote a *circuit-breaker.*

breaker (*Paper*). Apparatus, comprising a washing roll fitted with knives, for reducing raw material, other than grasses and wood pulp, to fibres or 'half-stuff.'

breaking (*Bot.*). The development of striping in the flowers of tulip.

breaking capacity (*Elec. Eng.*). The capacity of a switch, circuit-breaker, or other similar device to break an electric circuit under certain specified conditions.

breaking current (*Elec. Eng.*). The maximum current which a switch, circuit-breaker, or other similar device will interrupt without damage to itself.

breaking-down (*Carp.*). The operation of sawing logs into small stuff.

breaking joint (*Build., Masonry*). The principle of laying bricks or building stones in such a manner that joints are not continuous.

breaking of meres (*Bot.*). The sudden development of large masses of blue-green algae in small bodies of fresh water.

breaking piece (*Eng.*). An easily replaceable member of a machine subject to sudden overloads; made weaker than the remainder, so that in breaking it protects the machine from extensive damage.

breaking stress (*Eng.*). The stress necessary to break a material, either in tension or compression. See **ultimate tensile stress.**

breast (*Agric. Mach.*). See **mouldboard.**

breast (*Anat.*). An accessory gland of the generative system, rudimentary in the male and secreting milk in the female. Extending from the third to the sixth rib in the front of the chest, it consists of fatty, fibrous, and glandular tissue, the ducts of which end in the nipple.

breast (*Build.*). The wall between a window and the floor. See also **chimney-breast.**

breast (*Carp.*). The underside of a handrail or rafter.

breast (*Join.*). A Scottish term for a stair *riser.*

breast (*Mining*). The working coal-face in a colliery.

breast beam (*Weaving*). A guide at the front of a loom, over which the fabric passes to the take-up roller.

breast bone (*Zool.*). In higher Vertebrates, the sternum: in the larvae of Gall Midges (*Cecidomyidae*), an elongate sclerite situated mid-ventrally on the thorax.

breast lining (*Join.*). Panelling between window board and skirting.

breast mouldings (*Carp.*). Mouldings on the part of the wall between a window and the floor.

breast wall (*Masonry*). A breast-high parapet or retaining wall.

breast wheel (*Eng.*). An obsolete type of water wheel in which the water entered buckets on the wheel rim at a point about level with the wheel centre.

breastwork (*Build.*). A parapet on a building.

breastsummer (*Build.*). See **bressummer.**

breather pipe (*Eng.*). A vent pipe from the crank-case of an internal-combustion engine, for the release of pressure resulting from blow-by.

breathing root (*Bot.*). A root produced by mangroves and other large plants growing in mud; it projects above the mud and water and provides a means by which air is conveyed into the roots below.

breccia, bretch'i-a (*Geol.*). A coarse-grained clastic rock consisting largely of angular fragments of pre-existing rocks. According to its mode of origin, a breccia may be a *fault-breccia*, a *crush-breccia*, an *intrusion breccia*, or a *flow-breccia.*

breech (*Textiles*). See **britch.**

breech-loading guns (*Artillery*). See **B.L. guns.**

breech mechanism (*Artillery*). The mechanism by which the breech of a gun is closed before firing.

breeches pipe (*Eng.*). A pipe junction piece in the shape of an inverted Y; used in locomotives to provide a common exhaust outlet from the two cylinders.

breeze (*Build.*). A general term for furnace ashes, or for *coke breeze*, *pan breeze*, and *furnace clinker* (qq.v.).

breeze concrete (*Build.*). A concrete made of 3 parts coke breeze, 1 of sand, and 1 of Portland cement. It is cheap and nails can be driven into it, but it has poor fire-resisting qualities.

breeze fixing brick (*Build.*). A brick made from cement and breeze, built into the surface of a wall to provide a substance to which joinery may be nailed.

breezing (*Cinema.*). Said of a projected cinematograph image which is not clear, because of inaccurate focusing in camera, printer, or projector, or uneven sprocket holes, or other defect in processing.

breg'ma (*Anat.*). The point of junction of the coronal and sagittal sutures of the skull.

Bréguet spring, brā-gā (*Horol.*). A special form of balance spring, in which the outer coil of the spring is raised above the plane of the spiral, the end of the spring being bent to a special form before it enters the stud.

Bréguet-sprung (*Horol.*). Said of a watch when it is fitted with a Bréguet spring with terminal curve.

Bremer arc lamp (*Illum.*). An early form of inclined-carbon flame arc lamp.

Brem'ograph (*Illum.*). An arc projection device for exhibiting moving patterns on a screen, particularly with superposed lettering, in a cinema.

Bren gun (*Small Arms*). The type of light machine-gun most commonly used in the British Army; it has detachable barrels.

breph′ic (*Zool.*). See **neanic.**

Bressay and Noss Series (*Geol.*). The highest division of the Middle Old Red Sandstone of the Shetland Isles.

bressummer (*Build.*). A beam or lintel spanning a wide opening in a wall with whose surface it is flush. Also called a BREASTSUMMER.

Breto′nian (*Geol.*). The name applied to the Upper Cambrian strata of the Atlantic seaboard of N. America (Cape Breton district); of the same age as the Croixian of central and western U.S.A

brevi- (Latin *brevis*, short). A prefix used in the construction of compound terms; e.g. *brevilingual*, having a short tongue.

brevier, bre-vēr′ (*Typog.*). The old name for a size of type now standardised as 8-point.

brevipen′nate (*Zool.*). Having short wings.

brewers' grains (*Brew.*). See **grains (brewers').**

brewing. The processes by which beer is made. See **beer**, **malt**, **hops**, **finings**, **grains**, **grist**, **grist case**, **mash**, **mash tun**, **wort**, **yeast.**

Brewster's bands (*Light*). Interference fringes which are visible when white light is viewed through two parallel and parallel-sided plates, whose thicknesses are in a simple ratio (1 : 1, 2 : 1, 1 : 3, etc.).

Brewster's law (*Light*). The *angle of polarisation* (q.v.) at the surface of a medium is the angle whose tangent is equal to the refractive index of the medium.

bribe (*Textiles*). A defective length removed from a piece of cloth.

brick. A shaped and burnt block of special clay, used for building purposes.

brick-and-a-half wall (*Build.*). A wall which is just over 13½ in. thick, a mortar joint having to be added in. Usually called a 14 IN. WALL.

brick-and-stud (*Build.*). See **bricknogging.**

brick-axe (*Build.*). The two-bladed axe used by bricklayers in dressing bricks to special shapes for arches, etc.

brick clay (*Geol.*). An impure clay, containing iron and other ingredients. In industry the term is applied to any clay, loam, or earth suitable for the manufacture of bricks or coarse pottery. See **brick earths.**

brick-core (*Build.*). Rough brickwork filling between a timber lintel and the soffit of a relieving arch.

brick drier. An oven for drying green bricks, so as to prepare them for burning.

brick earths (*Build.*). Earths used for the manufacture of ordinary bricks; they consist generally of clayey silt interstratified with the fluvio-glacial gravels of southern England, frequently exploited in brick manufacture. See **foul clay, loam, marl.**

bricklayer's hammer (*Tools*). A hammer having both a hammer-head and a sharpened peen; used for dressing bricks to special shapes.

bricklayer's scaffold (*Build.*). A form of scaffold used in the erection of brick buildings, a characteristic being that one end of the *putlogs* (q.v.) is supported in holes left in the wall.

bricknogging (*Build.*). The type of work used for walls or partitions which are built up of brickwork laid in spaces between timber. Also called BRICK-AND-STUD work.

brick-on-edge coping (*Build.*). A coping finish to the exposed top of a wall; formed of bricks built on edge in cement in courses 4½ instead of 3 in. high, so that the frogs are concealed and only a few joints are exposed to the weather.

brick-on-edge sill (*Build.*). An external sill to window or door, formed in the manner of the *brick-on-edge coping* (q.v.).

brick-trimmer (*Build.*). See **trimmer arch.**

brick trowel (*Build.*). A flat triangular-shaped tool used by bricklayers for picking up mortar and spreading it on the wall.

brick veneer (*Build.*). A brickwork facing applied to a structure.

brickwork (*Build.*). The art of bonding bricks together so as to form a wall or building.

bricking (*Build.*). Work on plastered or stuccoed surfaces, in imitation of brickwork.

bricking-up (*Foundry*). Building up the interior of a large mould with bricks in order to give extra strength.

bridge (*Bot.*). See **disjunctor.**

bridge (*Civ. Eng.*). A structure built over or under a road or railway, or over a river or canal, to provide a continuous roadway from one side to the other for transport purposes.

bridge (*Elec. Eng.*). An arrangement of impedances, used for the measurement of various electrical quantities. See **alternating-current—**, **Anderson—**, **Kelvin double—**, **Maxwell—**, **Owen—**, **Schering—**, **Wheatstone—**, **Wien—**

bridge (*Horol.*). A raised platform or support, generally with two feet.

bridge board (*Carp.*). See **notch board.**

bridge duplex (*Teleg.*). An arrangement of a submarine cable and its balance with two resistances in the form of a Wheatstone bridge, so that the high currents transmitted do not affect the receiving apparatus.

bridge engineer. An engineer who is chiefly concerned with the design, construction, and erection of bridges.

bridge fuse (*Elec. Eng.*). A fuse in which the fusible wire is carried in a holder, supported by spring contacts at its two ends; it is thus easily removable for renewing the fuse wire.

bridge gauge (*Eng.*). A measuring device for detecting the relative movement of two parts of a machine due to wear at bearings, etc.

bridge hanger (*Elec. Eng.*). A form of hanger of small vertical dimensions, for supporting the overhead contact-wire of a traction system under bridges or tunnels.

bridge-megger (*Elec. Eng.*). A portable instrument for measuring resistances on the Wheatstone-bridge principle. A megger forms a component part, and supplies the necessary source of e.m.f. and the instrument dial on which the balance is obtained.

bridge network (*Elec. Comm.*). The same as *lattice network.*

bridge neutralising (*Radio*). A method of overcoming the adverse effects of inter-electrode capacities in thermionic valve amplifiers. Two valves are connected in 'push-pull' and their respective anodes and grids are cross-connected through balancing condensers, the whole forming a balanced Wheatstone bridge.

bridge-over (*Build.*). A term applied to some parts of a structure to indicate that they lie across and bear upon others; e.g. a *bridge-over* joist.

bridge-pile (*Civ. Eng.*). A pile driven to afford a firm foundation for a bridge-pier.

bridge receiver (*Radio*). A form of radio receiver employed when two-way working is carried out on one wavelength. By the use of the Wheatstone-bridge principle it is rendered sensitive to the distant, but not to the local, transmitter.

bridge-set (*Elec. Comm.*). An arrangement of normal transformers which replaces the hybrid-coil, when the associated apparatus of a four-wire radio-link is joined to the two-wire exchange and subscribers' lines.

bridge stone (*Masonry*). A flat stone spanning a narrow area or gutter.

bridge transformer (*Elec. Comm.*). The same as *hybrid coil.*

bridge transition (*Elec. Eng.*). A method, employed in connexion with the series-parallel control of traction motors, in which the change from series to parallel is effected without interrupting the main circuit, and without any change in the current flowing in each of the motors.

bridge truss (*Struct.*). A structural framework capable of supporting a bridge roadway.

bridged-T filter (or **network**) (*Elec. Comm.*). A filter section consisting of a T-network, with a further arm bridging the two series arms; used for phase compensation.

bridging (*Carp.*). The principle of diminishing lateral distortion of adjacent floor-joists by connecting them together with short cross-pieces.

bridging amplifier (*Elec. Comm.*). An amplifier for monitoring or tapping a channel without abstracting appreciable power. Also called MONITORING AMPLIFIER.

bridging fibrils (*Zool.*). Protoplasmic strands connecting the deep cells of stratified epithelium with one another across the intercellular channels.

bridging floor (*Carp.*). A floor supported by bridging joists, without girders.

bridging host (*Bot.*). A temporary host of a parasitic fungus, by means of which it may pass from one species to another.

bridging joist (*Carp.*). A timber beam immediately supporting the floor-boards in a floor. Also called a COMMON JOIST.

bridging piece (*Carp.*). A short piece of timber connecting floor-joists in order to reduce lateral distortion.

bridle (*Carp.*). A Scottish term for *trimmer* (q.v.).

bridle (*Elec. Eng.*). A portion of an overhead contact-wire system. It extends longitudinally between supporting structures and is attached at intervals to the contact-wire, in order to retain the latter in its proper lateral position.

bridle (*Paint.*). Whipcord or wire fastened half-way up the bristle of new brushes, when it is too long or flexible.

bridle butts (or **backs**) (*Leather*). Pliable butts, free from defects; used for harness.

bridle joint (*Carp.*). The converse of the mortise-and-tenon joint. Instead of leaving the central part of the tenoned member projecting to fit into a mortise in the second member, the central part on the first member is cut away to leave two side tongues projecting, and the second member is cut away at the sides to receive these tongues.

brier tooth saw (*Tools*). See **gullet saw.**

bright annealing (*Met.*). The heating and slow cooling of steel or other alloys in a carefully controlled atmosphere, so that oxidation of the surface is reduced to a minimum and the metal surface retains its bright appearance.

bright emitter (*Thermionics*). A pure tungsten cathode which emits electrons when heated to about 2600 degrees absolute. Formerly used in all thermionic tubes, but now restricted mainly to high-power tubes.

bright plating (*Elec. Eng.*). The production of a fairly bright deposit from an electroplating plant. Such surfaces require little finishing.

Bright's disease (*Med.*). A general term for acute and chronic nephritis.

brightener (*Elec. Eng.*). An addition agent added to an electroplating solution to produce bright deposits.

brightness (*Light*) See **intrinsic brilliancy.**

brightness (*Photog.*). The brilliance of a source of light, or a surface reflecting light, i.e. that attribute of colour which can be matched with a grey and distinguished from hue and saturation.

brighton (*Textiles*). A cotton fabric of the honeycomb type.

Brighton system (*Elec. Eng.*). A name sometimes given to the maximum-demand method of charging for an electric supply; derived from the name of the town in which it was first used.

brilliance (*Acous.*). The presence of considerable numbers of high harmonics in musical tone, or the enhancement of these in sound reproduction.

brilliance, brilliancy (*Light*). See **intrinsic brilliancy.**

brilliance control (*Television*). Control of the average illumination over the whole of the screen of a television receiver.

brilliant (*Gems*). The name applied to a diamond when cut and polished for use as a gemstone in the form generally adopted; i.e. with a large face (known as the *table*) girdled by 33 facets in the crown, and having a further 25 facets in the *pavilion* (the part of the stone below the girdle).

brilliant (*Typog.*). The old name for a size of type, about 4-point.

brilliant view-finder (*Photog.*). A view-finder with an inclined reflector between two small lenses; used in a hand-camera for locating the image on the emulsion.

brilliantine (*Textiles*). A plain-weave lustre dress material, with a cotton warp and a worsted weft; the lustrous character is produced by the weft. Figured patterns are produced by floating the weft on a plain ground.

Brin's process (*Chem.*). A method of obtaining oxygen from barium dioxide by first oxidising barium oxide in air to barium dioxide and further heating the barium dioxide at a higher temperature, when the oxygen is given off leaving barium oxide. This process has now given way to the liquid-air process.

brindled bricks (*Build.*). Bricks which, owing to their chemical composition, show a striped surface; when they are otherwise satisfactory they are frequently used in cases where appearance is not an important consideration.

brine pump (*Eng.*). The pump used to circulate brine through the evaporator of a refrigerator, the working parts being of corrosion-resisting alloy.

Brinell' hardness test (*Met., etc.*). A method of measuring the hardness of a material by measuring the area of the indentation produced by a hard steel ball under standard conditions of loading.

briolet, brĕ′ŏ-let (*Jewel.*). A double rose-facetted precious stone, with triangular and long facets, forming a pear or drop shape.

briquettes (*Fuels*). Fuel made from finely divided carbonaceous matter in pressure moulds, the shape and size depending on requirements; usually made from low-grade coal or coke breeze, mixed with a binder such as pitch, tar, or asphaltum; brown coals briquette without a binder.

brisket (*Vet.*). The breast or anterior sternal region of an animal.

bristle (*Bot.*). (1) A very stiff, erect hair.—(2) A long hollow outgrowth of the cell wall in some algae.

Bristol board (*Paper*). A fine-quality cardboard made by pasting several sheets together.

Bristol diamonds (*Min.*). Small lustrous crystals of quartz, i.e. rock crystal, occurring in the Bristol district.

britch or **breech** (*Woollen*). A wool-sorter's term for wool obtained from the thighs and root of the tail, estimated as the lowest quality in a fleece.

British Association (B.A.) screw-thread (*Eng.*). A system of metric threads, confined to small sizes, used in instrument work, etc. It is designated by numbers from 0 to 25, ranging from 6 mm. to 0·25 mm. in diameter and from 1 mm. to 0 072 mm. pitch.

British Columbian pine (*Timber*). See **Oregon pine.**

British Engineering Standards Association. Now *British Standards Institution* (q.v).

British Standard beam (*Struct.*). A rolled-steel joist conforming to the standard dimensions laid down by the British Standards Institution.

British Standard brass thread (*Eng.*). A screw-thread of Whitworth profile used for thin-walled tubing; it has 26 threads per inch irrespective of diameter. See **British Standard Whitworth thread.**

British Standard candle (*Illum.*). The standard of luminous intensity formerly adopted in Great Britain; equivalent to 1·02 international candles; it is the light given by a sperm candle of specified make-up and dimensions.

British Standard channel (*Struct.*). A rolled-steel channel conforming to the standard dimensions laid down by the British Standards Institution.

British Standard fine (B.S.F.) thread. A screw-thread of Whitworth profile, but of finer pitch for a given diameter; largely used in automobile work.

British Standard pipe (B.S.P.) thread or **British Standard gas thread** (*Eng.*). A screw-thread of Whitworth profile, but designated by the bore of the pipe on which it is cut (e g. ⅜ in. Gas) and not by the full diameter, which is a decimal one, slightly smaller than that of the pipe. See **British Standard Whitworth thread.**

British Standard Whitworth (B.S.W.) thread (*Eng.*). The standard English screw-thread, having a profile angle of 55 degrees and a radius at root and crest of 0·1373 × pitch; ⅙ of the thread cut off. The pitch is standardised with respect to the diameter of the bar on which it is cut.

British Standard wire gauge (S.W.G.). An arbitrary series of numbers used for expressing the diameter of wires, ranging from 6 (0 192 in.) to 50 (0·001 in.).

British Standards Institution. A national organisation for the preparation and issue of standard specifications, based on rational principles, for use in the building, chemical, engineering, and textile industries.

British Thermal Unit (*Heat*). The amount of heat required to raise the temperature of one pound of water one Fahrenheit degree (usually taken as from 60°-61° F.). Abbrev. **B.Th.U.**

brittle micas (*Min.*). A group of minerals (the clintonite group) resembling the true micas in crystallographic characters, but having the cleavage flakes less elastic. Chemically, they are distinguished by containing calcium as an essential constituent.

brittle silver ore (*Min.*). A popular name for *stephanite* (q.v.).

brittleness (*Met*). The tendency to fracture without appreciable deformation and under low stress. It is indicated in tensile test by low ultimate tensile stress and very low elongation and reduction in area. The notched-bar test may, however, reveal brittleness in metals that give a high ultimate tensile stress. See **toughness.**

broach (*Build.*). The sloping timber or masonry pyramid at the projecting corner of the square tower from which springs a *broach spire* (q.v.).

broach (*Eng.*). A metal-cutting tool for machining holes; it consists of a tapered steel shaft carrying transverse cutting edges, which is driven or pulled through the roughly finished hole.

broach (*Join.*). The locating pin, within a lock, about which the barrel of the key passes.

broach-post (*Carp.*). See **king-post.**

broach spire (*Build.*). An octagonal spire springing from a square tower without a parapet, and having the triangular corners of the tower covered over by short sloping pyramids blending into the spire.

broached work (*Masonry*). The finish given to a building-stone by dressing it with a punch so that broad diagonal grooves are left.

broad (*Cinema.*). A set of Klieg incandescent flood-lights used in studio illumination. Also called BROADSIDE.

broad (*Tools*). A wood-turning tool, often consisting of a flat disc with sharpened edges fixed at right-angles to a stem; used for shaping the insides and bottoms of cylinders.

broad-axe (*Tools*). A broad-edged axe with crooked handle used for rough-dressing timber. The sharpening bevel on the blade, as in the case of a chisel, is on one side only.

broad-base tower (*Elec. Eng.*). A transmission line tower in which each leg is separately anchored.

broadcloth (*Textiles*). A woollen cloth for men's wear, woven plain and finished with a dress face; originally made two yards wide.

broad gauge (*Rail.*). A railway gauge in excess of the standard 4 ft. 8½ in. In particular, the gauge of 7 feet laid down by Brunel.

broad irrigation (*Sewage*). A process of sewage purification in which the effluent is distributed over a large area of carefully levelled land, and allowed to soak through it and drain away as ordinary subsoil water down the natural watercourses. Cf. *intermittent filtration.*

broad-leaved tree (*Bot.*). Any tree other than a member of the *Coniferae.*

broad ray (*Bot.*). A vascular ray many cells in width, consisting of cells which are rounded in transverse section.

broadside (*Cinema.*). See **broad.**

broadside (*Typog.*). A large sheet printed on one side, such as a poster.

broadstone (*Masonry*). An *ashlar* (q.v.).

broad tool (*Masonry*). A steel chisel having a cutting edge 3½ in. wide, used by the mason for finish-dressing stone.

broadcast (*Teleg.*). The paralleling of a number of outgoing channels so that the transmitted messages are received by all receiving stations together. See also **broadcasting.**

broadcast channel (*Elec. Comm.*). The frequency band used for interference-free and widespread reception from a single transmitting source.

broadcast receiver (*Radio*). A radio receiver whose tuning ranges cover those normally used for broadcast transmission.

broadcast sower (*Agric. Mach.*). A type of sowing machine in which seed is scattered from a container, through holes in the lower part, by revolving brushes or by other means.

broadcast transmitter (*Radio*). A radio-telephone transmitter specially designed for broadcasting. The requirements for faithful transmission are higher than those for an ordinary commercial transmitter.

broadcasting (*Radio*). Radio-telephonic transmission primarily intended for reception by the general public.

broadcasting amplifier (*Elec. Comm.*). An amplifier of adequate performance, for use in amplifying the programme currents in a broadcasting channel.

broadcasting repeater (*Elec. Comm.*). The same as *programme repeater*.

brob (*Carp.*). A pointed spike with a one-sided head, used to support one timber butting against another; a number are driven into the second timber so that their sides give support to the first.

Broca galvanometer (*Elec. Eng.*). An astatic galvanometer in which the moving element consists of two magnetised needles with consequent poles at their centres.

Broca's area (*Anat.*). The left inferior convolution of the frontal lobe of the brain; the 'speech centre.'

brocade' (*Textiles*). Figured fabric made of silk or cotton, etc.; often made with cotton warp and rayon weft, or of rayon throughout.

brocatelle' (*Textiles*). A silk-and-linen fabric of rich appearance, with a raised satin warp figure; linen weft stiffens the fabric but is not visible.

brochantite, brok'— (*Min*). A basic sulphate of copper occurring in fibrous masses, or as incrustations; formed by the decomposition of chalcopyrite.

broché, brō-shā (*Silk*). A term applied to decorative effects obtained by the use of fancy colours, imparting a brocade appearance to the fabric.

brochone'ma (*Cyt.*). In cell-division, the spireme thread when it has become arranged in the form of loops.

Brocken, Spectre of the (*Meteor.*). The shadow of an observer cast by the sun on to a bank of mist. The phenomenon, often seen from a hill-top, may present the illusion that the shadow is a gigantic form seen through the mist.

brockram (*Geol.*). A sedimentary rock occurring in the Permian strata west of the Pennines, consists of angular blocks which probably accumulated as scree material.

Brocot suspension, brok-ō (*Horol.*). A form of pendulum suspension in which adjustment to the length of the pendulum can be made from the front of the dial.

Brodie's abscess (*Med.*). A localised abscess in bone due to tuberculous or other infection.

Brodie's reaction (*Chem*). A method of identifying graphite, which also distinguishes it from amorphous carbon.

Broenner's acid (*Chem.*). See **Brönner's acid.**

brog (*Join.*). An awl.

broich (*Woollen*). The spindle which holds the yarn cop during warping.

broken crow twill (*Woollen*). The four-shaft sateen (or four-end broken twill) weave.

broken ends (*Textiles*). Warp threads which have broken during weaving owing to defects in the yarn or excessive weighting of the warp beam.

broken-over (*Bind.*). The term used to indicate that plates or other separate sheets to be inserted in a book have been given a narrow fold on the inner edge, so that they will lie flat and turn easily when fixed.

broken picks (*Textiles*). Defects in weaving due to breaking of the weft carried by the shuttle.

broken-space saw (*Carp., Join.*). A handsaw having usually six teeth to the inch.

broken twills (*Textiles*). Fabrics in which the diagonal line forming the 'twill' is broken, or broken and reversed in direction, at intervals.

broken wind (*Vet.*). A chronic emphysema of the lungs of horses.

brokes (*Textiles*). Short staples of wool that come from the neck and belly parts of a fleece.

broma'tium (*Zool.*). A fungal enlargement formed by ants; used by them for food.

bromides (*Chem.*). Bromides are salts of hydrobromic acid. Silver bromide is extensively used in photography, potassium bromide and, to a less extent sodium, ammonium, and lithium bromides, in medicine.

bromide pencil (*Photog.*). A pencil for retouching bromide prints.

bromide process (*Photog.*). The use of silver bromide emulsion, coated on paper, for printing from negatives or for enlarging.

bromidro'sis (*Med.*). Fetid perspiration, especially of the feet.

bromination (*Chem.*). The substitution of bromine in, or its addition to, organic compounds.

bromine (*Chem.*). Symbol, Br. A non-metallic element in the seventh group of the periodic system, one of the halogens. At. no. 35, at. wt. 79·916, valencies 1, 3, 5, 7. It is a dark-red liquid, giving off a poisonous vapour, Br_2, with an irritating smell; m p. −7·2° C., b.p. 58·78° C., sp. gr. 3 12. In combination with various metals it is widely but sparingly distributed. The chief sources are Stassfurt and Michigan, where it is manufactured by treating the 'bittern' with chlorine. Bromine is used extensively in synthetic organic chemistry.

bromine solidificatum (*Chem*). Kieselguhr saturated with bromine. Commercially used as a disinfectant.

bromoform (*Chem.*). $CHBr_3$, tribromomethane, m p. 5° C., b.p. 151° C., sp. gr. 2 9; a colourless liquid, of narcotic odour.

bromoil process (*Photog.*). The combination of oil pigmenting on a bromide print, so that the image is obtained in a permanent pigment.

bronch-, broncho- (Greek *bronchos*, windpipe). A prefix used in the construction of compound terms; e.g. *bronchopulmonary*, pertaining to, or connecting, the bronchi and the lungs.

bronchi (*Zool.*). See **bronchus.**

bron'chia (*Zool.*). The branches of the bronchi.—*adj.* **bronchial.**

bron'chiec'tasis (*Med.*). Pathological dilatation of the bronchi as a result of weakening of the bronchial wall—usually from infection.

bron'chiole (*Zool.*). One of the terminal subdivisions of the bronchia.

bron'chiolec'tasis (*Med.*). Pathological dilatation of the bronchioles.

bron'chioli'tis (*Med.*). Inflammation of the bronchioles.

bronchi'tis (*Med.*). Inflammation of the bronchi. —(*Vet.*) See **husk.**

bronchoph'ony (*Med.*). Increase of voice sounds heard through the stethoscope when placed over the lungs; indicative of consolidation of lung tissue, as in pneumonia.

bron'choscope (*Med.*). An instrument consisting of a hollow tube with mirrors and light arranged for inspecting the interior of the bronchi.

bronchus (*Zool.*). One of the two branches into which the trachea divides in higher Vertebrates and which lead to the lungs.—*pl.* **bronchi.**—*adj.* **bronchial.**

Brönner's acid (*Chem.*). 2,6-Naphthylaminemonosulphonic acid. Intermediate for dyestuffs.

Bronsil Shales (*Geol.*). Grey shales occurring in the Malvern Hills, England; equivalent to the Tremadoc Shales of N. Wales; of Upper Cambrian age.

bronze (*Met.*). Primarily an alloy of copper and tin, but the name is now applied to other alloys not containing tin; e.g. aluminium bronze, manganese bronze, and beryllium bronze. For varieties and uses of tin bronze, see **alpha-bronze, gun metal, phosphor-bronze, leaded bronze, bell metal.**

bronzed diabetes (*Med.*). See **haemochromatosis.**

bronzite (*Min.*). A form of orthopyroxene, near hypersthene in composition; characterised by a metallic sheen, due to the reflection of light from planes of minute metallic inclusions in the surface layers.

brood (*Zool.*). A set of offspring produced at the same birth or from the same batch of eggs.

brood bud (*Bot.*). (1) A small multicellular organ serving for vegetative propagation in some red algae.—(2) A bulbil in *Bryophyta.*—(3) See **soredium.**

brood cell (*Bot.*). A naked or walled cell, produced asexually, separating from the parent and giving rise to a new plant.

brood gemma (*Bot.*). A multicellular body, formed asexually, and separating from the parent, forming a new plant.

brood pouch (*Zool.*). Any cavity of the parent animal or colony in which developing eggs or embryos are placed.

brookite (*Min.*). A form of crystalline titanium dioxide, occurring in flat, red-brown, platy, orthorhombic crystals.

brooming (*Civ. Eng.*). The spreading of the fibres at the head of a timber pile, due to the impact of the monkey.

brow (*Mining*). The top of the shaft or 'pit'; hence also called PIT-BROW.

brown (*Paint.*). A pigment obtained either from natural sources (brown ochre, bitumen) or by mixing black with red, orange, or yellow.

brown (*Textiles*). A term applied by wool-sorters to wool usually sorted from the haunches.

brown algae (*Bot.*). See **Phaeophyta.**

brown body (*Zool.*). In ectoproct *Polyzoa*, a brown rounded mass representing a degenerate zooecium and an invagination from which a new zooecium will develop.

brown coal or **lignite** (*Fuels*). Intermediate between peat and true coals, with high moisture content, the calorific value per pound ranging from about 4000 to 5000 B.Th.U.; used for firing boilers; found almost exclusively in Germany. The hydrogenation of brown coal is of great importance for the production of synthetic fuel, lubricating oils, and motor spirit.

brown funnels (*Zool.*). In *Cephalochorda*, two tubes lined by pigmented epithelium and projecting into the dorsopharyngeal coelom; of unknown function.

brown haematite (*Min.*). A misnomer, for the mineral bearing this name is *limonite* (q.v.), a hydrous iron-oxide, whereas true haematite is anhydrous.

brown rot (*Bot.*). A disease of plums and other fruit caused by fungi.

brown tubes (*Zool.*). In *Sipunculoidea*, the nephridia.

Brown and Sharpe wire gauge. A system of designating, by numbers, the diameter of wires; it ranges from 4/0 (0·46 in.) to 48 (0·00124 in.).

Brown loudspeaker (*Acous.*). An early type of loudspeaker in which the sound power, generated by a reed-driven unit, is augmented by the provision of a metal horn.

Brown relay (*Radio*). An early form of audio-frequency amplifier, comprising a carbon microphone mechanically coupled to a telephone receiver movement; used as a note magnifier in a radio receiver.

Brownian movement (*Phys.*). A continuous agitation of the particles in a colloidal solution, caused by unbalanced impacts with molecules of the surrounding medium. The movement may be watched with a microscope if a strong beam of light is caused to traverse the solution across the line of sight. It has been used to determine Avogadro's number.

Brownstone Series (*Geol.*). A division of the Old Red Sandstone, unfossiliferous and undated, lying above the Dittonian Red Marl Stage in the South-Western Province of England.

Bruce Series (*Geol.*). The lower division of the Huronian, including the Mississagi Quartzite, 12,000 ft. thick, followed by conglomerates, limestone, banded cherty greywackes, and finally quartzites at the top. The series is followed by the Cobalt Series.

Bruch's membrane, broohh (*Zool.*). In some Vertebrates, a transparent membrane lining the inner surface of the choroid.

brucine (*Chem.*). $C_{23}H_{26}O_4N_2$, $4H_2O$, a strychnine base alkaloid, m.p. of the anhydrous compound 178° C.; it contains two methoxyl groups, and is a monoacidic tertiary base. Its physiological action is less than that of *strychnine* (q.v.).

brucite (*Min.*). Hydroxide of magnesium, occurring as fibrous masses in serpentines. See also **periclase.**

brucite-marble (*Geol.*). A product of dedolomitisation; a crystalline metamorphic rock formed by the action of intense heat on dolomitic (or magnesian) limestone.

Brückner cycle (*Meteor.*). A recurrence of periods of cold and damp alternating with warm and dry years, the period of a cycle being about 35 years.

bruise (*Med.*). Rupture of blood-vessels in a tissue, with more or less extravasation of blood, as a result of a blow which does not lacerate the tissue bruised.

bruit (*Med.*). A sound or murmur heard by auscultation over the lung or heart.

Brunner's glands (*Zool.*). Small racemose glands situated in the submucosa of the duodenum.

Brunswick black (*Paint.*). An opaque varnish with a basis of asphaltum.

Brunswick blue (*Paint.*). White paint stained with ferro-cyanide.

Brunswick green (*Paint.*). A compound of carbonate of copper and lime or chalk.

brush (*Elec. Eng.*). A conductor arranged to make electrical contact between a stationary and a moving surface.

brush (*Mining*). (1) In a coal-mine, a road through the goaf, gob, or worked-out area packed with waste.—(2) To clean up fine coal from the floor.

brush (*Photog.*). See **Blanchard— Buckle— Aerograph.**

brush arc-lighter (*Elec. Eng.*). An old type of open-coil d.c. generator, used for supplying arc lamps in series.

brush-box (*Elec. Eng.*). That portion of the brush-holder of an electrical machine in which the brush slides or in which it is clamped.

brush contact (*Elec. Eng.*). See **laminated contact.**

brush discharge (*Elec. Eng., etc.*). A discharge of electricity from a conductor which takes place when the potential difference between it and its surroundings exceeds a certain value but is not high enough to cause a spark or an arc. It is usually accompanied by a hissing noise. The phenomenon is also experienced by an aircraft traversing an *electric storm* (q.v.).

brush-dyeing (*Leather*). Another name for *staining*.

brush gear (*Elec. Eng.*). A general term used to denote all the equipment associated with the brushes of a commutating or slip-ring machine.

brush-holder (*Elec. Eng.*). The portion of an electrical machine or other piece of apparatus which holds a brush. See **box-type brush-holder.**

brush-holder arm (*Elec. Eng.*). The rod or arm supporting one or more brush-holders. Also called BRUSH SPINDLE, BRUSH STUD.

brush lead (*Elec. Eng.*). See **brush shift.**

brush-rocker (*Elec. Eng.*). A support for the brushes of an electrical machine which enables them to be moved bodily round the commutator. Also called a BRUSH-ROCKER RING.

brush shift (*Elec. Eng.*). The amount by which the brushes of a commutating machine are moved from the centre of the neutral zone. Also called BRUSH LEAD. See **backward shift, forward shift.**

brush spindle (*Elec. Eng.*). See **brush-holder arm.**

brush spring (*Elec. Eng.*). A spring in a brush-holder which presses the brush against the commutator or slip-ring surface.

brush stud (*Elec. Eng.*). See **brush-holder arm.**

brush yoke (*Elec. Eng.*). A special frame for supporting the brush-rocker or brushes of an electrical machine, when these are not supported from the main frame or the pedestal of the machine.

brushing and steaming mill (*Textiles*). A machine comprising a steam box, a revolving brush or brushes, and a folding motion; used in finishing woollen and worsted cloths.

brushing discharge (*Elec. Eng., etc.*). See **brush discharge.**

Brussels lace (*Textiles*). (1) BRUSSELS NET, a plain net originally made at Brussels.—(2) BRUSSELS PILLOW, a fine pillow lace, the patterns being joined by small loops at the edges.—(3) BRUSSELS POINT, a lace with an open pattern, made partly in open and partly in closed stitch. It has a shaded appearance.

Bry'ophy'ta (*Bot.*). The liverworts and mosses. One of the main divisions of the plant kingdom, with some thousands of species. The plants are small, rootless, and without organised vascular tissue. They show clear alternation of generations, with a small spore-bearing plant parasitic on the generation which bears the archegonia and antheridia.

B.S.B. (*Struct.*). Abbrev. for *British Standard beam* (q.v.).

B.S.C. (*Struct.*). Abbrev. for *British Standard channel* (q.v.).

B.S.F. thread (*Eng.*). Abbrev. for *British Standard fine thread* (q.v.).

B.S.I. Abbrev. for *British Standards Institution* (q.v.).

B.S.P. screw-thread (*Eng.*). Abbrev. for *British Standard pipe thread* (q.v.).

B.S.W. thread (*Eng.*). Abbrev. for *British Standard Whitworth thread* (q.v.).

B.T.U. Abbrev. for *Board of Trade Unit* (q.v.).

B.Th.U. (*Heat*). Abbrev. for *British Thermal Unit* (q.v.).

Bu (*Chem.*). A symbol for the butyl radical, C_4H_9—.

bubble (*Surv.*). The bubble of air and spirit vapour within a *level tube* (q.v.): loosely, the level tube itself.

bubble line (*Surv.*). The imaginary tangent at the centre of an undistorted bubble, which is said to be horizontal when the bubble is at the middle of its run.

bubble trier (*Surv.*). See **level trier.**

bubble tube (*Surv.*). A *level tube* (q.v.).

bubbles, pressure in (*Phys.*). A spherical bubble of radius r, formed in a liquid for which the surface tension is T, contains air (or some other gas or vapour) at a pressure which exceeds that in the liquid in its immediate vicinity by $\frac{2T}{r}$. The excess pressure within a soap bubble in air is $\frac{4T}{r}$ since the soap film has two surfaces.

bu'bo (*Med.*). An inflamed and swollen lymphatic gland, especially in the groin.

bubon'ic plague (*Med.*). A form of plague in which there is great swelling of the lymphatic glands, especially those in the groin. See **plague.**

bubon'ocele (*Med.*). A swelling in the groin due to an incomplete hernia.

bubulum oil (*Chem.*). *Neatsfoot oil* (q.v.).

buc'cal (*Zool.*). Pertaining to, or situated in or on, the cheek or the mouth. See **bucco-.**

buccal cavity (*Zool.*). The cavity within the mouth opening but prior to the commencement of the pharynx.

buccal mass (*Zool.*). In *Mollusca*, the region of the alimentary canal containing the odontophore.

buccal respiration (*Zool.*). See **buccopharyngeal respiration.**

buc'cinator (*Anat.*). A broad, thin muscle at the side of the face, between the upper and lower jaw.

bucco- (Latin *bucca*, cheek). A prefix used in the construction of compound terms; e.g. *buccolingual*, pertaining to the cheeks and tongue, or to the buccal cavity and the tongue.

buc'cophar'ynge'al respiration (*Zool.*). Breathing by means of the moist vascular lining of the mouth cavity or diverticula thereof, as in some *Amphibia* and certain Fish which have become adapted to existence on land.

Buchholtz relay, boohh'holts (*Elec. Eng.*). A protective relay for use with transformers or other oil-immersed apparatus; it embodies a float, which becomes displaced and operates the relay contacts if gas bubbles are generated by a fault within the equipment being protected.

buchite, boohh'it (*Geol.*). A glassy rock resulting from the fusion of clay or shale, following its incorporation in magma. Crystals and microlites are normally present.

Buchmann-Meyer effect, boohh'man mi'er (*Acous.*). The special type of reflection of light from the sound-track on a disc record whereby the lateral velocity of the track can be determined.

Buchner funnel, boohh'ner (*Chem.*). A stout porcelain funnel having at its base a fixed horizontal perforated plate to act as a support over which a piece of filter paper is placed, thus ensuring a large area of filtration.

buck saw (*Tools*). A large frame-saw having one bar of the frame extended to form a handle.

buck skins (*Furs*). The term applied to tough skins from old animals.

buckskin cloth (*Woollen*). A fabric made from fine quality yarns with a fine warp twill surface.

buckskin leather (*Leather*). Deerskin prepared by dressing with oil, after removal of the grain; used for breeches, sports shoes, etc.

bucket (*Eng.*). (1) The piston of a reciprocating pump.—(2) Any of the cup-shaped vanes attached to the periphery of a *Pelton wheel* (q.v.).

bucket (*Hyd. Eng.*). A dredging scoop, usually capable of being opened and shut for convenience in depositing and taking up a load.

bucket conveyor (*Eng.*). A conveyor or elevator consisting of a pair of endless chains running over toothed wheels, and carrying a series of buckets which are automatically tipped to discharge their contents at the delivery end.

bucket-ladder dredger (*Civ. Eng.*). A vessel of small draught having a series of buckets moving in a continuous chain reaching down into the material to be dredged, and lifting it for discharge into the vessel itself or into an attendant vessel.

bucket-ladder excavator (*Civ. Eng.*). A mechanical excavator working on the same principle as a *bucket-ladder dredger* (q.v.), but adapted for use on land.

bucket valve (*Eng.*). A non-return (delivery) valve fitted in the bucket or piston of some types of reciprocating pump.

bucking kier (*Linen*). A vessel in which linen cloth is boiled in lime water, preparatory to bleaching.

buckle (*Eng.*). (1) To twist or bend out of shape; said usually of plates or of the deformation of a structural member under compressive load.—(2) A metal strap —(3) A swelling on the surface of a mould due to steam generated below the surface.

Buckle brush (*Photog.*). A cotton-wool brush made by holding a small wad at the end of a glass tube by a silver wire passing through the tube.

buckling (*Cinema.*) The irregular motion of film in a camera or projector, causing a jam; due to a break in the sprocket holes or to incorrect threading.

buckling (*Elec. Eng*). A distortion of accumulator plates caused by uneven expansion, usually as a result of heavy discharges or other maltreatment.

buckram (*Textiles*). A strong fabric made of jute, linen, or cotton, and stiffened by size and glue.

buckwheat (*Mining*). See **birdseye.**

buckwheat rash (*Vet.*). See **fagopyrism.**

bud (*Bot.*). The undeveloped stage of a branch. It contains a very short shoot bearing undeveloped leaves, and may in addition contain one or more young flowers.

bud scale (*Bot.*). A simplified leaf or stipule present on the outside of a bud, forming part of a covering which protects the contents of the bud from desiccation and other injuries.

bud sport or **bud variation** (*Bot.*). The production of an abnormal branch, inflorescence, or flower, from a bud, as a result of mutation.

budding (*Bot*). (1) The production of daughter cells in the form of rounded outgrowths, characteristic of yeasts and similar fungi.—(2) The production of buds in general —(3) A means of artificial propagation, in which a bud taken from one plant is inserted under the bark of another, subsequently developing into a shoot.

budding (*Zool.*). A primitive method of asexual reproduction by growth and specialisation and separation by constriction of a part of the parent.

buddle (*Mining*). A shallow annular pit with either a concave or convex bottom for concentrating finely crushed, slimed, base-metal ores. See also **dumb buddle.**

Budleigh Salterton Beds (*Geol.*). Pebble beds, presumably low in the Bunter Series, exposed on the seacoast at Budleigh Salterton. The pebbles are chiefly of quartzite; some of them, containing fossils, have apparently been carried from Normandy.

buff (*Eng.*). A revolving disc composed of layers of cloth charged with abrasive powder; used for polishing metals.

buff leather (*Leather*). White leather from which the grain surface has been removed; used for army accoutrements.

buffalo disease (*Vet.*). See **barbone.**

buffer (*Artillery*). A mechanism which controls and finally absorbs the force of recoil, after a gun has been fired.

buffer (*Elec. Eng.*). See **buffer reagent.**

buffer (*Eng.*). A spring-loaded pad attached to the framework of railway rolling-stock to minimise the shock of collision: any resilient pad used for a similar purpose.

buffer action (*Chem.*). The action of certain solutions in opposing a change of composition, especially of hydrogen ion concentration.

buffer amplifier (*Elec. Comm.*). An amplifying stage introduced to prevent feed-back to an uncontrolled oscillator from its load; e.g. a master oscillator and modulator, when such feed-back cannot be conveniently reduced to zero by balancing circuits.

buffer battery (*Elec. Eng.*). A battery of accumulators arranged in parallel with a d.c. generator to equalise the load on the generator by supplying current at heavy-load periods and taking a charge during light-load periods.

buffer circuit (*Acous.*). The resistance-capacitor unit which determines the rate of rise and fall of the envelope of the wave-form of emitted sounds, when these are generated in electrostatic circuits in electronic organs.

buffer reagent (*Elec. Eng.*). A substance added to an electrolytic solution which prevents rapid changes in the concentration of a given ion. Also called BUFFER

buffer resistance (*Elec. Eng.*). See **discharge resistance.**

buffer solution (*Chem.*). A solution of certain salts, usually of a weakly ionised acid or base, whose acidity is not appreciably changed by additions of acid or alkali.

buffer spring (*Eng., Rail.*). The part lending resiliency to a buffer.

buffer stage (*Radio*). An amplifying stage coming between the master oscillator and the modulating stage of a radio transmitter. The object is to prevent the changing load of the modulated valves from affecting the frequency of the master drive.

buffer valve (*Radio*). A valve used in a buffer stage.

buffeting (*Aero.*). An irregular oscillation of any part of an aircraft, caused and maintained by an eddying wake from some other part; commonly, tail buffeting in the downwash of the main planes.

bug (*Cinema.*). Any insect which flies across the view during shooting and so spoils the shot.

bug key (*Teleg.*). A telegraphist's key that permits higher transmission speeds than a normal key. The moving lever, moved horizontally by the hand, makes dashes in one direction when held over. Dots are sent by a spring contact attached to the lever, when the lever is released from sending a dash.

buhl (*Furn.*). A wrong spelling of *boulle* (q.v.).

buhl saw (*Tools*). A kind of frame-saw in which the back of the frame is so spaced from the saw itself as to allow the latter to cut well into the work.

builder's level (*Build.*). (1) A spirit-level tube set in a long wooden straightedge, for testing and adjusting levels.—(2) A simple form of dumpy or tilting level, used on building works or for running the levels of drains.

builders' staging (*Build.*). A robust type of scaffold, formed of square timbers strongly braced together, capable of being used for the handling of heavy materials.

builders' tape (*Build.*). A linen or steel measuring-tape, usually 50 or 100 ft. long, contained in a circular leather case.

building board (*Build.*). Board manufactured from various materials and supplied with various finishes; used for lining walls and ceilings. Also called WALL-BOARD.

building certificates (*Build.*). Certificates made out by the architect during the progress, or after completion, of the works on a building contract, to enable the contractors to obtain payments on account or in settlement from the employer.

building line (*Build.*). The line beyond which a building may not be erected on any given plot.

building motion (*Cotton Spinning*). A mechanism in fly frames and spinning machines which guides the roving or yarn and builds it into a package.

building-out network (*Elec. Comm.*). A network which is connected to a basic network, to match more exactly the impedance of a line over the frequency range of interest.

built-in (*Furn.*). Said of fixture furniture built to fill a special position in a house.

built-up (*Struct.*). Said of a structural section composed of separate plates secured together.

bulb (*Bot.*). A large underground bud consisting of swollen leaf bases containing much reserve food material, arranged on a short conical stem.

bulb (*Illum.*). The glass container holding the filament of an electric filament lamp or the electrodes of an electric discharge lamp.

bulb (*Zool.*). Any bulb-shaped structure— *adj.* **bulbar.**

bulb bar (*Eng.*). A rolled bar of strip form in which the section is thickened along one edge.

bulb geophyte (*Bot.*). A geophyte which perennates by means of a bulb.

bulb-like (*Bot.*). Resembling a bulb in appearance, but solid and not consisting of tightly packed swollen leaf bases.

bulbif'erous (*Bot.*). Having, on the stem, bulbs or bulbils in place of ordinary buds.

bulbil (*Bot.*). (1) A modified bud consisting of swollen leaves containing food reserves, and able to give rise to a new plant when detached from the parent.—(2) Any rounded mass of vegetative cells, detachable from the parent and able to give rise to a new plant.—(3) A small sclerotium, usually of rather loose construction.

bulbil (*Zool.*) (1) A contractile dilatation of an artery.—(2) Any small bulb-like structure.

bulblet (*Bot.*). (1) A small bulb.—(2) See **gemma.**

bulbonu'clear (*Zool.*). Pertaining to the medulla oblongata and the nuclei of the cranial nerves.

bulbous (*Bot.*). (1) Having underground bulbs.—(2) Swollen like a bulb.

bulbous hair (*Bot.*). A hair having a swollen base.

bulbus (*Bot.*). An enlargement of the base of the stipe of an agaric.

bulbus (*Zool.*). See **bulb.**

bulbus arte'rio'sus (*Zool.*). In many Vertebrates, a strongly muscular region following the conus arteriosus.

bulbus oc'uli (*Zool.*). The eyeball of Vertebrates.

bulim'ia (*Med.*). An abnormal increase in the appetite.

bulk concrete (*Civ. Eng.*). See **mass concrete.**

bulk supply (*Elec. Eng.*). A supply of electricity purchased by a distribution company from a larger electricity supply company.

bulkhead (*Civ. Eng.*). A masonry or timber partition to retain earth, as in a tunnel or along a water-front.

bulkhead (*Ship Constr.*). A partition within a ship's hull or superstructure. It may be transverse or longitudinal, watertight, oiltight, gastight, or partially open. It may form part of the ship's subdivision for seaworthiness or otherwise.

bulkhead-fitting (*Illum.*). A robust form of electric-light fitting designed for attachment to bulkheads or other situations where space is restricted and where it may be subject to severe treatment.

bulking (*Build., Civ. Eng.*). See **moisture expansion.**

bulldog calf (*Vet.*). A lethal form of achondroplasia inherited by a proportion of the calves of Dexter-Kerry cattle.

Bullhead Bed (*Geol.*). The basal stratum of the Tertiary rocks of S.E. England, composed largely of green-coated flints.

bullhead tee (*Plumb.*). A tee having a branch which is longer than the run.

bull-headed rail (*Rail.*). A rail section having the shape roughly of a short dumb-bell in outline, but with unequal heads, the larger being the upper part in use.

bull header (*Build.*). A brick with one corner rounded, laid with the short face exposed, as a quoin or for sills, etc.

bull-holder (*Vet.*). Forceps for grasping the nasal septum of cattle as a means of restraint.

bull-nose (*Build.*). A purpose-made brick having a rounded corner; for use in positions where sharp arrises might be damaged.

bullnose (*Join.*). A small metal rebating plane having the mouth for the cutting iron near the front.

bull-nosed step (*Build.*). A step which, in plan, is half-round or quarter-round at the end.

bull-ring (*Elec. Eng.*). A metal ring used in the construction of overhead contact wire systems for electric traction schemes; it forms the junction of three or more straining wires.

bull roarer. A primitive magic device consisting of a serrated strip of wood on the end of a cord, which rotates when swung round, at the same time emitting a low musical note of considerable intensity.

bull stretcher (*Build.*). A brick with one corner rounded, laid, with the long face exposed, as a quoin.

bull wheel (*Mining*). The driving pulley for the camshaft of a stamp battery.

bull's-eye arch (*Build.*). A circular or oval window or opening.

bull's-eye lens (*Photog.*). A small thick lens, used for condensing light from a source.

bull's nose (*Carp.*). A name sometimes given to the salient angle at the intersection of two plane surfaces.

bulla (*Med.*). A blister or bleb. A circumscribed elevation above the skin, containing clear fluid; larger than a *vesicle*.

bulla (*Zool.*). In Vertebrates with a flask-shaped tympanic, the spherical part of that bone which usually forms a protrusion from the surface of the skull.

bullate (*Bot.*). (1) Having a blistered or puckered surface.—(2) Bubble-like.—(3) Bearing one or more small hemispherical outgrowths.

bullet amplifier (*Elec. Comm.*). A colloquialism for the amplifier mounted in a cylinder and associated with a condenser microphone hanging therefrom.

bullet catch (*Join.*). See **ball catch.**

bulliform cell (*Bot.*). See **motor cell.**

bulling (*Civ. Eng., Mining*). The operation of detaching a piece of loosened rock by exploding blasting charges inserted in the surrounding fissures.

bulling bar (*Civ. Eng., Mining*). An iron bar used to force clay into the crevices in the sides of a bore hole.

bullion (*Met.*). (1) Gold or silver in bulk, i.e. as produced at the refineries or not in the form of coin.—(2) The gold-silver alloy produced before the metals are separated.

bullion (*Textiles*). (1) A lace constructed of gold or silver threads.—(2) A heavy twisted cord fringe, covered with gold or silver wire.

bullion point (*Glass*). The centre piece of a sheet of glass made by the old method of spinning a hot glass vessel in a furnace until it opened out under centrifugal action to a circular sheet. The centre piece bears the mark of attachment to the rod used to spin the sheet. The method is obsolete now, but is revived for 'antique' effects.

bullock (or **horse**) **gear.** A device for producing mechanical power by means of a lever attached to gears, which is operated by an ox or horse walking in a circle.

bulwark (*Civ. Eng.*). A sea-wall built to withstand the force of the waves. See **breakwater.**

bumblefoot (*Vet.*). A cellulitis of the foot of birds due to infection by pus-forming organisms.

bump (*Mining*). A dull noise produced in a coal-mine by settlement in the floor or roof of a seam.

bumps (*Cinema.*). Low-frequency extraneous sounds during reproduction, arising from irregular motion of sound-track, either in recording or reproduction.

Buna (*Chem.*). An artificial rubber manufactured in Germany by the polymerisation of butadiene, either as an aqueous emulsion or with sodium. Processing and vulcanisation are carried out in the same way as with ordinary rubber. It has superior ageing properties, and is better than natural rubber in some respects.

bunch light (*Illum.*). A group of electric lamps in a portable fitting; used chiefly for stage lighting.

buncher (*Thermionics*). An arrangement in a thermionic valve which velocity-modulates and thereby introduces bunches in the electron space-current which is passed through it. See **catcher, debunching,** and **rhumbatron.**

bundle (*Anat.*). Fibres collected into a band in the nervous system or in the heart.

bundle (*Bot.*) See **vascular bundle.**

bundle (*Textiles*). The commercial unit of yarn or cloth: for *cotton hanks* 10 or 5 lbs.; for *linen bundles* 60,000 yards of yarn, the weight varying according to fineness.

bundle end (*Bot.*) The much simplified termination of a small vascular bundle in the mesophyll of a leaf.

bundle of His (*Zool.*) See **His's bundle.**

bundle sheath (*Bot.*). A sheath of one or more layers of parenchymatous or of sclerenchymatous cells, surrounding a vascular bundle.

bundling (*Furs*). The operation of grading skins into bundles.

bungalow (*Build.*). A one-storey house, often built with verandas.

bungalow (*Cinema.*) The same as *blimp.*

Büngner's strands (*Zool.*). Long protoplasmic strands formed in the peripheral part of a cut nerve fibre.

bunion (*Med.*). A bursa formed on the outer side of the big toe where it joins the foot, as a result of deformity of the toe and pressure of tight-fitting shoes or boots.

bunker (*Eng.*). A storage room for coal or oil fuel for use in steam-boilers.

bunker capacity (*Ship Constr.*). The capacity of a space in a ship used for carrying fuel (oil, coal, or other combustible material) It is calculated at a fixed rate of stowage per cubic foot, according to fuel; and allowances for obstructions are made in percentage.

bu'nodont (*Zool.*). Having grinding teeth with low conical cusps.

bu'noid (*Zool.*). Said of the cusps of cheek teeth when they are low and conical with a rounded apex.

bunolo'phodont (*Zool.*). Having cheek teeth with crescentic cusps connected by basal ridges.

bu'nosele'nodont (*Zool.*). Having cheek teeth with the internal cusps bunoid, the external cusps selenoid.

Bunsen burner (*Chem.*, *Illum.*). A gas burner consisting of a tube with a small gas jet at the lower end, and an adjustable air inlet by means of which the heat of the flame can be controlled; used as a source of heat for laboratory work and, in conjunction with an incandescent mantle, as the usual form of gas burner for illuminating purposes.

Bunsen cell (*Elec. Eng.*). A double-fluid primary cell yielding 1·9 volt. It consists of a zinc anode dipping into dilute sulphuric acid and a carbon cathode dipping into concentrated nitric acid.

Bunsen flame (*Chem.*). The flame produced when a mixture of coal-gas and air is ignited in air, as in a Bunsen burner. It consists of an inner cone, in which carbon monoxide is formed, and an outer one, in which it is burnt.

Bunsen ice calorimeter (*Heat*). An instrument used for determining the specific heats of substances by measuring the contraction due to the melting of ice when the hot specimen is introduced into it.

Bunsen photometer (*Illum.*). See **grease-spot photometer.**

bunt (*Aero.*). An aeroplane manœuvre consisting of, first, the half of a loop, and from the inverted position, a half roll, or a further half loop, in the opposite direction, which brings the machine back to normal flying position.

bunt (*Bot.*). A parasitic fungus (*Tilletia foetens*), a species of smut, which destroys the grain of wheat by converting the interior portion into a black powder. Mainly confined to Europe.

Bunter Series (*Geol.*). The lowest of the three series into which the rocks of the Triassic System are divided. Well exposed in the English Midlands, it comprises pebble beds with sandstone above and beneath.

buntons (*Mining*). Horizontal timbers in a circular shaft, used to carry the guides for the cage and any pipes. See **dividers.**

buoy (*Hyd. Eng.*). A floating vessel, capable of being illuminated at night, moored in estuaries and ship-canals to mark the position of minor shoals, and to show the limits of the navigable channel.

buoyancy (*Hyd.*, *Phys.*). The loss in weight of a body when immersed in a fluid, due to the resultant upward pressure exerted by the fluid on a body wholly or partly immersed in it. See **Archimedes' principle.**—(*Aero.*) The vertical thrust on an aircraft due to its immersion, either wholly or partially, in a fluid. Equal to the weight of air displaced by the gas-bags in the case of an airship; equal to the weight of water displaced by the immersed portions of the floats of a seaplane, or the body of a flying-boat. See also **reserve buoyancy.**

buoyancy, correction for (*Phys.*). In precision weighing, it is necessary to correct for the difference in the buoyancy of the air for the body being weighed and the weights. The correction to be added to the value, w, of the weights (in grams) is:

$$1{\cdot}2w\left(\frac{1}{D}-\frac{1}{\delta}\right) \text{ milligrams,}$$

where D and δ are the densities of the body and of the weights respectively.

buran, boo-rahn' (*Meteor.*). A frequent winter north-easterly wind in Central Asia and Russia.

burden (*Elec. Eng.*). A term used to signify the load on an instrument transformer. It is usually expressed as the normal rated load in volt-amperes, or as the impedance of the circuit fed by the secondary winding.

burden (*Eng.*). See **on-costs.**

burden (*Met.*). The material charged into a blast-furnace, i.e. coke, ore, and flux. A *heavy burden* means one with a high ratio of ore to coke; a *light burden* means one with a low ratio of ore to coke.

Burdiehouse Limestone (*Geol.*). A limestone of non-marine origin, containing fossil ostracods and plant-remains of Lower Carboniferous age, occurring in the eastern part of the Central Lowlands (Midland Valley) of Scotland.

Burdizzo pincers, boor-dēt'sō (*Vet.*). A castrating instrument which crushes the spermatic cord.

burdo (*Bot.*). A graft hybrid presumed to have arisen by the union of vegetative nuclei derived from the stock and the scion.

burette, bū-ret' (*Chem.*). A long glass tube with a ground-glass tap at one end and open at the other end; used in volumetric analysis. The tube is accurately calibrated along its length in tenths of a cubic centimetre, so that the amount or volume of the liquid allowed to run out through the tap can be accurately measured to one tenth of a cubic centimetre. There are several types, but all are based on the same principle. See also **volumetric analysis.**

burglar alarm (*Elec. Eng.*). An electrical device whereby a bell is rung by the opening of a window or by the treading of a person on a section of floor.

buried antenna (*Radio*). An antenna in which the wires are buried under the ground.

buried cable (*Elec. Comm.*). Lead-covered cable which contains a number of communication circuits and is buried in the ground. See **aerial cable.**

buried wiring (*Elec. Eng.*). Wiring for buildings, in which the conductors are buried beneath the surface of the plaster.

bu'rin (*Engraving*). A tool of tempered steel, with a square or lozenge-shaped point, used in engraving and in photography for retouching etched plates. Also called GRAVER.

burl dyeing (*Woollen*). The dyeing or colouring, by separate treatment, of the vegetable matter remaining in some woollen fabrics, in order to secure level colour.

burlap (*Dec.*). A coarse jute, hemp, or flax textile used as wall-covering, etc.

burling-irons (*Woollen*). A large type of forceps used for removing burrs and slubs from yarns, previous to scouring and finishing. The operation is termed *burling.*

Burlington Limestones (*Geol.*). Marine limestones of Lower Mississippian age which succeed the Kinderhook beds in the Mississippi valley; equivalent in part to the Carboniferous Limestone of England.

burmite (*Min.*). An amber-like mineral occurring in the upper Hukong Valley, Burma, differing from ordinary amber by containing no succinic acid.

burned-up (*Cinema.*). Over-exposed (film).

burner (*Ind. Heat*). See Supplement.

Burnett's fluid. A zinc chloride solution used to preserve timber from wood-boring insects or from dry-rot.

burning (*Jewel.*). Changing the colour of certain precious stones by exposing them to heat.

burning (*Met.*). The heating of an alloy to too high a temperature, causing local fusion or excessive penetration of oxide, and rendering the alloy weak and brittle.

burning-in (*Plumb.*). The operation of fixing the edge of a lead flashing into a stone wall by turning it into a dovetail groove cut in the stone, filling the groove with molten lead, and caulking.

burning-in kiln (*Glass*). A kiln in which stain or enamel colour painted on glass-ware or sheet-glass is fired to cause it to adhere more or less permanently; usually of muffle type.

burning-off (*Paint.*). Removing paint by softening it with a blowlamp flame and then scraping it off.

burning-on (*Foundry*). The process of adding a piece to an existing casting by making a mould round the point of juncture and pouring metal into it.

burnisher (*Engraving*). A polished steel tool used to soften or remove lines on engraved plates.

burnishing (*Bind.*). The operation of applying a brilliant finish to gilt or coloured edges by means of a burnishing tool, which is applied under great pressure from the shoulder.

burnishing (*Pot.*). The operation of polishing gilding, with bloodstone or agate, after the ware comes out of the enamel kiln.

Burnley printer (*Cotton Weaving*). See **printer.**

burnt ballast (*Build.*). Burnt clay used as an aggregate in the manufacture of concrete. It should never be used in making cement concrete.

burnt deposit (*Elec. Eng.*). A loose powdery deposit obtained in electroplating, if the rate of deposition is allowed to be too great.

burnt metal (*Eng.*, *Met.*). Metal which has become oxidised by overheating, and is so rendered useless for engineering purposes.

burnt ochre (*Paint.*). A red pigment obtained from calcined ochre.

burnt-out bearing. A white-metal or bronze bearing-bush which has been destroyed by heat and friction resulting from excessive tightness or improper lubrication.

burnt-out lace. Embroidery in which a material such as wool forms a temporary ground during production, and is subsequently removed by an alkaline solution, leaving the design in vegetable thread intact.

burnt sienna (*Paint.*). Sienna earth calcined and ground up as a pigment.

burnt skins (*Furs*) Skins either scorched or having hard corny parts, caused by bad dressing or by the use of acids.

burnt umber (*Paint.*). Calcined umber ground up and used as a pigment.

burr (*Acous.*). The rough edge which the gramophone record has when it is removed from the press. This is removed by spinning the record in a special type of lathe.

burr (*Eng.*). (1) A rough or sharp edge left on metal by a cutting tool.—(2) A blank punched from sheet-metal.—(3) A small milling cutter used for engraving and dental work.

burr (*Engraving*). A ridge raised on an engraved plate by a cutting tool. Also the tool for raising the burr.

burr (*Furn.*). An excrescence in tree growth which, when sliced, produces strong contrasts in the form and colour of markings.

burr (*Woollen*). A seed vessel found in wool which, before scouring, is removed either by burling or by chemical action.

burrs (*Build.*). Lumps of brick, often misshapen, which in the burning have fused together, and which are used for rough-walling, artificial rock-work, etc.

bursa (*Zool.*). Any sac-like cavity: more particularly, in Vertebrates, a sac of connective tissue containing a viscid, lubricating fluid, and interposed at points of friction between skin and bone and between muscle, ligament, and bone.

bursa copula'trix (*Zool.*). A special genital pouch of various animals acting generally as a female copulatory organ.

bursa Entia'na (*Zool.*). In some *Selachii*, a pouch of the gut representing the pyloric caeca.

bursa Fabricii, fa-brish'i-i (*Zool.*). In Birds, a pocket of unknown function developed from the dorsal part of the cloaca.

bursa inguina'lis (*Zool.*). The cavity of the scrotal sac in Mammals.

bursa omenta'lis (*Zool.*). In Mammals, a sac formed by the epiploon or great omentum.

bursa propulso'ria (*Zool.*). In some *Oligochaeta*, a muscular sac opening at the male pore, into which the prostate gland discharges.

bursat'tee or bursat'i (*Vet.*). A disease of the skin of horses in India and North America characterised by nodules which ulcerate and form deep sinuses. Also called CUTANEOUS HABRONEMIASIS.

bur'siform (*Bot.*). Resembling a bag or pouch.

bursi'tis (*Med.*). Inflammation of a bursa.

bus (*Elec. Eng.*). A commonly used abbrev. for *bus-bar.*

bus-bar (*Elec. Eng.*). (Abbreviated from *omnibus-bar.*) A short conductor forming a common junction between two or more electrical circuits.

bus-bar sectionalising switch (*Elec. Eng.*). A switch for separating a bus-bar into sections. Also called a BUS-SECTION SWITCH.

bus-coupler switch (*Elec. Eng.*). A switch or circuit-breaker serving to connect two sets of duplicate bus-bars.

bus-line (*Elec. Eng*). A cable, extending the whole length of an electric train, which connects all the collector shoes of like polarity. Sometimes called a POWER LINE.

bus-line couplers (*Elec. Eng*). Plug-and-socket connectors to join the bus-line of one coach of an electric train to that of the next.

bus-section switch (*Elec. Eng.*). See **bus-bar sectionalising switch.**

bus-wire coupler (*Elec. Eng.*). A flexible connexion between the coaches of an electric train for maintaining the continuity of any bus-wires which have to run throughout the train-length.

bush (*Bot*). A low woody plant forming a number of branches at ground-level.

bush (*Eng.*). A cylindrical sleeve, usually inserted in a machine part to form a bearing surface for a pin or shaft.

bush-hammering (*Civ. Eng.*). The operation of dressing the surface of stone with a special hammer having rows of projecting points on its striking face.

bush waxing (*Cables*). This occurs in conjunction with carbon. It consists frequently of a waxed area, with streamers at its edges. See **cable wax.**

bushing (*Elec. Eng*). An insulator which enables a live conductor to pass through an earthed wall or tank (e.g. the wall of a switch house or the tank of a transformer).

bushing (*Plumb.*). A reducing adapter or screwed piece for connecting together in the same line two pipes of different sizes.

bushing current transformer (*Elec. Eng.*). A current transformer built into a bushing.

busy (*Teleph.*). A term signifying *engaged.* A 'busy' is placed on a circuit during testing or adjustment so that it gives the engaged test or the busy-back tone to operators who attempt to use it.

busy back (*Teleph.*). The audible tone which is sent back from an engaged circuit when an attempt is made to connect to it.

busy hour (*Teleph.*). The selected hour during which more calls are handled by an exchange than in any other of the remaining 23 during the day, starting at any hour or half-hour.

busy tone (*Teleph.*). The same as *busy back.*

bu′tadiene, —dī′ēn′ (*Chem.*). Erythrene, CH_2:CH·CH:CH_2, a di-olefine with conjugate linking. An *isoprene* (q.v.) homologue, an important compound in the synthesis of rubber.

Bu′tagas (*Chem.*). A trade-name for compressed *butane* (q.v.).

butane (*Chem.*). C_4H_{10}, a paraffin hydrocarbon, b.p. 1° C., sp. gr. at 0° C. 0·600, contained in natural petroleum, obtained from casing head gases in petroleum distillation. Used commercially in compressed form, and supplied in steel cylinders for domestic purposes.

butanol (*Chem.*). A synonym for *n-butyl alcohol* (q.v.).

butenes (*Chem.*). *Butylenes* (q.v.).

butt (*Foundry*). The large flat, round, end of a rammer.

butt (*Leather*). The back part of a tanned hide; used for boot soles, belting, etc.

butt coupling (*Eng.*). See **muff coupling.**

butt hinge (*Join.*). A hinge formed by two leaves, which are secured to the door and door-frame in such a manner that when the door is shut the two leaves are folded into contact.

butt joint (*Carp., Join.*). A joint formed between the squared ends of the two jointing pieces, which come together but do not overlap.—(*Eng.*) A joint between two plates whose edges abut, and are covered by a narrow strip or 'strap' riveted or welded to them.

butt strap (*Eng.*). The cover plate which overlaps the main plates of a *butt joint* (q.v.).

butt-welded tube (*Met.*). Tube made by drawing mild steel strip through a bell, so that the strip is coiled into a tube, the edges being then pressed together and welded.

butt-welding (*Eng.*). The joining of two plates or surfaces by placing them together, edge to edge, and welding along the seam thus formed. See **welding.**

butte, būt (*Geol.*). A steep-sided flat-topped hill: a small mesa.

butter (*Chem.*). A fat emulsion containing in solution sugar, albumen, salts, whereas fats and casein are present in colloidal dispersion.

buttermilk. The aqueous liquid occluded in butter which is removed during the manufacturing process.

butterfly (*Cinema.*). A diffuser used to soften the light from the sun or from lamps; made from silk stretched on a frame.

butterfly flower (*Bot.*). A flower pollinated by butterflies.

butterfly nut (*Eng.*). See **wing nut.**

butterfly valve (*Eng.*). (1) A disc turning on a diametral axis inside a pipe; used as a throttle valve in petrol and gas engines.—(2) A valve consisting of a pair of semicircular plates hinged to a common diametral spindle in a pipe; by hinging axially, the plates permit flow in one direction only.

buttering (*Build.*). The operation of spreading mortar on the edges of a brick before laying it.

buttering trowel (*Build*). A flat tool similar to, but smaller than, the brick trowel; used for spreading mortar on a brick before placing it in position.

buttock planes (*Ship Constr.*). Longitudinal sectional planes drawn through a ship's form; used for laying-off in the moulding loft, and for calculation of volumes, etc.

button (*Bot.*). A young fruit body of an agaric, before the pileus has spread out and exposed the hymenium.

button (*Horol.*). The serrated knob by means of which a keyless watch or similar movement is wound.

button-headed screws (*Eng.*). Screws having hemispherical heads, slotted for a screwdriver; known also as HALF-ROUND SCREWS.

button switch (*Elec. Eng.*). See **pushbutton switch.**

buttoning (*Woollen*). The formation of small lumps or buttons of fibre in the warp yarns during weaving.

buttress (*Civ. Eng.*). A supporting pier built on the exterior of a wall to enable it to resist outward thrust.

buttress, flying (*Arch.*). See **flying buttress.**

buttress root (*Bot.*). A root, often adventitious, which assists in keeping the stem of the plant upright.

buttress screw-thread (*Eng.*). A screw-thread designed to withstand heavy axial thrust in one direction. The back of the thread slopes at 45°, while the front or thrust face is perpendicular to the axis.

butty (*Mining*). A working partner in a colliery.

bu′tyl group (*Chem.*). The aliphatic group C_4H_9— .

***n*-butyl acetate** (*Chem.*). $CH_3COOC_4H_9$; commercial product has a boiling range 124°-128° C., sp. gr. 0·885, a colourless liquid, of fruity odour, soluble in alcohol, ether, acetone, benzene, turpentine, slightly in water. A very important lacquer solvent.

butyl alcohols (*Chem.*). C_4H_9 OH. There are four isomers possible and known, viz.:
normal primary butyl alcohol $CH_3\cdot(CH_2)_3\cdot OH$, b.p. 117° C.;
normal secondary butyl alcohol $CH_3\cdot CH_2\cdot CH(OH)\cdot CH_3$, b.p. 110° C.;
iso-butyl alcohol $(CH_3)_2{:}CH\cdot CH_2\cdot OH$, b.p. 107° C.;
tertiary butyl alcohol $(CH_3)_3C\cdot OH$, b.p. 83° C.

butylenes (*Chem.*). C_4H_8, olefine hydrocarbons, the next higher homologues to propylene. Three isomers are possible and known, normally gaseous, b.p. between −6° C. and +3° C.

butyr'ic acids (*Chem.*). $C_3H_7\cdot COOH$, two isomers, viz. *normal* and *iso*-butyric acid. Only *n*-butyric acid is of importance, m.p. −8° C., b.p. 162° C.; it is a thick liquid of rancid odour.

butyric fermentation (*Chem.*). The fermentation of sugar and starch by fission ferments, e.g. *Bacillus butylicus*, resulting in the formation of butyric acid.

bu'tyryl (*Chem.*). The monovalent acyl radical $C_3H_7\cdot CO-$.

Buys Bal'lot's law, bis— (*Meteor.*). The law giving the direction of rotation of cyclones and anticyclones. In the northern hemisphere, with wind arriving from the rear, the pressure is lower on the left-hand side than on the right. The phenomenon is due to the rotation of the earth, and is therefore reversed in the southern hemisphere.

buzz track (*Cinema.*). A sound-track on a normal film on which is registered a constant note; the reproduction from this is used for the accurate adjustment of the optical parts of the light-scanning system.

buzzard (*Cinema.*). A take which is not good photographically.

buzzer (*Elec. Comm.*). A vibrating reed, actuated by self-interrupted direct current, used to generate a note to indicate the presence of actuating current.

buzzer wavemeter (*Radio*). A wavemeter in which oscillations of known frequency are generated in a resonant circuit connected across the vibrating contacts of a buzzer.

B.W.D. (*Vet.*). See **bacillary white diarrhoea.**

B.W.G. (*Eng.*). See **Birmingham Wire Gauge.**

by-pass (*Plumb.*). Any device for directing flow around a fixture, connexion, or pipe, instead of through it.

by-pass condenser (*Radio, etc.*). A condenser offering a very low impedance to currents of high frequencies but a high impedance to those of low frequencies. Connected in shunt across the output terminals of a rectifier, it effectively removes the high-frequency carrier components.

by-pass road (*Civ. Eng.*). A road specially constructed to serve as a diversion road for traffic which would otherwise pass through a town.

by-pass valve (*Eng.*). A valve by which the flow of fluid in a system may be directed past some part of the system through which it normally flows; e.g. an oil-filter in a lubrication system.

bye-channel (*Civ. Eng.*). A channel formed around the side of a reservoir past the end of the dam, to convey flood discharge from the stream above the reservoir into the stream below the dam. Also called BYE-WASH, DIVERSION CUT, SPILLWAY.

bye-pass. See **by-pass.**

bye-wash (*Civ. Eng.*). See **bye-channel.**

byewater (*Jewel.*). A term expressing off-colour in diamonds.

byre (*Build.*). A cowshed.

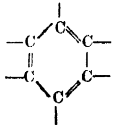
bys'malith (*Geol.*). A form of igneous intrusion bounded by a circular fault and having a dome-shaped top; described by Iddings from the Yellowstone Park.

byssa'ceous, bys'soid (*Bot.*). (1) Consisting of a mass of fine threads, and resembling cotton in appearance.—(2) Of delicate, filamentous structure.

bys'sus (*Zool.*). In *Pelecypoda*, a tuft of strong filaments secreted by a gland in the foot and used for attachment.—*adjs.* **byssogenous, byssal.**

bytownite (*Min.*). A variety of plagioclase feldspar, containing a high proportion of the anorthite molecule; occurs in basic igneous rocks.

Bz (*Chem.*). A symbol for (1) The benzoyl radical, $C_6H_5\cdot CO-$; (2) the benzene nucleus,



c (*Chem.*). A symbol for *concentration.*

c- (*Chem.*). Abbrev. for (1) *cyclo-*, i.e. containing an alicyclic ring.—(2) *cis-*, i.e. containing the two groups on the same side of the plane of the double bond or ring.

c (*Phys.*). The symbol used for the velocity of light *in vacuo*. Its value, according to the most accurate measurements made by Michelson, is $(2{\cdot}99796 \pm 0{\cdot}00004) \times 10^{10}$ cm. per second. This is also equal to the ratio of an electrical quantity, expressed in electrostatic units, to the same quantity expressed in electromagnetic units.

C (*Chem.*). The symbol for *carbon*.

C (*Chem.*). A symbol for (1) *concentration*.—(2) (With subscript) *molecular heat capacity*; C_p, at constant pressure; C_v, at constant volume.

C- (*Chem.*). Containing the radical attached to a carbon atom.

C (*Elec.*). Symbol for *capacitance*.

C (*Heat*). When used after a number of degrees thus: 45° C., the symbol indicates a temperature on the Centigrade scale.

[C] (*Light*). One of the Fraunhofer lines in the red of the solar spectrum. Its wavelength is 6563·045 A., and it is due to hydrogen.

C-amplifier (*Elec. Comm.*). The line or distribution amplifier following the B-amplifiers in broadcasting studios.

C-battery (*Elec. Comm.*). The battery or power supply required for the grid polarisation of thermionic valves, making the grid usually negative with respect to the cathode, and therefore supplying power only when the grid voltage becomes positive with respect to the cathode.

C-layer (*Radio*). A reflecting or scattering region between about 35 and 70 km., postulated to explain return signals sometimes obtained with vertically radiated waves.

C-service-area (*Radio*). The region surrounding a broadcasting transmitter where the field strength is between 2·5 and 5 millivolts per metre.

C-wire (*Teleph.*). The holding wire associated with the A and B wires of each subscriber connected to a telephone exchange, and connected to the sleeve on the plug which is inserted into the subscriber's line jack by the A-operator.

Ca (*Chem.*). The symbol for *calcium*.

cab (*Eng.*). The covered shelter for the driver of a locomotive or road-transport vehicle.

cab-tyre sheathing (*Cables*). A hard rubber cable-sheath. It may be used in house-wiring without a protecting steel tube.

cabane, ka-ban′ (*Aero.*). A system of struts in an aircraft arranged in the form of a pyramid or pylon.

cabin (*Build., Civ. Eng.*). The wooden hut used as an office by the clerk of works or general foreman, on or near a building works area.

cabin (*Mining*). A fireman's station underground in a coal-mine.

cabin hook (*Join.*). A hooked bar and eye, serving as a fastener for doors and casements.

cabinet (*Paper*). A standard size of cut card, 6½×4¼ in.

cabinet (*Photog.*). A standard size of photographic print, measuring approximately 6×4 in.

cabinet-file (*Tools*). A single-cut smooth file used by joiners and cabinet-makers.

cabinet projection (*Drawing*). A method of representation of a solid object in a drawing; one face of the object is drawn parallel to the plane of the paper, and faces perpendicular to this face are drawn at an angle of 45°, slant lengths being drawn to half scale.

cabinet-work (*Join.*). Fine joinery used in the construction of furniture and fixtures.

cable (*Eng., etc.*). A general term for rope or chain used for engineering purposes.—Specifically, a ship's anchor cable.

cable (*Elec. Comm.*). (1) An electrical circuit, comprising one or more conductors surrounded by dielectric and a sheath, suitable for laying on the bed of the ocean for carrying telegraphic signals.—(2) The collection of a number of circuits in a lead sheath, for burying in the ground.

See **aerial—**
air-core—
armoured—
bank—
bearer—
belted-type—
buried—
co-axial—
coil-loaded—
concentric—
continuously-loaded—
dry-core—
H-type—
intermittently-loaded—
loaded—
loop—
Krarup—
multiple-twin—
oil-filled—
paper—
pressure—
Pupin—
quad—
S.L.-type—
standard—
star-quad—
submarine-telegraph—
taper-loaded—
twin—

cable buoy. A buoy attached to an anchor, and serving to mark its position.

cable code (*Teleg.*). The modification of the Morse code in which a dash becomes a dot reversed in polarity; used for telegraph transmission in submarine cables.

cable ducts (*Cables*). Earthenware, steel, or concrete pipes through which cables are drawn, and in which they lie underground.

cable form (*Elec. Comm.*). The normal scheme of cabling between units of apparatus. The bulk of the cable is made up on a board, using nails at the appropriate corners, each wire of the specified colour identification being stretched over its individual route with adequate skinner. When the cable is bound with twine and waxed, it is fitted to the apparatus on the racks and the skinners connected, by soldering, to the tag blocks.

cable grip (*Cables*). A flexible cone of wire which is put on the end of a cable. When the cone is pulled, it tightens and bites into the lead sheath of the cable, and can be used to pull the cable into a duct.

cable-laid rope. A rope formed of several strands laid together so that the twist of the rope is in the opposite direction to the twist of the strands.

cable-length. One-tenth of a nautical mile (6080 feet).

cable railway (*Civ. Eng.*). A means of transport sometimes used for short straight inclines, or other stretches, the motive power coming from a continuous cable, overhead or underground, to which the car may at any time be rigidly connected through a clutch device.

cable tramcars (*Civ. Eng.*). Tramcars deriving motive power from an underground cable, in the same manner as the cable railway.

cable wax (*Cables*). A solid wax formed by the ionic bombardment of the oil in a cable. It is a good insulator, and cables operate very successfully even when much wax is present. It is produced by a condensation process such as $C_6H_{14}+C_5H_{12} \rightarrow C_{10}H_{22}+CH_4$.

cable-way (*Civ. Eng., etc.*). A construction consisting of cables slung over and between two towers, so that a skip suspended from the cables may be raised and lowered and moved to any position along the cables. It is used for transport of spoil and materials. Also known as a BLONDIN.

cabling (*Arch.*). A round moulding used to decorate the lower parts of the flutes of columns.

cabling (*Cotton Spinning*). A method of producing folded yarns involving a double twisting operation, the product being known as *cabled* yarn.

cabling (*Elec. Comm.*). The collection of cables required for distributing the power supplies in a telephone exchange. The collection of cables for the telephone circuits is usually referred to as *trunking* (q.v.).

cabochon or **en cabochon,** ahn^g ka-bosh-on^g (*Jewel.*). Said of a precious stone cut with a domed face.

caboose (*Rail.*). A separate car at the end of a freight train, accommodating the guide and brakemen. [U.S.]

Cabot quilt (*Acous.*). An acoustic absorbing material made from dried eel grass, supported between sheets of canvas or paper.

cab′riole (*Furn.*). A chair- or table-leg having a double curve; originally in the shape of a goat's leg. (Latin *capreolus*, a wild-goat.)

cachexia, —kek′si-a (*Med.*). A combination of wasting, weakness, anaemia, and an 'earthy' complexion, characteristic of patients with cancer.

cac′odyl (*Chem.*). $As_2(CH_3)_4$, a colourless liquid; b.p. 170° C.; of horribly nauseous odour. It combines directly with oxygen, sulphur, chlorine, etc. Cacodyl and cacodyl oxide form the basis for other secondary arsines. Cacodyl derivatives are important as rubber accelerators.

cacos′mia (*Med.*). A bad smell.

cada′ver (*Anat.*). The dead human body.

cadav′erine (*Chem.*). $NH_2{\cdot}(CH_2)_5{\cdot}NH_2$, pentamethylenediamine, a colourless syrupy liquid; b.p. 178° C. Ring formation occurs by elimination of NH_3 with the formation of the heterocyclic base *piperidine* (q.v.).

cadence (*Teleg.*). The audible signal which is given to the operator of a Baudot transmitter to indicate the timing for pressing the keys forming the code.

caderas, mal de, ka-dā̆′ras (*Vet.*). A chronic infectious disease of horses in South America; due to *Trypanosoma equinum*, and characterised by weakness of the hind-quarters.

cadmium (*Met.*). A white metallic element. Chem. symbol, **Cd.** At. wt. 112 41, at. no. 48, sp. gr. at 20° C. 8·648, m.p. 321° C. Specific electrical resistivity 7·59 microhms per cm. cub. Used for coating small steel articles as a protection against corrosion. Added to overhead copper conductors to increase their strength, and is a common constituent of *fusible alloys* (q.v.).

cadmium cell (*Chem.*). See **Weston cell.**

cadmium cell (*Photo-electronics*). A vacuum photo-electric cell having a cadmium or cadmium-coated cathode, with maximum spectral sensitivity in the ultra-violet range.

cadmium copper (*Met.*). A variety of copper containing 0·7-1·0% of cadmium. Used for trolley, telephone, and telegraph wires because it gives high strength in cold-drawn condition, combined with good conductivity.

cadmium electrode (*Elec. Eng.*). A normal electrode made of cadmium; used in testing accumulator cells.

cadmium red line (*Light*). The source chosen (on account of the homogeneity of its radiation) for comparing optical wavelength with standards of length such as the standard metre and yard. The most recent accurate measurements are by Sears and Barrell, who have obtained the value $6438{\cdot}4708 \times 10^{-8}$ cm. as the wavelength of the red cadmium line.

cadmium yellow (*Dec.*). A sulphide of cadmium.

cad′ophore (*Zool.*). In some *Urochorda*, a postero-dorsal process to which the zooid buds become attached.

cadubran′chiate (*Zool.*). Possessing gills at one period of the life-cycle only.

cadu′cous (*Bot.*). Soon falling from the plant: lasting for a short time only.—(*Zool.*) ***Deciduate*** (q v.).

caecostomy, cecostomy, sē-kos′— (*Surg.*). The surgical formation of an artificial opening into the caecum.

caecum, sē′kum (*Bot.*). An outgrowth from the embryo sac into the endosperm in some plants.

caecum (*Zool.*). Any blind diverticulum or pouch, especially one arising from the alimentary canal.

Ca′en stone (*Build.*). A non-oölitic limestone from the Jurassic rocks of Normandy, very suitable for interior carving.

caenogen′esis, sē-no— (*Zool.*). A type of ontogeny in which the non-ancestral characters appear as a result of secondary adaptation of the young to peculiar environmental conditions.—Hence **caenogenet′ic,** of recent origin.

caeoma, sē-ō′ma (*Bot.*). A form of aecidium in which the spores are surrounded by a few sterile hyphae only, and not by a well-formed peridium.

Caesa′rean (or **Cesarean**) **section** (*Obstet.*). Artificial delivery of a foetus through the incised abdomen and uterus.

cae′sious (*Bot.*). Bearing a bluish-grey waxy covering (bloom).

cae′sium, cesium (*Chem.*). A metallic element in the first group of the periodic system, one of the alkali metals. At. no. 55, at. wt. 132·8. Symbol Cs.

caesium cell (*Photo-electronics*). A photo-electric cell having a cathode consisting of a thin layer of caesium deposited on minute globules of silver; it is particularly sensitive to infra-red radiation.

caesium oxygen cell (*Photo-electronics*). A caesium cell in which the vacuum is replaced by an atmosphere of oxygen at very low pressure. It is more sensitive to red light than the plain caesium cell.

cae′spitose (*Bot.*). Growing from the root in tufts, as many grasses.—*dim.* **caespit′ulose.**

caffeine, kaf′ē-in (*Chem.*). Theine; 1, 3, 7-trimethyl-2,6-dihydroxypurine; crystallises with 1 H_2O in silky needles and loses its water of crystallisation completely at 100° C.; m.p. of the anhydrous caffeine, 234° C. It has a very marked physiological action on the heart. Can be obtained by extracting tea-dust, or by synthesis from uric acid

cage (*Carp.*). Any timber construction serving to enclose another.

cage (*Civ. Eng.*). The platform on which goods are hoisted up or lowered down a vertical shaft.

cage (*Mining*). The platforms and framework for lowering and raising men and wagons in a shaft.

cage (*Skins*). See **cageing.**

cage antenna (*Radio*). An antenna comprising a number of wires connected in parallel, and arranged in the form of a cage, to reduce the copper losses and increase the effective capacity.

cage rotor (*Elec. Eng.*). A form of rotor, used for induction motors, having on it a cage winding. Also called SQUIRREL-CAGE ROTOR.

cage-type negative plate (*Elec. Eng.*). See **box-type negative plate.**

cage winding (*Elec. Eng.*). A type of winding used for rotors of some types of induction motors, and for the starting or damping windings of synchronous machines. It consists of a number of bars of copper or other conducting material, passing along slots in the core and welded to rings at each end. Also called a SQUIRREL-CAGE WINDING.

cageing (*Skins*). A method of freeing skins from the materials (sand, sawdust) with which they have been cleaned, by rotating them in a drum-shaped *cage*.

Cainozo'ic, Kainozo'ic (*Geol.*). The word signifies 'recent life,' and is applied to the fourth of the great geological eras. It is synonymous with Tertiary plus Quaternary.

cairngorm (*Min.*). Smoky-yellow or brown varieties of quartz, the colouring matter probably due to some organic compound; named from Cairngorm in the Scottish Grampians, the more attractively coloured varieties being used as semi-precious gemstones. Also called SMOKY QUARTZ.

cais'son (*Build.*). A deeply recessed sunk panel in a soffit or ceiling.

caisson (*Civ. Eng.*). A water-tight box used to surround the works involved in laying the foundations of a bridge or other structure below water.

caisson (*Hyd. Eng.*). (1) A water-tight air-receiver used to help float a sunken vessel, to which it is attached for this purpose.—(2) A floating structure which may be placed across the entrance to a basin, lock, or dry dock, thereby excluding water from it.

caisson disease (*Med.*). The bends; diver's palsy; diver's paralysis. Pains in the joints and paralysis, occurring in workers in compressed air who are too suddenly subjected to atmospheric pressure after compression; it is due to accumulation of bubbles of nitrogen in the nervous system.

Caithness Flags (*Geol.*). The local representative of the Old Red Sandstone in N.E. Scotland, but equivalent only to the Middle O.R.S. of other regions. The beds are rich in fish remains.

caking coal (*Mining*). Coal which cakes or forms coke when heated in the absence of air.

calamif'erous (*Bot.*). Having a hollow stem.

cal'amine (*Min.*). In England, smithsonite; in U.S.A., hemimorphite (*electric calamine*).

calamis'trum (*Zool.*). In some Spiders, a brush-like series of hairs on the metatarsus of the fourth leg, correlated with the presence of the cribellum.

cal'amus (*Zool.*). The proximal hollow part of the scapus of a feather; quill.—*pl.* **calami.**

cal'athide, —thēd (*Bot.*). (1) The involucre of a capitulum.—(2) The capitulum itself.

calca'neum (*Zool.*). In some Vertebrates, the fibulare, or large tarsal bone forming the heel; more generally, the heel itself: in Birds, a process of the metatarsus.

calcar (*Zool.*). In Insects, a tibial spine: in *Amphibia*, the prehallux: in Birds, a spur of the leg, or more occasionally, of the wing: in Bats, a bony or cartilaginous process of the calcaneum supporting the interfemoral part of the patagium.

cal'carate (*Bot.*). Bearing one or more spurs.

Calca'rea (*Zool.*). A class of *Porifera*, distinguished by the possession of a calcareous skeleton and large choanocytes.

calca'reous (*Bot.*). Coated with, or containing lime (as calcium carbonate).—(*Chem.*) Containing compounds of calcium, particularly minerals.

calcareous clay (*Geol., etc.*). See **marl.**

calcareous pan (*Bot.*). A hard layer of limy material, more or less impermeable to water, formed below the surface of the soil, and affecting the water supply of plants growing above it.

calcareous ring (*Zool.*). In *Holothuroidea*, a ring of ten calcareous ossicles surrounding the oesophagus.

calcareous rocks (*Geol.*). The sedimentary rocks containing appreciable quantities of calcium carbonate, or in many cases composed almost entirely of this substance. Amongst them are to be numbered all limestones, magnesian limestones, and dolomites, as well as chalk, and chemically precipitated material such as calc-tufa.

cal'cicole, calcic'olous (*Bot.*). Flourishing on soils or rocks rich in calcium carbonate.

calcico'sis (*Med.*). Lung disease caused by the inhalation of marble dust.

calcif'erous, calcigerous (*Zool.*). Producing or containing calcium salts.

Calciferous Sandstone (*Geol.*). The lowest group of the Lower Carboniferous rocks of Central Scotland, equivalent to part of the Carboniferous Limestone of England, and including the well-known oil-shales of the Lothians.

calcifica'tion (*Bot.*). The accumulation of calcium carbonate on or in cell walls.—(*Zool.*) The deposition of lime salts; e.g. in diseased or dead tissues such as the walls of arteries.—*adj.* **calcified.**

cal'cifuge, cal'ciphobe, calcipho'bous (*Bot.*) Terms applied to any species of plant which is intolerant of a limy soil.

calcigerous, kal-sij'— (*Zool.*). See **calciferous.**

calcigerous glands (*Zool.*). In some *Oligochaeta*, a pair of oesophageal glands producing a limy secretion to neutralise the acids in swallowed soil: in some *Amphibia*, the glands of Swammerdam, calcareous concretions lying on either side of the vertebrae, close to the points of exit of the spinal nerves.

cal'cimine (*Paint.*). A wash made up of whiting and glue with water, sometimes tinted for use on walls.

calcination (*Chem.*). The process of subjecting a material to the effect of prolonged heating at fairly high temperatures.—(*Met.*) The operation of heating ores to drive off water and carbon dioxide. Frequently it is not distinguished from roasting.

calcine (*Met.*). Ore or concentrate after treatment by calcination or roasting and ready for smelting.

calcining furnace (*Met.*). A furnace in which ores or metallurgical products are calcined.

cal'ciphile, calciphi'lous (*Bot.*). Terms applied to any species which occurs more or less exclusively on a limy soil.

cal'ciphobe, calcipho'bous (*Bot.*). See **calcifuge.**

cal'ciphyre (*Geol.*). A crystalline limestone, containing silicate minerals produced by metamorphism. The term is obsolete.

calcite or **calcspar** (*Min.*). The crystalline form of calcium carbonate, showing trigonal symmetry and a great variety of mineral habits. It is one of the commonest of minerals in association with both igneous and sedimentary rocks.

calcium (*Met.*). A silvery-white metallic element. Chemical symbol, Ca. At. wt. 40·08, at. no. 20, sp. gr. at 20° C. 1·55, m.p. 851° C., specific electrical resistivity 4·6 microhms per cm. cub. Used as a deoxidising agent for copper and some copper alloys, as a hardener in lead-base bearing alloys and lead cable-sheathing alloys, and for eliminating bismuth from lead. The metal is usually produced by the electrolysis of fused calcium chloride. It occurs in nature in the form of several compounds, although the form of carbonate predominates.

calcium carbide (*Chem.*). CaC_2. A compound of calcium and carbon usually prepared by fusing lime and hard coal in an electric furnace. See also **acetylene.**

calcium chloride (*Chem.*). $CaCl_2$. Formed by the action of hydrochloric acid on the metal and its common compounds. It absorbs moisture from the atmosphere, and for that reason is extensively used for drying gases. See **deliquescence.**

calcium chloride tubes (*Chem.*). Tubes filled with granular calcium chloride, used for the absorption of water vapour.

calcium fluoride (*Chem.*). CaF_2. In the form of *fluorspar* (q.v.) it is used for the manufacture of hydrofluoric acid. It is also an important constituent of opal glass.

calcium tube (*Photog.*). A dry container for photographic materials; it makes use of calcium carbide.

calcium tungstate screen (*Cathode Ray Tubes*). A fluorescent screen used in cathode ray tubes; it gives a blue and photo-actinic luminescence.

calco-uranite (*Min.*). See **autunite.**

calcspar (*Min.*). See **calcite.**

Cal′culagraph (*Teleph.*). A device for printing timing dials on a card. It indicates the time taken during a telephone connexion, particularly over a trunk circuit, in order that the proper charges may be made.

calculating machine. A machine which can perform one or more of the four fundamental operations of arithmetic when the figures with which the machine is to operate are set. Machines may be operated by hand (keyboard or barrel type) or they may be electrically driven.

cal′culus (*Maths*).

See **differential—** **integral—**

calculus (*Med.*). A concretion of mineral or of organic matter in certain organs of the body; e.g. the kidney, the gall-bladder.

caldera, kal-dā′ra (*Geol.*). A volcanic crater of large size, commonly produced by eruptions of great explosive force.

Caledonian (*Geol.*). Appertaining to the great mountain-building episode of late Silurian-early Devonian date.

Caledonoid′ direction (*Geol.*). The direction assumed by the Caledonian (Siluro-Devonian) mountainfolds and associated structures in Britain and Scandinavia. Commonly N.E.-S.W., but subject to considerable variations.

calendar. See **Gregorian—** **Julian—**

calendar month, calendar year (*Astron.*). A month or a year as defined in a calendar, particularly the *Gregorian calendar.* A calendar month differs from the synodic (or lunar) month. The terms are also used for periods equivalent to a month or year, e.g. from July 9 to August 9, or July 9 of one year to July 9 of the next.

calendar work (*Horol.*). The mechanism of a calendar watch or clock which indicates the progress of the calendar. In *simple calendar* work the mechanism requires to be adjusted at the end of a month having less than 31 days. In *perpetual calendar* work the mechanism automatically corrects for all months of less than 31 days, also for leap year.

calender (*Paper, Textiles, etc.*). A machine, generally consisting of a number of rollers, through which material is passed under pressure, to impart the desired finish, or to ensure uniform thickness.

calender rollers (*Woodworking*). Rollers for feeding timber into sawing or planing machines.

calendered paper (*Paper*). Paper which has been 'finished' in a calender. The varying degrees of gloss are distinguished thus: *low machine* (or *mill*) *finish* (usual printing paper), *high machine* (or *mill*) *finish* (intermediate), and *supercalendered* (highly glazed).

calf (*Bind.*). Calfskin with a smooth finish; used extensively for binding law books and account books.

Calgon (*Chem.*). Trade-name for sodium hexametaphosphate, used in water-softening because of its marked property of forming soluble double salts with calcium. Also used in the treatment of textiles and in laundry work.

caliber. See **calibre.**

calibration (*Phys., etc.*). The process of determining experimentally the absolute values corresponding to the graduations on an arbitrary or inaccurate scale on an instrument.

calibration error (*Radio*). An error in the bearings given by a ship's direction-finder, due to currents in the hull, masts, and rigging. The error is corrected in the initial calibration.

calibre, caliber. The internal diameter or bore of a pipe.

calibre (*Artillery*). The diameter of the piece measured between the lands of the rifling.

calibre (*Horol.*). The arrangement of the various components of a watch or clock.

caliche, ka-lē′chā (*Min.*). See **soda nitre.**

calico (*Textiles*). A plain grey cotton cloth, woven in different qualities.

calico weave (*Weaving*). See **plain weave.**

caliduct (*Build.*). A steam or hot-water pipe used for heating purposes.

Californian bees (*Bot.*). See **ginger-beer plant.**

Californian jade (*Min.*). A compact form of green vesuvianite (idocrase) obtained from California, and used as an ornamental stone and in jewellery. Also known as CALIFORNITE.

Californian onyx (*Min.*). A term wrongly applied to amber- or brown-tinted aragonite, a soft mineral unsuited for use as a cut stone. Cf. *onyx.*

califor′nite (*Min.*). See **Californian jade.**

caliper (*Horol.*). The size of a watch movement.

calipers. See **callipers.**

calked ends (*Build.*). The ends of built-in iron ties, split and splayed to provide more secure anchorage.

calking (*Civ. Eng.*). See **caulking.**

call (*Teleph.*). The request from a subscriber for connexion to another subscriber: the completion of that connexion.

See **direct—** **reverting—**
double-switch— **service—**
local— **single-switch—**
long-distance— **toll—**
préavis— **trunk—**
report— **unit-fee—**

call-counting meter (*Auto. Teleph.*). A meter which counts the total calls passing through a given group of trunks.

call-indicator (*Elec. Eng.*). An electric indicating device used in conjunction with a system of electric bells, or in a lift, to indicate the point from which a call has been made.

call-indicator (*Teleph.*). The device which indicates to a manual operator a required number which has been dialled. Both visual number plates and aural methods are in use.

call-indicator position (*Teleph.*). A B-operator's position which is equipped for call-indicator working from an automatic exchange.

call-indicator working (*Teleph.*). The use of aural or visual indication to the B-operator of the number of the called subscriber on a manual exchange, when the calling subscriber has dialled this number through his automatic exchange. See also **coded call indicator working.**

call office, public (*Teleph.*). See **public call office.**

Call and Exener bodies (*Histol.*). Groups of cells bordering the fluid-filled central cavity of the ovarian follicles in Mammals.

callain′ite (*Min.*). A very rare green phosphate of aluminium, resembling turquoise but translucent.

callaite (*Min.*). A little-used name for the mineral turquoise.

Callan cell (*Elec. Eng.*). A modification of the Bunsen type of primary cell, in which the positive electrode is of cast-iron instead of carbon.

Callaud cell, kal-ō (*Elec. Eng.*). A form of Daniell cell in which the lower part of the container is of copper and the upper part zinc; the zinc sulphate in the top part of the cell floats on the copper sulphate in the lower part, without any porous diaphragm between.

called-party release (*Auto. Teleph.*). The operation of automatic telephone switching circuits by which the connecting apparatus is released when the called party replaces his receiver and thereby opens his loop.

called subscriber (or **sub**) (*Teleph.*). The subscriber to whom connexion is desired by the calling subscriber.

calling dial (*Auto. Teleph.*). See **dial.**

calling-party release (*Auto. Teleph.*). The operation of automatic telephone switching circuits by which the connecting apparatus is released when the calling subscriber replaces his receiver on its hook and thereby opens his loop.

calling subscriber (or **sub**) (*Teleph.*). The subscriber who originates a call by passing a number to an exchange, either verbally or by dialling.

calling-subscriber release (*Auto. Teleph.*). The same as *calling-party release* (q.v.).

callipers. An instrument, consisting of a pair of hinged legs, used to measure external and internal dimensions.

calliper gauge (*Eng.*). A limit gauge having two pairs of jaws, marked 'Go' and 'Not Go' respectively, truly ground to specified distances apart, corresponding to the tolerance allowed on the dimension of the work. See **limit gauges.**

calliper splint (*Surg.*). A splint fitted to the broken leg so that the patient may walk without any pressure on the foot, the weight of the body being taken by the hip bone.

callipers, poising (*Horol.*). A form of callipers between the jaws of which a balance may be mounted and rotated, as a test for truth and poise.

cal'lose (*Bot.*). A carbohydrate, insoluble in cuprammonia, but soluble in the cold in 1% solutions of caustic alkalies. It occurs in the callus pads which form over sieve plates, and in calcified walls.

callos'ity (*Bot.*). See **callus** (3).

callosity (*Med.*). A thickening of the skin as a result of irritation or friction.

callous, callose (*Bot., Med., etc.*). Hardened, usually thickened, and often like horn in appearance.

cal'lus (*Bot.*). (1) A mass of parenchymatous cells formed by plants over or around a wound.—(2) A pad of callose formed over a sieve plate either as winter approaches or as the sieve tube ages and degenerates; also called CALLUS PLATE.—(3) A deposit of material inside the wall of a cell, around the entering germ tube of a parasitic fungus, which may prevent the parasite establishing itself in the cell; also called CALLOSITY.

callus (*Med.*). (1) Callosity.—(2) Newly formed bony tissue between the broken ends of a fractured bone.

callus (*Zool.*). In some Insects, a swelling of the mesonotum: in *Mollusca*, a proliferation of calcareous material within the umbilicus of the shell.

callus plate (*Bot.*). See **callus** (2).

Calmuc (*Textiles*). A coarse type of wool, from the Khirghiz district, Central Asia.

cal'omel (*Chem.*). Mercurous chloride, Hg_2Cl_2; found naturally in whitish or greyish masses, associated with cinnabar. From it can be obtained, by digesting in air with hydrochloric acid, mercuric chloride, the corrosive sublimate, used as an antiseptic and, in photography, for intensification processes.

calomel electrode (*Chem.*). See **standard calomel electrode.**

calores'cence (*Heat, Light*). The absorption of radiation of a certain wavelength by a body, and its re-emission as radiation of shorter wavelength. The effect is familiar in the emission of visible rays by a body which has been heated to redness by focusing infra-red heat rays on to it.

cal'orie (*Heat*). The unit quantity of heat in the c.g.s. system. The *gram-calorie*, or *small calorie*, is the quantity of heat required to raise the temperature of 1 gm. of water from 15° to 16° C. The *mean calorie* is $\frac{1}{100}$ part of the heat required to raise 1 gm. of water from 0° to 100° C. (Owing to slight variations of the specific heat of water, these are not exactly equal.) The *kilogram* (or *large*) *calorie* is equal to 1000 gram calories. See also **pound-calorie.**

calorif'ic value (*Heat*). The number of heat units obtained by the complete combustion of unit mass of a fuel. The numerical value obtained for the calorific value depends on the units used; e g. lb.-calories per lb. or British Thermal Units (B.Th.U.) per lb. for solid and liquid fuels, and per standard cubic foot for gaseous fuels.*

calor'ifier (*Heating*). An apparatus for heating water in a tank, the source of heat being a separate coil of heated pipes immersed in the water in the tank.

calorim'eter (*Heat*). The vessel containing the liquid used in calorimetry. The name is also applied to the complete apparatus used in measuring thermal quantities. See **Bunsen ice calorimeter.**

calorim'etry (*Heat*). The measurement of thermal constants, such as specific heat, latent heat, or calorific value. Such measurements usually necessitate the determination of a quantity of heat, by observing the rise of temperature it produces in a known quantity of water or other liquid.

calori'sing (*Met.*). A process of rendering the surface of steel or iron resistant to oxidation by spraying the surface with aluminium and heating to a temperature of 800° to 1000° C.

calotte (*Build.*). A small dome in the ceiling of a room, used to increase head room.

calotte (*Zool.*). In the larval stage of some *Polyzoa*, a retractile disc bearing motionless sensory cilia.

cal'otype (*Photog.*). An early wet-plate process, using silver iodide, invented by Talbot.

calving fever (*Vet.*). See **milk fever.**

calvities, —vish'i-ēz (*Med.*). Baldness, especially of the anterior and upper part of the head.

calx (*Anat.*). Calcaneum; os calcis; the heel.

cal'ycanthe'my (*Bot.*). An abnormal condition in which the calyx becomes coloured, resembling the corolla.

Calyciflo'rae (*Bot.*). A subclass of *Dicotyledones*, with a corolla usually consisting of distinct petals, and with the stamens perigynous or epigynous.

cal'ycine (*Bot.*). Relating to the calyx.

cal'ycle (*Zool.*). A synonym for *calyx* (senses 1-3).

cal'ycule, calyc'ulus (*Bot.*). (1) A group of small leaf-like organs placed close beneath the calyx.—*adj.* **calyculate.**—(2) Sometimes used to denote the *epicalyx.*

calym'ma (*Zool.*). In *Radiolaria*, a layer of jelly containing vacuoles and forming part of the outer layer of the body.

calym'nocytes (*Zool.*). In *Urochorda*, follicle cells of the ovary.

calyon (*Build.*). Flint or pebble stone used in wall construction.

calyp'ter (*Zool.*). See **calyptron.**

Calyp'toblaste'a (*Zool.*). An order of *Hydrozoa* in which the polyps are colonial and the skeleton of the colony shows both hydrothecae and gonothecae, in addition to the perisarc; the medusae, when set free, are *Leptomedusae* (q.v.).

calyp'toblas'tic (*Zool.*). Said of hydroid colonies, in which the blastostyles are protected by gonangia. Cf. *gymnoblastic.*

calyp'tobran'chiate (*Zool.*). Having the gills hidden by a gill-cover of some kind.

calyptop'sis (*Zool.*). In *Euphausiacea*, a larval form succeeding the metanauplius and resembling the zooea, from which it differs mainly in having the eyes covered by the carapace.

calyp'tra (*Bot.*). (1) A membranous covering over the young capsule of a moss or liverwort, derived from part of the archegonium wall.—(2) A thickened wall over a terminal cell of a filament in the *Myxophyceae*.—(3) The *root cap* (q v).

calyp'trate (*Zool.*). (Of *Diptera*) having the balancers covered by the antitegulae.

calyp'trogen (*Bot*). The group of meristematic cells from which the root cap is formed.

calyp'tron (*Zool*). In *Diptera*, the antitegula when it hides the balancer. Also called CALYPTER.

ca'lyx (*Bot*). The outer whorl of the flower, consisting of sepals. It is usually green, and protects the unopened flower-bud.

calyx (*Zool.*). (1) A pouch of an oviduct, in which eggs may be stored —(2) In some *Hydrozoa*, the cuplike exoskeletal structure surrounding a hydroid.—(3) In *Crinoidea*, the body as distinct from the stalk and the arms.—(4) In some Mammals, part of the pelvis of the kidney.

calyx tube (*Bot.*). The hollowed-out receptacle of a perigynous flower, from which the petals and stamens spring.

cam (*Eng.*). An eccentric projection on a revolving shaft, shaped so as to give some desired linear motion to a follower, which is usually returned by a spring.

cam (*Weaving*). See **wiper.**

cam profile (*Eng.*). The shape of a cam as determined by the form of the flanks and tip; in general, the cam outline.

camshaft (*Eng*). A shaft on which cams are keyed, or formed integrally; used to operate the valves of internal-combustion engines.

camshaft controller (*Elec. Eng*) A form of control equipment for electric motors (usually in locomotives), in which the contactors are operated mechanically by means of cams on a rotating shaft.

cam-type steering-gear (*Automobiles*). Steering gear in which the steering column carries a pair of opposed volute cams, which engage with a peg or roller carried by a short arm attached to the drop-arm spindle.

camaieu, kam-ī-yě' (*Dec.*). Painting in different shades of a single colour, giving the effects of a cameo.

camber (*Aero.*). The curvature of the surface of an aerofoil, relative to the chord line.

camber (*Build.*). A curvature, convex upwards, to allow for settlement of a structure, to facilitate run-off of water, or for some other purpose.

camber (*Eng.*). A convexity applied for some specific purpose; e g. to girders to allow for deflection under load, or to road surfaces for drainage.

camber (*Hyd. Eng.*). The recess in the side of the entrance to a basin, lock, or graving dock, accommodating the *sliding caisson* (q.v.).

camber (*Ship Constr.*). The convexity of a deck line in a transverse section, normally ¼ in. to each foot of breadth. Its purpose is to assist drainage and provide strength. Also called ROUND OF BEAM.

camber arch (*Build.*). An arch having a flat horizontal extrados and a cambered intrados, with a rise of about ⅛ in. per foot of span.

camber-beam (*Carp.*). A beam having an arched upper surface, or one sloping down towards each end, so as to form a support for roof covering on a flat roof.

camber-slip (*Build.*). A strip of wood having a slightly cambered upper surface, upon which the brickwork of a flat arch is laid, so that after settlement the soffit shall be straight.

cam'biform cell (*Bot.*). A parenchymatous cell occurring in the phloem; it is elongated, and pointed at both ends.

cambium (*Bot.*). A cylinder, strip, or layer of meristematic cells, which divide mostly in one plane and give rise to daughter cells from which permanent tissue is ultimately formed.

cambium initial (*Bot.*). One of the permanently meristematic cells of a cambium.

cambo'gia (*Chem.*). *Gamboge gum* (q.v.).

Cam'brian System (*Geol.*). The lowest division of the fossiliferous Palaeozoic rocks. The type area is Wales, where the rocks reach a thickness of 12,000 feet, but they have been recognised at widely separated localities all over the world. See also **Cambric.**

Cam'bric (*Geol.*). Equivalent to *Cambrian.* See **Acadian, Bretonian, Croixian, Etcheminian, Ozarkian,** and **Waucobian.**

cambric (*Textiles*). A fine linen cloth, used chiefly for handkerchiefs; the name is also applied to a fine quality cotton cloth.—(*Diel.*) Varnished cotton-cambric is much used for insulating bars in slots.

Cambridge Greensand (*Geol.*). A thin bed of clayey greensand occurring at the base of the Chalk in Bedfordshire, Cambridgeshire, etc.; it contains many phosphatised nodules and fossils, derived chiefly from the underlying Gault Clay.

came (*Build*). A bar of lead suitably grooved to hold and connect adjacent panes of glass in a window.

camel (*Hyd. Eng.*). A water-tight air-receiver, used to raise a vessel in the water in order to assist its passage in shallow waters. See also **caisson.**

camel hair (*Textiles*). A silky fibre from the haunch and underpart of the camel; used for dress fabrics, warm coverings, etc.

cam'eo. (1) Carving or modelling in relief.—(2) A striated shell or precious stone carved in relief so as to show different colours in the layers.

cam'eoid (*Dec.*). Moulded paper forming relief decoration.

camera (*Photog.*). The apparatus in which sensitised emulsions are exposed under controlled conditions.

See **automatic—**
beam-splitting—
binocular—
candid—
ciné—
cinematograph—
colour—
hand—
panoramic—
pinhole—*
reflex—
sound—
stereoscopic—
synchronous—
twin-lens—

camera angle (*Photog.*). The angle marked by the vertical or horizontal sight lines covered by the lens, when exposing a normal-sized area of emulsion in the camera.

camera booth (*Cinema.*). In sound-film studios, a portable enclosure for the accommodation of cameras, with optically worked glass windows to avoid distortion of the photographic image; usually provided with wheels.

camera crew (*Cinema.*). The same as *camera staff.*

camera lines (*Photog.*). Lines which delineate the area in which objects are in good focus during exposure.

camera lucida (*Optics*). A device for facilitating the drawing of an image seen in a microscope or other optical instrument. In its simplest form, it consists of a thin plate of unsilvered glass, placed above the eyepiece at an angle of 45° with the axis of the instrument, so as to reflect into the eye of the observer an image of the drawing surface, which is seen simultaneously with the microscope image.

camera man (*Cinema.*). The operator responsible for the photographic quality of the pictures in motion-picture production.

camera marker (*Cinema.*). The lamp used, in a cinematograph or sound camera, for fogging the edge of the film and so marking it for future synchronisation between the picture track (mute) and the sound track.

camera mount (*Cinema.*). Any structure (other than a tripod) for supporting a camera.

camera obscura (*Optics*). A darkened room in which an image of surrounding objects is cast on a screen by a long-focus convex lens.

camera staff (*Cinema.*). In motion-picture production, the operators of cameras acting under the direction of the camera man.

camouflage, kam′oo-flazh (*Mil.*). Any device used to deceive or mislead an enemy; e.g. use of branches to conceal guns, bizarre painted designs on ships, vehicles, aircraft, roofs, etc.—(*Zool*.) In animals, blending coloration or deceptive coloration, especially if it imitates that of the environment.

camp-ceiling (*Build.*). A ceiling having two opposite parts sloping in line with the rafters, the middle part being horizontal.

camp sheathing (*Civ. Eng.*). An earth-retaining wall formed of timber piles placed 6 to 10 ft. apart and connected by stout timber walings; often used to support river banks.

camp sheeting (*Build.*). Sheet piling used in foundation work to retain earth of a sandy character.

campan′iform (*Zool.*). Dome-shaped; as *campaniform sensillae* of certain Insects, which are sensory nerve-endings of unknown function occurring widely on the body.

campanile, —pan-ē′le (*Build.*). A bell tower, often detached from the main building.

campan′ula Hal′leri (*Zool.*). In the eyes of Fishes, a vascular expansion of the falciform process in contact with the lens, the whole structure probably acting as a means of accommodation in the absence of ciliary muscles.

campan′ulate (*Bot.*). Bell-shaped.

Campbell (or Mayo) twill (*Textiles*). A fancy twill, 8-end, used for worsted and woollen coatings.

Campbell's formula (*Elec. Comm.*). The formula which gives the effective attenuation of a coil-loaded transmission line in terms of the constants of the line and the magnitude of the loading.

Campbell-Stokes recorder (*Meteor.*). See **sunshine recorder.**

camphane (*Chem.*). $C_{10}H_{18}$, white crystals; m p. 154° C. It is a saturated terpene hydrocarbon, the parent substance of the camphor group (see **camphor**).

camphene (*Chem.*). $C_{10}H_{16}$, a white solid; m.p. 50° C. An unsaturated terpene hydrocarbon, occurring in various essential oils; it can be prepared from pinene hydrochloride. There are three modifications, viz. the *d*-, *l*-, and the optically inactive form.

camphor (*Chem.*). Common (or Japan) camphor, $C_{10}H_{16}O$, colourless transparent prisms of characteristic odour; m.p. 175° C., b.p. 209° C., sp. gr. 0·985. It can be sublimed readily, is dextro-rotatory in alcoholic solution, and is volatile in steam. Obtained from the camphor tree (*Laurus camphora*), or synthesised. Important solvent for celluloid and other plastics.

campode′iform (*Zool.*). Resembling the Thysanuran insect *Campodea*; the term is applied to a primitive type of active insect larva which, however, lacks the lateral abdominal appendages of *Campodea*.

camp′tonite (*Geol.*). An igneous rock occurring in minor intrusions, and belonging to the family of the lamprophyres. It consists essentially of plagioclase feldspar and brown hornblende.

camp′totrich′ia (*Zool.*). Jointed dermal fin-rays of fibrous substance, occurring in *Ceratodus* and some other primitive Fish.

cam′pylite (*Min.*). See **kampylite.**

campy′lotro′pous (*Bot.*). (Of an ovule) curved in such a way that the chalaza and micropyle do not lie in a straight line.

can (*Cinema.*). (1) Slang for the telephone receiver used for monitoring in sound-film production.—(2) The cylindrical container, usually of tin-plate, for holding a roll of film (e.g. 1000 feet) during transport.—(3) See **ash can.**

can coiler (*Worsted*). A revolving can in which slivers from the Noble comb are laid in a double spiral form to preserve the fibre arrangement.

Canada balsam (*Chem.*). Balsam of fir, or Canada turpentine A yellowish liquid, of pine-like odour, soluble in ether, chloroform, benzene; obtained from *Abies balsamica*. It is used for lacquers and varnishes, and as an adhesive for lenses, instruments, etc., its refractive index being approximately the same as that of most optical glasses.

Canadian asbestos (*Min.*). See **chrysotile.**

Canadian latch (*Join.*). See **Norfolk latch.**

Canadian Series (*Geol.*). The lowest of the three main divisions of the American Ordovician rocks, comprising the Beekmantown and Chazy formations.

Canadian Shield (*Geol.*). The name applied to the vast area of Pre-Cambrian rocks which cover two million square miles in eastern Canada. See

Algoman Granites
Animikie Series
Grenville Series
Huronian System
Keewatin Group
Keweenawan Series
Laurentian Granites
Loganian System
Timiskaming Group

canal (*Bot.*). An elongated intercellular space, often containing resins, oils, or other similar substances.

canal (*Hyd. Eng.*). An artificial water channel used for navigational or irrigational purposes or to convey water power.

canal cell (*Bot.*). One of the short-lived cells present in the central cavity of the neck of an archegonium.

canal rays (*Phys.*). See **positive rays.**

canal system (*Zool.*). See **water-vascular system.**

canalette blind (*Build*.). See **Italian blind.**

canalic′ular apparatus (*Zool.*). See **Golgi apparatus.**

canalic′ulate (*Bot.*). Marked longitudinally by a channel or groove.

canalic′ulus (*Zool.*). Any small channel: in the liver, an intercellular bile-channel: in bone, one of the ramified passages uniting the lacunae: in nerve-cells, a fine channel penetrating the cytoplasm of the cell-body.—*adj.* **canalicular.**

canalisation (*Hyd. Eng.*). The practice, sometimes applied to assist navigation, of dividing the bed of a river into a series of reaches separated by dams or weirs, provided with communicating locks.

canalisation (*Med.*). The formation of a new channel in a clot blocking the lumen of a blood-vessel.

canaries (*Cinema.*). Extraneous high-frequency noises in a sound-recording channel.

cancel (*Acous.*). The thumb or toe piston for shutting off groups of stops on a manual or pedals in an organ. See **ventil.**

cancel (*Auto. Teleph.*). The extra key provided on a key-strip to release, at any stage before completion, the apparatus (coder) which transmits coded impulses to operate selectors at a distant exchange. The coded impulses are set up by the plunger keys on the key-strip.

cancel (*Typog.*). A page, containing an error or errors, which is removed and replaced by another suitably amended. A *cancel title* is a new title-page, usually carrying alterations to the imprint.

can'cellate (*Bot.*). Lattice-like.

can'cellous, can'cellated (*Zool.*). Having a spongy structure, with obvious interstices.

cancer (*Med.*). See **carcinoma.**

Cancer (*Astron.*). Crab. Fourth sign of the *Zodiac* (q.v.).

Cancer, Tropic of (*Astron.*) See **Tropics.**

can'cerophobia (*Med.*). Morbid fear of contracting cancer.

can'cerous (*Med.*). Pertaining to cancer or carcinoma.

can'criso'cial (*Zool.*). Leading a commensal existence with a crab.

cancrum o'ris (*Med.*). Noma. A destructive ulceration of the cheek in debilitated children, usually during convalescence from an infectious disease.

candelilla wax, —lēl'ya (*Chem.*). A natural wax, of yellow or brown colour; sp. gr. 0·983, m.p. 67°-68° C., saponification value 65, iodine value 37.

candid camera (*Photog.*). A small unobtrusive camera for use by journalists, detectives, etc.

candle (*Illum.*). The name for various units of photometry.

See **British Standard— international—**
decimal— Jablochkoff—
Hefner— standard—

candle-fitting (*Illum.*). An electric-light fitting consisting of an opal glass tube with a lamp at the top designed to imitate an ordinary wax candle.

candle-foot (*Illum.*). An obsolescent variant of *foot-candle.*

candle-lamp (*Illum.*). An electric filament lamp shaped to imitate the flame of a wax candle; used in candle-fittings.

candle-metre (*Illum.*) An obsolescent variant of *metre-candle.*

candle-power (*Illum.*). The luminous flux emitted by a source of light per unit solid angle in a given direction. It is expressed in terms of the *international candle* (q.v.).

See **mean hemispherical— mean spherical—**
mean horizontal— mean zonal—

cane (*Textiles*). A term for *warp*; current in some silk-manufacturing districts.

cane-sugar (*Chem.*). A synonym for sucrose and saccharobiose; $C_{12}H_{22}O_{11}$, a carbohydrate; m.p. 160° C.; it crystallises in large monoclinic crystals, is optically active and occurs in beet, sugar-cane, and many other plants.

canes'cent (*Bot.*). Having a somewhat hoary appearance; due to a covering of short inconspicuous hairs.

canine (*Zool.*). Pertaining to, or resembling, a dog: in Mammals, a pointed tooth with a single cusp; it is adapted for tearing, and occurs between the incisors and the premolars: pertaining to a canine tooth: pertaining to a ridge or groove on the surface of the maxillary.

canker (*Bot.*). A name applied to various diseases of trees, caused by fungi; usually they have the form of localised patches of dead bark surrounded by swollen margins.

canker (*Vet.*). A chronic inflammation of the keratogenous membrane of the frog and sole of a horse's foot: a chronic eczema of the ear of dogs: an abscess or ulcer in the mouth, eyelids, ear, or cloaca of birds.

canned (*Acous.*). See **canning.**

cannel coal (*Fuels*). A dull variety of coal, breaking with a conchoidal fracture; it is rich in volatile constituents, and burns with a bright flame.

can'nelure (*Ammunition*). A groove in the driving-band of a projectile, into which the surplus copper is swaged.

can'nibalism (*Vet.*). A vice or depraved appetite of animals and birds due to deficiency of minerals or protein in the food, or to boredom in the case of confined birds and animals. The affected individual injures and eats portions of its own body or the bodies of other animals or birds.

canning, canned (*Acous.*). Colloquialisms applied respectively to the recording of sound and to the record thereof.

cannon bone (*Zool.*). In Mammals in which the digits are reduced in number, a bone formed by fusion of the persisting metacarpals or metatarsals (in which it supports the limb from hock to fetlock): in Birds, the tarsometatarsus.

cannon pinion (*Horol.*). A wheel in the motion work; the wheel or pinion with an extended pipe to which the minute hand is attached.

cannon-shot gravel (*Geol.*). A gravel associated with the glacial boulder-clays of East Anglia; it contains large numbers of almost perfectly spherical flint cobbles.

can'nula (*Med.*). A tube, usually fitted with a trocar, for insertion into the body for the injection or removal of fluids or gases.

cañon, kan'yon (*Geol.*). A deep, narrow, steep-sided valley.

canon (*Typog.*) The old name for a type-size (about 48-point).

canopy (*Aero.*). The fabric of a parachute which is extended by an up-current of air, the reaction between the air and the canopy forming a resistance which ensures a low terminal velocity to the man or supplies dropped from an aircraft.

canopy (*Bot.*). The layer of branches, twigs, and leaves formed by woody plants at some distance above the level of the ground.

canopy (*Build.*). An enriched roof-like part projecting from a wall or supported on pillars.

canopy switch (*Elec. Eng.*). A circuit-breaker placed under the canopy of a tramcar, so that the driver can cut off the current in an emergency.

cant. To tilt.

cant (*Build.*). A moulding having plane surfaces and angles instead of curves.

cant (*Surv.*). The transverse slope given to the surface of the rails on a railway curve, or to the road surface on a highway curve, as a result of applying superelevation. Also used synonymously with *superelevation.*

cant bay (*Build.*). A bay window having three sides, the outer two being splayed from the wall face.

cant board (*Carp.*). A board laid on each side of a valley gutter to support the sheet-lead.

cant brick (*Build.*). A *splay brick* (q.v.).

canted column (*Build.*). A column having faceted sides instead of curved flutes.

canted pillar (*Furn.*). A pillar of polygonal shape.

canted wall (*Build.*). A wall built at an angle to the face of another wall.

canthar'idin (*Chem.*). A pharmaceutical product obtained from the dried elytra of the Spanish Fly (species of *Lytta* and *Mylabris*).

cantilever (*Struct.*). A beam or girder fixed at one extremity and free at the other. Also called SEMI-BEAM, SEMI-GIRDER.

cantilever arm (*Civ. Eng.*). One of the projecting arms of a *cantilever bridge* (q.v.).

cantilever bridge (*Civ. Eng.*). A bridge composed of self-supporting projecting arms built inwards from the piers and meeting in the middle of the span, where they are connected together. See also **suspended span.**

cantilever crane (*Civ. Eng.*). A straight steel truss, resting on central supports, used for the transport of excavated materials from the bottom of a cutting to a spoil-bank at one side; for this purpose skips hang from the truss and may be moved along it.

cantilever deck (*Civ. Eng.*). A type of *cantilever bridge* (q.v.) in which the loads are carried by the upper chord.

cantilever spring (*Automobiles*). A laminated spring, anchored to the frame at its mid-point, and, at its ends, to shackles on the frame and the axle respectively; not a true cantilever. See **quarter-elliptic spring.**

cantilever-through (*Civ. Eng.*). A type of *cantilever bridge* (q.v.) in which the loads are carried by the lower chord.

canting (*Eng., etc.*). Tilting over from the proper position; as the canting of a piston in its cylinder under the oblique thrust of the connecting-rod

canting strip (*Build.*). A projecting sloping member fitted around a building to deflect rain water from the wall. Also called a WATER TABLE

cantling (*Build*). The lower of two courses of burnt brick enclosing a clamp for firing bricks.

canton (*Build*). A pilaster or quoin forming a salient corner, which projects from the wall-face.

canvas (*Textiles*). (1) An openwork cotton fabric, usually with an embroidered design, used for cushion covers, etc.—(2) A plain coarse cotton cloth with hard twisted yarns.—(3) A coarse linen cloth, frequently made from natural tow yarns; used for interlinings.

canyon (*Geol.*). A variant of *cañon*.

caoutchouc, kowt'shook. Raw *rubber* (q v.).

• **caoutchouc, mineral** (*Min.*). See **elaterite.**

cap (*Ammunition*). That part of a cartridge or shell which is filled with a detonating composition, and is fired by a percussion striker. It ignites the propellant charge in gun and small-arm ammunition. See **detonator, primer, propellant.**

cap (*Bot.*). (1) See **pileus.**—(2) The strand of sclerenchyma often present on the outside of a vascular bundle, and seen as a crescent-shaped mass in a cross-section.

cap (*Build*). (1) The upper member of a column.—(2) A wall coping.

cap (*Carp*). (1) A door or window lintel.—(2) A hand-rail supported on balusters.

cap (*Civ. Eng*). The horizontal beam connecting the heads of piles in a piled foundation.

cap (*Meteor.*). (1) The covering of cloud which congregates at the top of a mountain.—(2) The transient top of detached clouds above an increasing cumulus. Also PILEUS.

cap-and-pin type insulator (*Diel.*). A special form of the *suspension type insulator* (q.v.)

cap cell (*Bot.*). The cell which surmounts the antheridium of a fern, and is thrown off when the antheridium liberates the sperms.

cap iron (*Carp.*). See **back iron.**

cap jewel (*Horol.*). A jewel with endstone.

cap, lens (*Photog*). See **lens cap.**

cap spinning (*Textiles*). A method of spinning employed for Botany and fine cross-bred yarns; spun yarn is led on to a bobbin, rotating at high speed, by means of a cap on the top of the spindle.

capacitance (*Elec.*). The property of a body by virtue of which a quantity of electricity has to be imparted to it to raise its potential above that of the surroundings. The capacitance between two bodies is the ratio of the charge to the potential between them. Frequently written **C.** See **jar, micro-farad, micro-micro-farad, pico-farad**; also **capacity, stray capacitance.**

capacitance grading (*Cables*). Grading of the properties of a dielectric so that the variation of stress from conductor to sheath is reduced. The inner dielectric has the higher permittivity. Ideally, the grading is continuous and the permittivity varies as the reciprocal of the distance from the centre. See **condenser bushing.**

capacitive load (*Elec. Eng.*). See **leading load.**

capacitor (*Elec. Eng.*). A piece of electrical apparatus consisting of two conducting plates separated by a layer of insulating material. It will thus have an appreciable capacitance and each electrode carries a charge of electricity. If an alternating p.d. is applied to it, it will take a leading current. Previously called CONDENSER.

See **electrolytic—** **synchronous—**
series— **condenser.**

capacitor motor (*Elec. Eng*). A single-phase induction motor arranged to start as a two-phase motor by connecting a capacitor in series with an auxiliary starting winding. The capacitor may be automatically disconnected when the motor is up to speed (capacitor-start motor) or it may be left permanently in circuit for power-factor improvement (capacitor start-and-run motor).

capacity (*Elec. Eng.*). A term commonly used to denote the output of a piece of electrical apparatus; e.g. a generator may be said to have a *capacity* of 60,000 kW. In an accumulator (secondary) battery, it denotes the quantity of electricity, usually expressed in ampere-hours, that can be passed through it. In reference to a capacitor, the preferred term is CAPACITANCE.

See **breaking—** **current-carrying—**

capacity balance (*Teleph.*). The equality of capacitance between conductors and sheath in a telephone pair or quad

capacity (or **electrostatic**) **coupling** (*Elec. Comm*, *Radio*). Coupling between two circuits which is effected either by a condenser included in a common branch, or by a condenser connected between appropriate points in the two circuits.

capacity earth (*Radio*). Another name for *counterpoise antenna.*

capacity reactance (*Elec. Eng*) A reactance produced as a result of capacitance in an a.c. circuit.

capacity reaction (*Radio*). Reaction from the output to the input circuit of an amplifier, through a path which includes a condenser.

Cape asbestos or **Cape blue asbestos** (*Min*) A form of crocidolite, a silicate of sodium and iron, occurring in narrow interbedded veins traversing the Griqua Town series of banded jaspers and ironstones in Griqualand West, Union of S. Africa. It is extensively mined in the neighbourhood of Prieska northwards towards Mafeking, and is put to most of the uses of other forms of asbestos, being a particularly good heat insulator.

Cape diamond (*Min.*). A name used in grading diamonds to designate an off-colour stone of a yellowish tint.

Cape ruby (*Min.*). The fiery red garnet *pyrope* (q.v.), obtained in the diamond-mines in the Kimberley district, mostly from the rocks kimberlite and eclogite. See also **false ruby.**

capes (*Gloves*). Gloves made from bark-tanned leather dressed on the grain side; originally made from Cape Colony sheepskins.

capilla'ceous, capil'liform (*Bot.*). Hair-like.

capillari'asis (*Vet.*). Inflammation of the alimentary tract of animals or birds due to infection by nematode worms of the genus *Capillaria.*

capillarity (*Phys.*). A phenomenon associated with surface tension and angle of contact. The rise of liquids in capillary tubes and the action of blotting paper and wicks are examples of capillarity.

capil'lary (*Bot., Zool.*). Of very small diameter; slender, hair-like.—(*Zool.*) Any tiny, thin-walled vessel of small diameter, forming part of a network, which aids rapid exchange of substances between the contained fluid and the surrounding tissues; as *bile capillaries, blood capillaries, lymph capillaries.*

capillary activity (*Chem.*). See **surface activity.**

capillary bronchitis (*Med.*). Acute catarrhal bronchitis of the smaller bronchi and bronchioles.

capillary electrometer (*Chem.*). An instrument in which small electric currents are detected by the movement of a mercury meniscus in a capillary tube.

capillary pyrite (*Min.*). See **millerite.**

capillary soil water (*Bot.*). Water held between the particles of the soil by capillarity.

cap'illator (*Chem.*). An apparatus for the colorimetric determination of pH; it involves comparison of solutions in capillary tubes.

capillit'ium (*Bot.*). (1) A mass of threads.—(2) The whole assemblage of threads or tubes, found mingled with the spores in the fructifications of *Myxomycetes* and of *Gasteromycetes.*—*pl.* **capillitia.**

capital (*Build.*). The upper member of a column, pier, or pilaster.

capital (*Typog.*). The large capital letter; e.g. C; indicated in manuscript or proof by three lines under the letter. Cf. *small capital.*

capitalist (*Bot.*). A plant which has reserves of stored food.

cap'itate (*Bot.*) (1) Resembling a pin-head in appearance.—(2) Bearing a rounded swelling at the apex.—(3) Having flowers grouped in a capitulum or head.—(*Zool.*) Having an enlarged tip, as *capitate antennae.*

Capitellifor'mia (*Zool.*). An order of *Phanerocephala*, comprising a number of burrowing forms superficially resembling earthworms; they are of blood-red colour, and have small parapodia which lack cirri; the buccal region is eversible and the pharynx is unarmed; the prostomium is conical and lacks palps and tentacles but bears a pair of retractile ciliated organs; the peristomium is without setae or cirri; in the males there is a copulatory apparatus.

capitel'lum (*Zool*). An enlargement or boss at the end of a bone, for articulation with another bone.

capit'ulate (*Bot.*). Of the nature of a head.

capitu'liform (*Bot.*). Having the characters of a dense head of flowers.

capit'ulum (*Bot.*). A racemose inflorescence in which the sessile flowers are crowded on the concave, flat, or convex surface of the enlarged apex of the scape, the whole group being surrounded and covered in bud by an envelope of bracts forming an involucre; the whole group appears to be a single flower, as in the daisy.

capitulum (*Zool.*). In pedunculate *Cirripedia*, the whole of the body excluding the stalk: a terminal expansion, as that of some shaft bones, some tentacles, and some hairs.

caponising (*Vet*). Castration of a cock bird.

Cappagh brown, kap'a (*Dec.*). A bituminous earth pigment, stained with oxide of manganese and iron.

capped elbow (*Vet.*). A swelling of the olecranon bursa of animals.

capped hock (*Vet.*). A swelling over the point of the hock of animals.

capping (*Elec. Eng.*). The wooden strip used as a cover for the wood-casing system employed in electrical installation work.

capping (*Furn.*). A moulding or slab serving as a cap or permanent covering.

capping (*Mining*). The fixing of a shackle or a swivel to the end of a hoisting rope.

capping-brick (*Build.*). A *coping brick* (q.v.).

capping-plane (*Join.*). A plane for giving a slight rounding to the upper surface of a wooden hand-rail.

cap'reolate (*Bot.*). Having tendrils.

Capricorn, Tropic of. See **Tropics.**

Capricornus (*Astron.*). Goat. Tenth sign of the *Zodiac* (q.v.).

caprifica'tion (*Bot., Zool.*). The fertilisation of the flowers of fig-trees by the agency of Fig Insects, a family of Chalcids (*Agaonidae*): the process of hanging caprifigs in the female trees.

cap'rifier (*Zool.*). A Fig Insect. See under **caprification.**

cap'rifig (*Bot.*). A race of fig which does not produce edible fruits, but provides food for the wasps which pollinate the figs.

cap'riform (*Zool.*). Resembling a goat; as certain Fish.

Caprot'ti valve-gear (*Eng*). A locomotive valve-gear using two pairs of vertical double-beat *poppet valves* (q v.), cam operated, cut-off being adjustable by varying the angular position of the inlet cams.

caps and smalls (*Typog.*). Small capitals with the first letters in capitals. The first word of a chapter is often set in *caps and smalls.*

capstan (*Eng.*). A vertical drum or spindle on which rope is wound (e.g. for warping a ship alongside a wharf); it is rotated by man-power or by hydraulic or electric motor.

capstan-headed screw (*Eng*). A screw having a cylindrical head provided with radial holes in its circumference. It is tightened by a tommy bar inserted in these holes.

capstan lathe (*Eng*). A lathe in which the tools required for successive operations are mounted radially in a tool-holder resembling a capstan; by revolving this, each tool in turn may be brought into position in exact location.

capstan nut (*Eng.*). A nut which is tightened in the same way as a *capstan-headed screw* (q.v.).

cap'sule (*Bot.*). (1) The portion of the sporogonium of *Bryophyta* which contains the spores.—(2) A fruit formed from a syncarpous gynaeceum, not fleshy when ripe, and splitting at maturity, releasing the seeds —(3) A coating of mucilaginous material outside a bacterial cell.

capsule (*Med*). A soluble case of gelatine in which a dose of medicine may be enclosed.

capsule (*Zool.*). Any fibrous or membranous covering of a viscus; e.g. the kidney. The name is applied also to certain areas in the brain which are formed by nerve fibres.

capsulogenous, —oj'en-us (*Zool.*). Capsule-secreting: capsule-forming.

captac'ula (*Zool.*). In *Scaphopoda*, sensory and prehensile filaments with expanded adhesive tips, arising from the head.

caption (*Typog.*). The descriptive wording under an illustration. Often called a *legend* (q.v.).

captive balloon (*Aero*). A balloon anchored or towed by a line. Usually the term refers to spherical balloons only. Special shapes for stability, etc. are called *kite balloons.*

cap'ut (*Zool*). An abrupt swelling at the distal end of a structure.—*pl.* **cap'ita.**—*adj.* **cap'itate.**

caput medu'sae (*Med.*). Dilated subcutaneous veins round the umbilicus in cirrhosis of the liver.

car. (1) A vehicle running on three or more wheels, e.g. a tram car: specifically (Britain), a motor-car.—(2) In a lift or hoist, the moving part in which the goods or passengers are carried.

car (*Aero.*). In an airship, the part intended for the carrying of the load (crew, passengers, goods, engines, etc.). It may be suspended below, or may be actually inside, the hull or envelope.—CONTROL CAR, the car from which the controls of an airship are operated, and the navigation is carried out.—WING CAR, a car suspended from either side of the hull of an airship, i.e. not directly beneath the keel.

car-floor contact (*Elec. Eng.*). A contact attached to the false floor of an electrically controlled lift; it is usually arranged to prevent operation of the lift by anyone outside the car.

car-shed hanger (*Elec. Eng.*). A hanger of small vertical dimensions used for supporting the overhead contact wire of a traction system in car sheds.

caraate (*Med.*). See **pinta.**

caracal, caracul (*Furs*). The dressed skin of the Persian lynx; reddish-brown in colour and silky; sometimes dyed black.

caracole (*Carp*). A helical staircase.

Carado'cian (*Geol.*). A stage or series of the Ordovician System in Britain, well represented in the Caradoc region of Salop, Wales, the Lake District, etc. It is equivalent to the Lower Hartfell stage of Scotland.

caramel (*Chem.*). Sugar-dye; the brown dye formed when cane-sugar is heated above its melting point. Caramel is used for flavouring in cooking, and in photography for backing plates to reduce halation.

car'apace (*Zool*). An exoskeletal shield covering part or all of the dorsal surface of an animal; as the bony dorsal shield of a tortoise, the chitinous dorsal shield of some *Crustacea.*

carat or **karat.** (1) A standard of weight for precious stones. The *metric carat,* standardised in 1932, equals 200 mg. ($\frac{1}{5}$ of a gram).—(2) The standard of fineness for gold. The standard for pure gold is 24 carats; 22 carat gold has 2 parts of alloy; 18 carat gold 6 parts of alloy.

carbam'ic acid (*Chem.*). $NH_2{\cdot}CO{\cdot}OH$; is not known to occur free, being known only in the form of derivatives; e.g. the ammonium salt, $NH_2{\cdot}CO{\cdot}ONH_4$.

car'bamide (*Chem.*). *Urea* (q.v.).

car'bamyl chloride (*Chem*). $NH_2{\cdot}CO{\cdot}Cl$; colourless needles of pungent odour; m p. 50° C, b p. 61° C; formed by the action of hydrochloric acid (gaseous) upon cyanic acid; it serves for the synthesis of organic acids.

carban'ilide (*Chem.*). Diphenyl-urea, $CO(NHC_6H_5)_2$.

car'bazole (*Chem.*). $(C_6H_4)_2NH$; colourless plates; m.p. 238° C.; sublimes readily; contained in coal-tar and in crude anthracene oil. It is the imine (intramolecular) of diphenyl and is formed from diphenylamine by passing the vapour through red-hot tubes, or by distilling *o*-amino-diphenyl over lime at about 600° C.

carbide, calcium (*Chem.*). See **calcium carbide.**

carbides (*Met.*). Compounds of carbon with iron and other elements in steel; e.g. Fe_3C (cementite), Fe_4W_2C., Cr_4C_2, etc.

car'binol (*Chem.*). Methyl alcohol. The nomenclature of alcohols is often based upon their homologous relation to methyl alcohol; e.g. tertiary butyl alcohol, $(CH_3)_3C{\cdot}OH$, is termed *trimethyl carbinol.*

carbocy'clic (or **isocyclic**) **compounds** (*Chem*). These are closed-chain or ring compounds in which the closed ring or chain consists entirely of carbon atoms.

car'bograph (*Photog.*). A combined silver bromide and pigmented bichromated gelatine process for printing. On development, the reduced silver acts catalytically and reduces the bichromate, which in turn hardens the pigmented gelatine, the differential hardening yielding the image on soaking in water.

carbohy'drases (*Chem.*). A group of enzymes which induce digestion of polysaccharoses and hydrolyse glucosides and carbohydrates generally.

carbohy'drates (*Chem.*). A group of compounds represented by the general formula $C_x(H_2O)_y$, where x is 6 or a multiple of 6. Substances widely occurring in vegetables and animals; e.g. sugars, starch, cellulose. The carbohydrates also comprise other compounds of a different general formula but closely related to the above substances; e.g. rhamnose, $C_6H_{12}O_5$. Carbohydrates are divided into *monosaccharoses* (q.v.), *di-* and *trisaccharoses* (qq.v.), *polysaccharoses* (q.v.), or polyoses. The carbohydrate element in diet supplies energy, provided by the oxidation of the constituent elements.

carbolic acid (*Chem.*). *Phenol* (q.v.).

carbolic oils (*Chem.*). See **middle oils.**

Carbolineum (*Build.*). A timber preservative.

carbolu'ria (*Med.*). The presence of carbolic acid in the urine, due to carbolic-acid poisoning.

carbon (*Chem.*). A non-metallic element in the fourth group of the periodic system. Symbol, C. At. no. 6, at. wt. 12·01, m.p. above 3500° C., b p. 4200° C. Its allotropic modifications include diamond, graphite, charcoal, gas carbon, and coke. The assumption that the carbon atom is tetravalent, the bonds being directed towards the apexes of a regular tetrahedron, is the basis of all theoretical organic chemistry.

carbon (*Illum*). A term commonly used to denote the carbon electrode of an electric arc lamp.

See **copper-cored—**
coppered—
cored—
flame—
flame-cored—
impregnated—
solid—

carbon (*Mining*). A special quality of diamond used for setting in the crown of a diamond drill. See **black diamond.**

carbon anode (*Thermionics*). An anode constructed of carbon, usually in graphite form, to resist the high temperatures encountered under some conditions of operation.

carbon arc (*Elec. Eng.*). An arc between carbon electrodes; usually limited to pure carbon rather than flame carbon electrodes.—(*Cinema.*) See **high-intensity carbon arc.**

carbon arc lamp (*Illum.*). A lamp employing, as the light source, an arc between carbon electrodes.

carbon arc test (*Diel*). A test used on non-ignitable boards of insulating materials. A carbon arc is held just clear of the surface of the board.

carbon-arc welding (*Elec. Eng.*). Arc-welding carried out by means of an arc between a carbon electrode and the material to be welded, filler metal being added if required.

carbon assimilation (*Bot.*). See **photosynthesis.**

carbon bisulphide (*Chem.*). See **carbon disulphide.**

carbon black (*Chem.*). A trade name given to the finely divided carbon produced from burning hydrocarbons, such as mineral oils, in conditions where combustion is incomplete. Large quantities of carbon black are used in the rubber and leather-cloth industries, and the substance is a common filler for gramophone records. See also **gas black.**

carbon brush (*Elec. Eng.*). A small block of carbon used in electrical equipment for making contact with a moving surface.

carbon button (*Teleph.*). The same as *carbon capsule*; used in telephone transmitters.

carbon capsule (*Teleph.*). In a telephone transmitter or microphone, the unit containing the carbon granules, which rest between two insulated electrodes.

carbon compounds (*Chem.*). Compounds containing one or more carbon atoms in the molecule. They comprise all organic compounds and include also compounds, e.g. carbides, carbonates, carbon dioxide, etc., which are usually dealt with in inorganic chemistry. Carbon compounds are the basis of all living matter.

carbon contact (*Elec. Eng.*). In a switch, an auxiliary contact designed to break contact after and make contact before the main contact, in order to prevent burning of the latter; the auxiliary contact is of carbon and is made to be easily removable.

carbon core (*Cables*). A minute puncture of the first one or two insulating papers, near the conductor. Cores are carbonised, and their diameters lie between 0 05 and 0 2 mm.

carbon cycle (*Bot.*). The circulation of carbon in nature.

carbon dioxide (*Chem.*). CO_2. A colourless gas with slight smell; weight of 1 litre at 0°/760 mm., 1·965 gm., rather more than 1·5 that of air. Produced when carbon is burnt in air, when limestone and magnesite are burnt, and by the action of hydrochloric acid on calcium carbonate. It is also produced during the process of fermentation. CO_2 has a high heat of formation and is therefore a stable compound. Can be liquefied at 0° under a pressure of 34 atmospheres, and at 20° under 56 atmospheres. Used in this form for the production of carbon dioxide 'snow' and compressed carbon dioxide, employed for cooling and in certain types of fire extinguishers.

carbon disulphide (*Chem.*). CS_2. Sulphur vapour passed over heated charcoal combines with the carbon to form *carbon disulphide*. Used as a solvent for sulphur and rubber. The disagreeable smell associated with commercial carbon disulphide is due to impurities.

carbon-dust resistance (*Elec. Eng.*). A type of resistance made of carbon dust in zig-zag troughs; used as a neutral earthing resistance on account of the fact that its resistance decreases as the current increases. Also called a BRAZIL RESISTANCE.

carbon filament (*Illum.*). The fine conductor of a carbon-filament lamp, which is heated to incandescence to produce light; the filament is made by heating a thread of cellulose material to convert it to pure carbon.

carbon-filament lamp (*Illum.*). An incandescent electric lamp consisting of a fine thread of carbon heated to white heat inside an evacuated bulb. Often called simply a CARBON LAMP.

carbon gland (*Eng.*). A type of gland used in steam-turbines to prevent leakage along the shaft. It consists of carbon rings cut into segments and pressed into contact with the shaft by an encircling helical spring. See **garter spring.**

carbon granules (*Teleph.*). The specially prepared small particles of anthracite coal used in the capsules of telephone transmitters; their varying resistance results in speech modulation of a direct current.

carbon hydrides (*Chem.*). A synonym for *hydrocarbons.*

carbon lamp (*Illum.*). See **carbon-filament lamp.**

carbon microphone (*Acous.*). See **carbon transmitter.**

carbon monoxide (*Chem.*). CO. Formed when carbon is heated in a limited supply of air, when carbon dioxide is heated with an excess of carbon, or when carbon dioxide is passed over some hot metals. A product of incomplete combustion. Poisonous. Its properties as a reducing agent render it valuable in industrial processes. See also **carbonyls.**

carbon monoxide-haemoglobin (*Chem.*). Haemoglobin combines with carbon monoxide instantaneously, being deprived of its oxygen-exchanging properties; this leads to poisoning of the body and suffocation.

carbon-nitrogen ratio (*Bot.*). The relation between the carbon and nitrogen content of a plant.

carbon oxychloride (*Chem.*). *Phosgene* (q.v.).

carbon paper. Paper coated with waxes containing dyes or carbon black, used for making duplicate copies in typewriting, etc.

carbon pick-up (*Acous.*). A pick-up in which the tracking needle varies the pressure on a capsule of carbon granules, so that their contact resistance is varied and a direct current is modulated.

carbon printing (*Photog.*). The use of a relief made by the solvent action of warm water on an emulsion containing bichromate, which has been differentially hardened by exposure to light.

carbon process (*Photog.*). Printing on to a carbon tissue surface sensitised with a solution of potassium bichromate, with subsequent single or double transfer to a final support.

carbon rheostat (*Elec. Eng.*). A rheostat consisting of a number of carbon plates through which the current is passed; its resistance can be varied by altering the mechanical pressure on them by means of a screw.

carbon silicide (*Chem.*). See **silicon carbide.**

carbon steel (*Met.*). A steel whose properties are determined primarily by the percentage of carbon present. Besides iron and carbon, carbon steels contain manganese (up to 1%), silicon (up to 0·2%), sulphur and phosphorus (up to 0·1%), but no chromium, nickel, molybdenum, etc.

carbon suboxide (*Chem.*). Malonic anhydride, C_3O_2, O:C:C:C:O; a colourless liquid or gas; m.p. −107° C., b.p. +7° C.; formed by heating malonic acid to 140°-150° C.

carbon tetrachloride (*Chem.*). Tetrachloromethane, CCl_4; a colourless liquid, b.p. 76° C.; prepared from chloroform or carbon disulphide and chlorine. Solvent for fats and oils; widely used in fire extinguishers.

carbon tetrachloride fuse (*Elec. Eng.*). A fuse immersed in carbon tetrachloride; for use on high-voltage circuits.

carbon tissue (*Photog.*). Paper coated with a mixture of gelatine and a pigment (sometimes carbon powder).

carbon transmitter (or **microphone**) (*Acous.*). The acousti-electrical convertor which utilises the variation of the contact resistance of carbon granules with minute pressures, such as can be applied by a diaphragm that is subjected to acoustic pressures. The device is a current modulator.

carbona'ceous (*Bot.*). Hard, blackened, and appearing as if charred.

carbonaceous (*Chem.*). Said of material containing carbon as such or as organic (vegetable or animal) matter.

carbonaceous rocks (*Geol.*). Sedimentary deposits of which the chief constituent is carbon, derived from plant residues. Under this heading are included peat, lignite, or brown coal, and the several varieties of true coal (bituminous coals, anthracite, etc.).

carbona'do (*Min.*). See **black diamond.**

carbonate (*Chem.*). A compound containing the acid radical of carbonic acid (CO_3 group). Bases react with carbonic acid to form carbonates.

carbonated (*Chem.*). Said of a liquid saturated with carbon dioxide under pressure.

carbonation (*Chem.*). The process of saturating a liquid with carbon dioxide, or converting a compound to carbonate by means of carbon dioxide.

carbonator (*Chem.*). The vessel in which *carbonation* (q.v.) is carried out.

Carbonic (*Geol.*). Synonymous with *Pennsylvanian.* Compare Carboniferous System in Europe, which includes the representatives of both the Mississippian and the overlying Pennsylvanian.

carbonic acid (*Chem.*). H_2CO_3. A weak acid formed when carbon dioxide is dissolved in water. It has an acid reaction to litmus.

carbonic acid derivatives (*Chem.*). Carbonic acid forms both normal and acid salts. The esters, chlorides, and amides form two series, viz. normal compounds, in which both hydroxyl groups of the acid are substituted; and acid compounds, in which only one hydroxyl group is substituted. The acid compounds are unstable in the free state, but form stable salts.

carbonic acid esters (*Chem.*). These comprise the methyl, ethyl, and propyl esters of carbonic acid, and also the salts of the acid esters. See **carbonic acid derivatives.**

carbonic acid gas (*Chem.*). Carbon dioxide effervescing from liquids which have been saturated with carbon dioxide under pressure. The gas escapes when the pressure is withdrawn.

carbonic anhydride (*Chem.*). A synonym for *carbon dioxide*. See **carbonic acid.**

Carbonif'erous igneous rocks (*Geol.*). The igneous rocks of Carboniferous age in Britain include great masses of basic lavas and associated intrusions in Lowland Scotland, as well as the 'toadstones' of Derbyshire and various lavas in S.W. England.

Carboniferous System (*Geol.*). One of the chief of the Palaeozoic Systems, comprising, in Britain, the Carboniferous Limestone, the Millstone Grit, and the Coal Measures. See also **Carbonic.**

carbonisation (*Chem.*). The destructive distillation of organic substances out of contact with air, accompanied by the formation of carbon, in addition to liquid and gaseous products. Coal yields coke, while wood, sugar, etc. yield charcoal.

carbonisation (*Met.*). See **cementation.**

carbonisation (*Textiles*). The destruction of the vegetable matter in burry wool by steeping it in a weak solution of sulphuric acid. This reduces the burrs to carbon dust and facilitates removal.

carbonised anode (*Thermionics*). A metallic anode coated with carbon, in the form of lampblack, to assist in the radiation of heat and reduce the secondary emission of electrons.

carbonised cloth (*Elec. Eng.*). Cloth, carbonised in a vacuum, which can be used for making variable resistances by arranging for layers of the cloth to be subjected to a varying mechanical pressure.

car'bonyl (*Chem.*). When carbon monoxide acts as a radical, as it appears to do in many reactions, it is called the *carbonyl* group. Carbon monoxide combines with certain metals to form carbonyls, e.g. $Co(CO)_3$, $Ni(CO)_4$, $Fe(CO)_5$, $Mo(CO)_6$.

carbonyl chloride (*Chem.*). *Phosgene* (q.v.).

carbonyl platinous chlorides (*Chem.*). These are formed when carbon monoxide unites with platinous chloride.

Carborun'dum. A proprietary *silicon carbide* (q.v.).

Carborundum detector (*Radio*). A crystal detector consisting of a point contact between steel and a Carborundum crystal. It is most sensitive when a small steady voltage is maintained across the contact.

Carborundum furnace (*Elec. Eng.*). See **Acheson furnace.**

Carborundum wheel (*Eng.*). An abrasive or grinding wheel consisting of Carborundum grains held together and moulded into disc form by a bonding agent. See **grinding wheel.**

car'bostyr'il (*Chem.*). α-Hydroxyquinoline, the lactim of *o*-amino-cinnamic acid. It crystallises with 1 H_2O, the m.p. of the anhydrous compound being 201° C.

carboxy-haemoglobin (*Chem.*). See **carbon monoxide-haemoglobin.**

carboxy-haemoglobinaemia (*Med.*). A state of the blood in which carbon monoxide combines with haemoglobin to the exclusion of oxygen, occurring in carbon-monoxide poisoning.

carbox'yl group (*Chem.*). The acid group $-CO(OH)$.

carbox'ylase (*Chem.*). An enzyme which is capable of eliminating CO_2 from alpha-ketonic acids, with the formation of aldehydes.

carbro process (*Photog.*). The printing of an enlarged image by the carbon process, by enlarging the original image on bromide paper and, after sensitising the latter, bringing it into contact with the sensitised tissue.

carbuncle (*Med.*). A circumscribed staphylococcal infection of the subcutaneous tissues.

carbuncle (*Min.*). This is the precious garnet; it consists of an iron, aluminium silicate, which crystallises in the cubic system. It has a deep-red colour. See **almandine.**

carburation or **carburetion** (*Eng.*). The mixing of air with a volatile fuel to form a combustible mixture for use in an internal-combustion (petrol) engine.

carburetted (or **enriched**) **water-gas** (*Fuels, etc.*). Blue water-gas which has been enriched by passing it through a carburettor into which gas oil is sprayed; calorific value per cubic foot, at 60° F., about 490 B.Th.U. Usually mixed with coal-gas to form town gas.

carburettor or **carburetter** or **carburetor** (*Eng.*). A device for mixing air and a volatile fuel in correct proportions, in order to form a combustible mixture. It consists essentially of a jet, or jets, discharging the fuel into the air stream under the pressure difference created by the velocity of the air as it flows through a nozzle-shaped constriction (choke).

carburisation or **carbonisation** (*Met.*). See **cementation, case-hardening.**

carbylam'ines (*Chem.*). See ***iso*cyanides.**

carcase. A variant of *carcass.*

carcass (*Build.*). The shell of a house in construction, consisting of walls and roof only, without floors, plastering, or joiner's work.—(*Furn.*) The main part of a structure such as a cupboard, chest-of-drawers, etc.

carcass-saw (*Join.*). A saw like the dovetail saw, but of larger size and with fewer teeth per inch.

carcassing (*Build.*). The structural work involved in constructing the carcass of a building.—(*Gas Fittings*) The layout and installation of gas piping for a building.

carcassing timber (*Build.*). Timber for the framing of a building or other structure.

Carcel lamp (*Illum.*). A little-used French standard lamp, burning colza oil and giving a luminous intensity of 9·6 candles.

carceru'lus (*Bot.*). A fruit which splits at maturity into several one-seeded portions.

car'cinogen'esis (*Med.*). The production and development of cancer.

carcino'ma (*Med.*). A disorderly growth of epithelial cells which invade adjacent tissue and spread via lymphatics and blood-vessels to other parts of the body. See also **malignant disease.**

car'cinomato'sis, carcino'sis (*Med.*). Cancer widely spread throughout the body.

carcino'matous (*Med.*). Of the nature of cancer.

carcino'sis (*Med.*). See **carcinomatosis.**

card (*Surv.*). The graduated dial or face of a magnetic compass in which the card and needle are firmly connected.

cards (*Textiles*). Strips of cardboard that function in a jacquard machine in controlling the cords connecting with the harness mails, which lift or depress the threads to form the desired pattern of fabric.

cardboards (*Paper*). Made from a single layer of pulp (*pulp boards*); several layers (*triplex boards*); or sheets of paper pasted together (*pasteboards*). The term should be applied only to the finer qualities of boards. See also **box-boards, millboards, strawboards.**

card chase (*Typog.*). A small chase used for imposing small jobs such as cards.

card clothing (*Cotton Spinning*). Material consisting of a foundation of woven cotton and wool, generally covered with rubber, and filled with a number of wire teeth set closely together; used to cover the cylinder, doffer, and flats of carding engines.

card lacing (*Lace*). Thick twine, sufficiently pliable to permit the laced jacquard cards to assume a folded form easily.

card nippers (*Lace*). A hand tool used for punching holes in jacquard cards.

card puncher (*Lace*). A machine which punches jacquard cards by means of pins arranged according to the draft pattern.

card-weight pipe (*Plumb.*). Standard or full-weight pipe of Briggs' standard thickness.

Cardan joint (*Automobiles*). See **universal joint.**

Cardan shaft (*Automobiles*). See **propeller shaft.**

carded yarns (*Cotton Spinning*). Yarns made from sliver which passes directly from the carding engine to the draw frames, the usual method. Cf. *combed yarns.*

Cardew earthing device (*Elec. Eng.*). An apparatus for earthing a circuit in case of abnormal pressure; it consists of an earthed metal plate and an aluminium strip, which are electrostatically attracted to each other by the pressure.

Cardew voltmeter (*Elec. Eng.*). An early form of hot-wire voltmeter, utilising the expansion of a long platinum wire to operate the needle.

cardia, cardiac sphincter (*Med.*). The sphincter surrounding the opening of the oesophagus into the stomach.

cardiac. Pertaining to the heart.

cardiac aneurysm (*Med.*). See **aneurysm.**

cardiac muscle (*Histol.*). The contractile tissue forming the wall of the heart in Vertebrates; the fibres have no sarcolemma, show only faint transverse striations, frequently branch and anastomose, and have the nuclei in the thickness of the fibre. Cf *striated muscle.*

cardiac sphincter (*Med.*). See **cardia.**

car'diagraph (*Med.*). A recording device to exhibit a wave-form determined by heart electromotive forces. The most usual forms are those using either an Einthoven galvanometer or a cathode ray tube with long after-glow.

Cardice (*Chem.*). Trade-name for solid CO_2. See **carbon dioxide.**

cardigan rib (*Hosiery*). A variation of the one-and-one rib stitch, known as *half-cardigan* and *full cardigan*; used for the cardigan coat and for heavier makes for fishermen.

cardinal (*Zool.*). In *Insecta,* pertaining to the cardo: in *Pelecypoda* and *Brachiopoda,* pertaining to the hinge: more generally, primary, principal, as the *cardinal sinuses* or *veins,* being the principal channels for the return of blood to the heart in the lower Vertebrates.

cardinal planes (*Light*). In a lens, planes perpendicular to the principal axis, and passing through the cardinal points of the lens.

cardinal points (*Astron.*). The name given to the four principal points of the horizon—north, south, east, and west—corresponding to *azimuths* (q.v.) 0°, 180°, 90°, and 270° respectively.

cardinal points (*Light*). In a lens or in a system of lenses, these are the two principal foci, the two nodal points, and the two principal points. When the lens is used normally in air, the principal points coincide with the nodal points. For a lens of negligible thickness, the cardinal points coalesce into a single point, at the optical centre of the lens.

carding (*Textiles*). The process of preparing textile fibres for conversion into sliver; performed by a carding machine or carding engine.

carding engine (*Textiles*). A machine used in the cotton industry for combing and cleaning cotton fibres, for conversion into sliver. Finer materials are treated in the revolving flat-card type of engine, coarse materials in the roller- and clearer-card type.

car'dioblast (*Zool.*). A mesodermal cell in an embryo, destined to take part in the formation of the heart.

car'diocente'sis (*Med.*). Puncture of the heart with a needle.

cardioid diagram (*Radio*). The heart-shaped polar diagram characteristic of the combination of loop and vertical antennae used in direction-finding systems.

cardiol'ogy (*Med.*). That part of medical science concerned with the function and diseases of the heart.—*n.* **cardiol'ogist.**

cardiol'ysis (*Surg.*). Operative freeing of the heart from the chest wall when it is adherent to it in chronic adhesive pericarditis.

cardiomala'cia (*Med.*). Pathological softening of the heart muscle.

cardiorrhex'is (*Med.*). Rupture of the heart wall.

car'diospasm (*Med.*). Spasm of the cardia or cardiac sphincter of the stomach.

cardiovas'cular (*Med.*). Pertaining to the heart and the blood-vessels.

cardi'tis (*Med.*). Inflammation of the muscle and the coverings of the heart.

cardo (*Zool.*). The hinge of a bivalve shell: in *Insecta,* the proximal segment of the maxilla attached to the head.—*pl* **car'dines** (—din-ēz).

car'et (*Typog.*). A symbol (∧) used in proof correcting to indicate that something is to be inserted at that point.

Carey-Foster bridge (*Elec. Eng.*). A form of Wheatstone bridge incorporating a slide wire; used for comparing resistances of approximately equal value.

car'idoid facies, —fā'sēz (*Zool.*). A group of characters which must have been possessed by the ancestors of the *Malacostraca* before the present groups emerged.

ca'ries (*Med.*). (1) Pathological absorption of bone infected by the tubercle bacillus or by syphilis.—(2) Decay of teeth due, probably, to lack of calcium salts and of vitamin D.—*adj.* **ca'rious.**

cari'na (*Bot.*). The boat-shaped structure formed by the two lower petals in the flower of pea and similar plants; it encloses the stamens and carpel, and plays a part in pollination.

carina (*Zool.*). A median dorsal plate of the exoskeleton of some *Cirripedia*: a ridge of bone resembling the keel of a boat, as that of the sternum of flying Birds.

car'inate (*Bot., Zool.*). Shaped like a keel: having a projection like a keel.

ca'rious, ca'riose (*Bot., Med.*). Appearing as if decayed.

carmin'ative (*Med.*). Relieving gastric flatulence: medicine which does this.

carmine (*Dec.*). A red pigment made from cochineal (to be ground in water) or alizarin (ground in oil).

car'nallite (*Min.*). The hydrated chloride of potassium and magnesium, crystallising in the orthorhombic system; occurring in bedded masses with other saline deposits, as at Stassfurt. Such deposits arise from the desiccation of salt-lakes. It is used as a fertiliser.

Carnarvon arch (*Build.*). A lintel supported on corbels or shaped into shoulders at its ends.

carnas'sial (*Zool.*). In *Carnivora,* a large sectorial tooth derived from a cheek tooth, there being usually two in the upper and two in the lower jaw.

carnauba wax, —now'ba (*Chem.*). Also called BRAZIL WAX. Yellow or yellowish-green natural wax; m.p. 84°-86° C., sp. gr. 0·995, saponification value 88·3, acid value 2·9, iodine value 13·17; soluble in alkalis, ether, hot alcohol. It is obtained from the Brazilian wax palm. Carnauba wax is used, in gramophone-record manufacture, as basic material for the metallic soaps on which the original recordings are made; and in the oil of high-voltage cables to give viscosity at low temperatures.

carne'lian (*Min.*). A translucent red variety of chalcedony (silica).

car'neous (*Bot.*). Flesh-coloured.

Carniv'ora (*Zool.*). An order of carnivorous or omnivorous Mammals, terrestrial or aquatic; usually with three pairs of incisors in each jaw and large prominent canines; the last upper premolar and the first lower molar frequently modified as carnassial teeth; collar-bone reduced or absent; four or five unguiculate digits on each limb. Cats, Lions, Tigers, Panthers, Dogs, Wolves, Jackals, Bears, Raccoons, Skunks, Seals, Sea-Lions, and Walruses.

carniv'orous. Flesh-eating.

carnivorous plant (*Bot.*). A plant which catches and digests insects and other small animals.

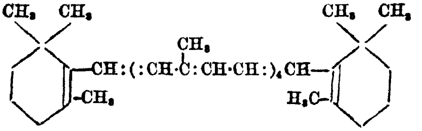
car'nose (*Bot.*). Fleshy in texture.

Carnot cycle, kar-nō (*Eng.*). A sequence of operations forming the working cycle of an ideal heat engine of maximum thermal efficiency. It consists of isothermal expansion, adiabatic expansion, isothermal compression, and adiabatic compression to the initial state.

car'notite (*Min.*). A vanadate of uranium and potassium, found (in Colorado) as a yellow impregnation in sandstones. It is an important source of radium.

carol or **caroll** (*Build.*). A seat built into the opening of a bay window. Also called BAY-STALL.

carotenes (*Chem.*). A group of orange-red, crystalline, highly unsaturated hydrocarbons, $C_{40}H_{56}$, to which various animal and vegetable substances owe their yellow colour (e.g. carrots, butter). They are present in the chromatophores of some *Phytomastigina* and in the chloroplasts of plants. They are precursors of vitamin A. All contain an unsubstituted β-ionine ring, and β-carotene has two such rings joined by a polyene bridge:



carpal, carpa'le (*Zool.*). One of the bones composing the *carpus* (q.v.) in Vertebrates.—*pls.* **carpals, carpalia.**

carpel (*Bot.*). The ovule-bearing structure, which, either singly or in association or combination with two or more other carpels, forms the gynaeceum of the flower. A carpel may be compared with a leaf, folded so that its edges come together, and bearing the ovules along the line of junction. A carpel consists of three parts: the *ovary*, a swollen basal portion containing the ovules, the *style*, a filamentous prolongation of the apex of the ovary, and the *stigma*, the specialised tip of the style, on which pollen lodges and germinates.

car'pellary scale (*Bot.*). See **bract scale.**

car'pelloid (*Bot.*). Said of some other member of a flower which is in part changed into a carpel.

carpentry. The craft of working timber, generally of a building or structural character.

carpet strip (*Carp.*). A strip of wood secured to the floor below a door.

carpeting, bituminous (*Civ. Eng.*). See **bituminous carpeting.**

carphol'ogy, carpholo'gia (*Med.*). Fitful movements of a delirious patient; e.g. plucking at the bedclothes, as in typhoid fever.

carpocerite, —pos'er-it (*Zool.*). In some *Crustacea*, the fifth antennal joint.

carpogo'nium (*Bot.*). (1) The female organ in *Rhodophyceae*.—(2) The early stage of the fructification in lichens and in *Ascomycetes*.

car'pometacar'pus (*Zool.*). In Birds, a bone of the wing skeleton, formed by the fusion of some of the carpals with the metacarpals.

car'pophore (*Bot.*). (1) An elongation of the receptacle of the flower between the insertion of the stamens and that of the carpels.—(2) The forked stalk from which the mericarps of the parsley and similar plants are suspended.—(3) A general term for the stalk of a fructification, especially in lower plants.

carpop'odite (*Zool.*). In some *Crustacea*, the third joint of the endopodite of the walking-legs or maxillipeds.

car'posporan'gium (*Bot.*) The sporangium in which one carpospore is formed, characteristic of the *Rhodophyceae.*

car'pospore (*Bot.*). A globose, uninucleate, non-motile spore, formed by *Rhodophyceae* after fertilisation and the subsequent development of a fructification containing groups of carposporangia, each yielding one carpospore.

carpotrop'ic movement (*Bot.*). A curvature of the fruit-stalk after fertilisation, bringing the fruit into a favourable position for ripening the seeds, or liberating them in a place where conditions will favour germination.

carpus (*Zool.*). In land Vertebrates, the basal podial region of the fore-limb; the wrist.

carr (*Bot.*). A community of woody plants growing on drying fenland.

carragheen, kar'a-gēn (*Chem.*). *Irish moss* (q.v.).

Carrar'a marble (*Geol.*). A well-known pure-white statuary marble, extensively quarried at Carrara; formed by contact metamorphism from ordinary limestone.

carriage (*Carp.*). A timber joist giving intermediate support, between the wall string and the outer string, to the treads of wide wooden staircases. Also called CARRIAGE-PIECE or ROUGH-STRING.

carriage (*Textiles*). The part of the mechanism of a lace machine that carries bobbin thread and swings in an arc on the combs containing the warp threads.

carriage clock (*Horol.*). A small portable clock with platform escapement, usually fitted in brass case with glass panels.

carriage gain (*Cotton Spinning*). The distance that the mule carriage travels in its outward run in excess of the delivery of roving. This slight stretching of the roving is known as *gain*.

carriage-piece (*Carp.*). See **carriage.**

carriage spring (*Eng.*). A spring used for the suspension of railway rolling-stock and other vehicles. It consists of a number of steel strips of varying length, curved to semi-elliptic form, held together so as to be capable of acting independently, and loaded as a beam. See **laminated spring.**

carriage-type switchgear (*Elec. Eng.*). See **truck-type switchgear.**

carriageway (*Civ. Eng.*). A road surface.

carrier (*Elec. Comm.*). A colloquial term for telephonic speech transmission in which the speech frequencies are modulated up into another frequency band for transmission with other bands, and modulated down for reception.

carrier (*Eng.*). A device for conveying the drive from the faceplate of a lathe to a piece of work which is being turned between centres. It is screwed to the work and driven by a pin projecting from the faceplate.

carrier (*Med.*). One who carries pathogenic bacteria without having the disease caused by the bacteria and who is thus infective to other people.—Similarly (*Bot.*) a plant showing no symptoms of disease, but containing a concealed virus which can be transmitted to other plants.

carrier (*Photog.*). A frame for holding a negative in an enlarger or lantern slides in a lantern.

carrier (*Radio*). The high-frequency current or voltage generated in a radio transmitter, which is varied in amplitude or frequency by the envelope of the signal to be transmitted. See **exhalted carrier***.

carriers (*Elec. Eng.*). The conductors fixed to the moving discs of an influence machine, which carry the charge to the main conductors.

carrier condition (*Elec. Comm.*). The condition of voltages and currents in an amplifier for a modulated signal when there is, at the time considered, no modulation.

carrier current (or **carrier wave) telegraphy** (*Teleg.*). The use of interrupted alternating currents of audio or super-audio frequency for conveying telegraphic signals over wires.

carrier current (or **carrier wave**) **telephony** (*Teleph.*). The use of modulated super-audio currents for transmitting speech frequencies over wires in parts of the frequency spectrum which are not normal for telephony.

carrier filter (*Elec. Comm.*). An electric wave filter suitable for discriminating between currents used in carrier telephony according to their frequency, particularly when they are combined with or separated from currents of normal telephonic frequency.

carrier frequency (*Elec. Comm.*). The steady frequency of current or voltage which is modulated by speech or telegraphic signals, resulting in no change in the carrier but the addition of side-frequencies.

carrier, fuse (*Elec. Eng., Teleph.*). See **fuse carrier.**

carrier metal (*Thermionics*). The metal, usually a thin film of silver, on which, after surface oxidation, molecular layers of caesium are deposited, when making photo-sensitive surfaces.

carrier power (*Radio*). The power radiated by a radio-telephone transmitter in the absence of modulation.

carrier telegraphy (*Teleg.*). The use of modulated frequencies, usually in the audio-frequency band, for telegraphic transmission; generally with the five-unit code transmitted by teleprinters.

carrier wave (*Radio*). That component of a modulated wave which is independent of the modulation, as distinguished from the *side waves* (q.v.).

carrier wave telegraphy (or **telephony**). See **carrier current telegraphy** (or **telephony**).

car'rollite (*Min.*). A sulphide of cobalt, with small amounts of copper, iron, and nickel; crystallises in the cubic system.

carrying capacity (*Elec., Cables*). See **current-carrying capacity.**

carrying-current (*Elec. Eng.*). See **instantaneous carrying-current.**

Carstone (*Geol.*). A ferruginous sandstone occurring at the top of the Lower Greensand, both in the Isle of Wight and in Norfolk, though possibly partly equivalent in age with the Gault. In Norfolk (Hunstanton) it is used as a building-stone.

carte-de-visite (*Paper*). A standard size of cut card, 2¼ × 4¼ in.—(*Photog.*) A standard size of photograph of this size.

Carter's coefficient (*Elec. Eng.*). A coefficient used in making calculations on the magnetic circuit of electric machines, in order to allow for the effect of the fringing of the flux in the air gap, due to open or semi-closed slots.

cartilage (*Histol.*). A form of connective tissue in which the cells are embedded in a stiff matrix of chondrin. See **hyaline, fibro-cartilage.**

cartilage bones (*Histol.*). Bones formed by the ossification of cartilage.

cartilaginous, —laj'in-us. Of the nature of cartilage: hard, tough, and pliable.

carting-boy (*Mining*). A boy who pushes or pulls carts of coal from the working face in thin coal-seams.

cartog'raphy (*Surv.*). The preparation and drawing of maps which show, generally, a considerable extent of the earth's surface.

carton (*Paper*). A folded card box.

cartoon (*Dec.*). A drawing or painting serving as a pattern for wall painting, mosaic, tapestry decoration, etc.

cartoon film (*Cinema.*). A film made by photographing frames step-by-step, the drawings being slightly modified between each frame, so that on projection an animated drawing is viewed. See also **animated cartoon.**

cartouch, cartouche, kar-toosh (*Build.*). (1) An ornamental block supporting the eave of a house. —(2) An ornamental scroll to receive an inscription or decoration.—(*Dec.*) A small scrolled panel or shield, in relief, or painted to represent relief: a modillion.

cartridge (*Ammunition*). For small arms or Q.F. guns firing fixed ammunition, the complete round is termed a *cartridge*; otherwise the cartridge is the propellant charge in its container. See **B.L. guns.**

cartridge (*Photog*). (1) The holder for roll films for daylight loading of cameras.—(2) A card-board tube for the carriage of a small quantity of chemical.

cartridge brass (*Met.*). Copper-zinc alloy containing approximately 30% zinc. Possesses high ductility; capable of being severely cold-worked without becoming brittle. Used for cartridges, tubes, etc.

cartridge case (*Ammunition*). A case, usually of brass, which contains the propellant charge of small-arm and Q.F.-gun ammunition, and which seals the chamber against the escape of gases.

cartridge fuse (*Elec. Eng.*). A fuse-link enclosed in a cylindrical tube of insulating material, which may or may not be filled with an arc-quenching medium. See **screw-plug cartridge fuse.**

cartridge paper (*Paper*). A hard, tough type of paper with a rough surface, used for drawing, wrapping, etc. See also **manilla paper.**

carun'cle (*Bot.*). An outgrowth from the neighbourhood of the micropyle of a seed. The seed is said to be *carunculate.*

caruncle (*Med.*). Any small fleshy excrescence: a small growth at the external orifice of the female urethra: (*pl.*) epithelial nodules found at the end of pregnancy on the placenta and the amnion.

caruncle (*Zool.*). Any fleshy outgrowth: in some *Polychaeta*, a fleshy dorsal sense-organ: in some *Acarina*, a tarsal sucker: in embryo chicks, a horny knob at the tip of the beak.

carun'cula lacrima'lis (*Med.*). The small reddish eminence situated at the inner angle of the eye.

carunculae myrtifor'mes (*Med.*). The small rounded elevations of hymen tissue which are the sole remains of this structure after parturition.

carun'culate (*Bot.*). Having a caruncle.

car'vacrol (*Chem.*). $C_{10}H_{14}O$, 1-methyl-4-isopropyl-2-hydroxy-benzene, an isomer of *thymol* (q.v.); m.p. 0° C., b.p. 236° C.; obtained from camphor by heating with iodine; present in *Origanum hirtum.*

carvene (*Chem.*). See **d-limonene.**

carvone (*Chem.*). Δ-6,8-Terpadiene-2-one, an unsaturated ketone of the terpene series, the principal constituent of carraway seed oil; m.p. 62° C., b.p. 228° C.; readily forms *carvacrol* (q.v.).

caryo-. Prefix. See **kary-, karyo-.** For terms not appearing below see under **k-.**

car′yoid (*Bot.*). A very small mass of protein of obscure significance, present in some algal cells.

car′yolytes (*Zool.*). In the histolysis which accompanies metamorphosis in some Insects, muscle-fragments containing nuclei.

caryop′sis (*Bot.*). A fruit, dry, indehiscent, and containing one seed, of which the testa is united closely to the fruit wall; a wheat grain is a *caryopsis*.

cascade (*Elec. Comm., etc.*). A number of devices connected in such a way that each operates the next one in turn.

cascade amplifier (*Radio*). A series of thermionic valve amplifiers so connected that the output of one stage is amplified by the succeeding stage.

cascade connexion (*Elec. Eng.*). A method of connecting two or more pieces of electrical apparatus so that the output of one forms the input to the next.

cascade control (*Elec. Eng.*). A method of obtaining two or more economical running speeds from two induction motors by connecting them in cascade, i.e. by supplying the stator of the first from the slip-rings of the second, the two being mechanically coupled.

cascade converter (*Elec. Eng.*). See **motor converter.**

cascade motor (*Elec. Eng.*). A single induction motor with a special arrangement of windings, which gives it the properties of two induction motors in cascade connexion.

cascading of insulators (*Elec. Eng.*). Flashover of a string of suspension insulators; initiated by the voltage across one unit exceeding its safe value and flashing over, thereby imposing additional stress across the other units, and resulting in a complete flashover of the string.

case (*Bind.*). The binding of a book when it is made as a separate unit from the book. A case consists of boards, cut to suitable size, and covered with cloth or other material. A cased book is described as *cloth boards* or *paper boards*, according to the covering material.

case (*Horol.*). The housing of a watch or clock.

case (*Masonry*). The external facings of a building when these are of better material than the backing.

case (*Met.*). The surface region of a steel component in which the properties and composition have been altered by carburising, nitriding, or cyaniding.

case (*Typog.*). A wooden tray divided into many compartments from which individual letters are taken. Usually in pairs, the *upper case* (q.v.) and *lower-case* (q.v.).

case bay (*Carp.*). The space between two binders under a floor.

case-hardening (*Met.*). The production of a hard surface layer on steel by heating in a carbonaceous medium to increase the carbon content, then quenching. See **cyanide hardening, pack hardening.**

case screws (*Horol.*). The screws that hold a watch movement in its case.

caseation, kās-e-ā′shon (*Med.*). The process of becoming cheese-like; e.g. in tissue infected with the tubercle bacillus the cells break down into an amorphous cheese-like mass.

cased frame (*Join.*). The wooden box-frame containing the sash-weights of a window.

casein, kā′se-in (*Chem.*). The principal albuminous constituent of milk, in which it is present as a calcium salt. Transformed into insoluble paracasein (cheese) by the action of enzymes. Casein is a raw material for plastic materials which are used extensively as insulators for low-tension systems, wireless panels, and for handles, buttons, etc. See **plastics.**

casein′ogen (*Chem.*). A phosphoprotein found in milk, yielding casein on acidification.

casemate (*Join.*). A small hollow moulding subtending about 60° to 90°. Also called a CASEMENT.—(*Mil.*) A heavily protected structure (e.g. on ships of war, in fortified lines) from which the defenders may fire upon the enemy.

casement (*Build.*). (1) A window hinged to open about one of its vertical edges.—(2) See **casemate.**

casement (*Textiles*). A plain woven cotton fabric used for curtains. Woven grey, and dyed or printed later.

ca′seoses (*Chem.*). Proteoses occurring in milk.

ca′seous (*Med.*). Cheese-like: having undergone *caseation* (q.v.).

casette′ (*Radiol.*). A holder for an X-ray plate or film.

cashmere (*Textiles*). Fabric made from wool which forms the under, winter coat of the Cashmere (Kashmir) goat. The term is also used for light-weight fabrics with a silk, cotton, or woollen warp and a fine Botany weft; and for material (shoddy) manufactured from merino rags.

casing (*Join.*). (1) The frame enclosing the sash-weights.—(2) The frame enclosing the steps in a staircase.—(3) The frame within which a door hangs.

casing (*Mining*). (1) The lining of a drill hole.—(2) The steel lining of a circular shaft.

casing (*Paper*). A standard size of brown paper, 36 × 46 in.

casinghead gasoline (*Fuels*). A very volatile product obtained by condensation of the low-boiling constituents of natural gas derived from oil-wells; blended with gasoline (petrol) to increase starting property.

Caspar′y's band, Caspa′rian strip (*Bot.*). The strip of material, impermeable to water, present in the radial walls of endodermal cells when these are in the primary condition. In transverse section, the strip appears as an elliptical swelling on the wall, and is then known as the *Casparian dot*.

Cassegrai′nian telescope (*Astron.*). A reflecting telescope with a hole in the principal mirror, the object being viewed through an eye-piece placed at its centre. Another mirror, placed normal to the main mirror and at the other end of the tube, brings back the doubly reflected rays to a focus in the optical plane of the eye-piece.

Cassel's yellow (*Chem.*). Commercial name for lead oxychloride made by heating lead oxide and ammonium chloride.

cassia oil (*Chem.*). An oil obtained from the bark of *Cinnamomum cassia*, a yellow or brown liquid, of cinnamon-like odour; b.p. 240°-260° C., sp. gr. 1·045-1·063.

cassie (*Paper*). The damaged tops and bottoms of a ream of paper.

cas′simere twill (*Textiles*). The 2-and-2 twill.

Cassini's division, ka-sē′nē (*Astron.*). A dark ring concentric with the ring of Saturn and dividing it into two parts; first observed by J. D. Cassini in 1675.

cassit′erite or **tin-stone** (*Min.*). Oxide of tin, crystallising in the tetragonal system; it constitutes the most important ore of this metal. It occurs in veins and impregnations associated with granitic rocks; also as 'stream-tin' in alluvial gravels.

Cassius, purple of (*Chem.*). See **purple of Cassius.**

cast (*Geol.*). A fossil organism, replaced by inorganic matter which has filled the original body cavity after the decay of the soft parts, and which may survive even the destruction of the enclosing skeletal structure. A cast shows the surface features of the organism but nothing of its internal structure.

cast (*Med.*). A mould of cellular or organic matter shed from tubular structures in the body (e.g. the bronchi or the tubules in the kidney).

cast (*Print.*). A stereotype or electrotype plate.

cast holes (*Foundry*). Holes made in cast objects by the use of cores, in order to reduce the time necessary for machining, and to avoid metal wastage.

cast-in-situ concrete piles (*Civ. Eng.*). A type of pile formed by driving a steel pipe into the ground and filling it with concrete, using the pipe as a mould. Also known as MOULDED-IN-PLACE CONCRETE PILES.

cast-iron (*Met.*). An iron-carbon alloy distinguished from steel by its containing substantial amounts of cementite or graphite, which make it unsuitable for working. Carbon content is usually above 2·5%. See **grey iron, white iron, mottled iron.**

cast-off (*Typog.*). An estimate of the number of pages or lines that copy will occupy when set up in type.

cast-steel (*Met.*). Steel as cast, i.e. not shaped by mechanical working. Originally applied to steel made by the crucible process as distinguished from that made by cementation of wrought-iron.

cast welded rail joint (*Rail.*). A joint between the ends of two adjacent rails in position; made by pouring molten metal between them.

casta'neous (*Bot.*). Chestnut brown.

caste (*Zool.*). In some social Insects, one of the types of polymorphic individuals composing the community.

castellated filament (*Illum.*). A form of electric lamp filament shaped like the battlements of a castle; used in some types of traction lamp.

caster (*Furn.*). A small swivelling roller attached to the feet of chairs, settees, tables, etc.—BALL CASTER, a hard metal ball kept in place by a metal holder.

caster action (*Automobiles*). The use of inclined king-pins by which the steerable front wheels of a motor vehicle are given fore-and-aft stability and a self-centring tendency after angular deflection by road shocks, on the principle of the domestic caster. See **trail.**

casting (*Cinema.*). The selection of artists to perform in the production of cinematographic films. See also **double casting.**

casting (*Met.*). (1) The operation of pouring molten metals into sand or metal moulds in which they solidify.—(2) A metallic article cast to the shape required, as distinct from one shaped by working.

casting (*Plastics*). A mixture of phenol, formaldehyde, plasticiser, lubricant, and dye is heated in a steam-jacketed kettle for about twenty-four hours; the viscous resin is then run into a ladle and transferred to a lead mould. The machining properties of the cast material are similar to those of brass or wood. When properly finished this forms the most beautiful of plastics.

casting (*Pot.*). A moulding process in which slip is used.

casting (*Typog.*). In Monotype work, the operation of passing the perforated spool (see **keying**) through a machine (*caster*), in which the individual characters are formed of molten lead, the matter being mechanically assembled in words, lines, and galleys.

casting (*Vet.*). (1) The process of throwing and securing an animal from the upright into the prone position.—(2) The pellet of undigested feathers, fur, or bones disgorged by a raptorial bird.

casting copper (*Met.*). Metal of a lower purity than *best selected copper* (q.v.). Generally contains about 99·4% of copper.

casting department (*Cinema.*). In a film-producing organisation, the unit responsible for selecting artists and testing their suitability for specified rôles.

casting ladle (*Foundry*). A steel ladle, lined with refractory material, in which molten metal is carried from the furnace to the mould in which the casting is to be made.

casting-on (*Foundry*). See **burning-on.**

castle nut (*Eng.*). A six-sided nut in the top of which six radial slots are cut. Two of these line up with a hole drilled in the bolt or screw, a split pin being inserted to prevent loosening.

Castner's process (*Chem.*). An electrolytic process for chlorine and alkaline hydroxides, incorporating the mercury diaphragm process to prevent the sodium hydroxide formed at the cathode from mixing with the chlorine discharged at the anode.

castor (*Furn.*). See **caster.**

castor oil (*Chem.*). Oil obtained from the seeds of *Ricinus communis*, a yellow or brown, syrupy, non-drying liquid; m.p. −10° C., sp. gr. 0·960-0·970, saponification value 178, iodine value 85, acid value 19·21.

castration (*Surg.*, *Vet.*). Removal or surgical destruction of the testicles.

castration-complex (*Psycho-an.*). The unconscious mental factor formed around the fear of the loss of the genital organs or their analogue; e.g. the experience of the withdrawal of the mother's breast in nursing. Later privation may become associated with the original experience, resulting in similar emotional reactions to the original fear-situation.

casual species (*Bot.*). An alien occurring in a plant community of which it is not a regular inhabitant.

C.A.T. (*Thermionics*). A trade abbreviation for *cooled-anode transmitting valve.*

cat (*Furs*). The fur of the common cat, widely used in certain countries for low-grade furs. The name is sometimes loosely used for the fur of *civet, genet,* and *lynx* (qq.v.).

catgut (*Surg.*). Sterilised strands of sheep's intestine used as ligatures.

cat'head or spider (*Eng.*). A lathe accessory consisting of a turned sleeve having four or more radial screws in each end; used for clamping on to rough work of small diameter and running in the *steady* (q.v.) while centring.

cat sapphire (*Min.*). Blackish- or greenish-blue oriental sapphire (i.e. true sapphire) of some value as a cut gemstone, but not of characteristic colour.

cat walk (*Cinema.*). A high bridge in a studio, for manipulating ropes and scenery.

cat's-eye (*Min.*). A variety of fibrous quartz which shows chatoyancy when suitably cut, as an ornamental stone. The term is also applied to crocidolite when infiltrated with silica (see **tiger's eye, hawk's eye**). A more valuable form is *chrysoberyl cat's-eye.* See **cymophane.**

cat's whisker (*Radio*). A colloquial term for the fine wire used to make contact with the crystal in some forms of crystal detector.

cata-. Prefix. See **kata-.**

cata- (*Chem.*). Containing a condensed double aromatic nucleus substituted in the 1.7 positions.

catab'olism (*Biol.*). See **katabolism.**

cataclas'tic structures (*Geol.*). See **kataklastic structures.**

catacorol'la (*Bot.*). A second corolla formed externally to the true one.

catad'romous (*Bot.*, *Zool.*). See **katadromous.**

cat'alase (*Chem.*). An enzyme present in animal and vegetable tissues, characterised by readiness to decompose hydrogen peroxide, while being slowly destroyed itself. It manifests maximum activity at *p*H 6·5-7.

cat'alepsy (*Med.*). The condition in which any posture of a limb may be maintained without movement for a period of time longer than normal; occurring in disease of the cerebellum and in hysteria, also in deep hypnotic states and in certain types of schizophrenia. Also used (*Zool.*) to indicate the action known as 'feigning death' which can be induced in some animals by any sudden disturbance.—*adj.* **catalep'tic.**

catal'ysis (*Chem.*). The acceleration or retardation of a chemical reaction by a substance which itself undergoes no permanent chemical change, or which may be recovered when the reaction is completed.

cat'alyst (*Chem.*). A substance which catalyses a chemical reaction. See **catalysis.**

catalytic poison (*Chem.*). A substance which inhibits the activity of a catalyst.

catamorphism (*Geol.*). See **katamorphism.**

cataphore'sis (*Chem.*). The migration of suspended particles under the influence of an electric field, especially towards the cathode.

cat'aphyll, cataphyl'lary leaf (*Bot.*). A simplified form of leaf, such as a cotyledon, a scale leaf on a rhizome, or a bud scale.

cat'aplasm (*Med.*). A medicated poultice or plaster.

cat'aplexy (*Med.*). Sudden attack of weakness, following some expression of emotion; the patient falls to the ground, immobile, speechless, but conscious.

catapult mechanism (*Bot.*). A means of seed dispersal, depending on sudden jerks due to the stiffness of the long stalk as the fruit sways in the wind.

cataract (*Med.*). Opacity of the lens of the eye as a result of degenerative changes in it.

catarrh, kat-ar' (*Med.*). Inflammation of a mucous membrane, with discharge of mucus.

catarrh, contagious (*Vet.*). An infection of birds due to *Haemophilus parainfluenzae.*

catarrh, equine contagious (*Vet.*). See **strangles.**

catarrhal fever, malignant (*Vet.*). An acute infection of cattle and buffalo, which is usually complicated by ulceration of the nostrils and severe nervous symptoms. See also **malarial catarrhal fever.**

catato'nia, catat'ony (*Med.*). See **catatonic schizophrenia.**

cataton'ic schizophrenia (*Psychiatry*). A type of schizophrenia characterised by states of motor activity and excitement, shown by echolalia and echopraxia, alternating with a state of stupor. Homicidal and suicidal tendencies are strong in the former phase, and are accompanied by delusions and hallucinations; in the stuporous phase all interest is withdrawn from the outside world, and the patient sits mute and idle and often has to be tube-fed. Flexibilitas cerea may be present, while a marked feature is negativism—a tendency to do the opposite of what is asked or expected.

catch (*Join.*). A spring bolt for securing doors when shut.

catch bar (*Textiles*). A long bar of steel forming part of a lace machine; it is faced with brass on the part which engages with the carriages.

catch-basin (*Civ. Eng.*). See **catch-pit.**

catch-bolt (*Join.*). A door-lock having a spring-loaded bolt which is always normally in the locking position (i.e. extended), but which is automatically and momentarily retracted in the process of shutting the door.

catch feeder (*Hyd. Eng.*). An irrigating ditch.

catch-line (*Typog.*). A temporary headline inserted on slip proofs, etc.

catch muscle (*Zool.*). A set of smooth muscle-fibres which form part of the adductor muscle in bivalve Molluscs, and are capable of keeping the valves closed by means of a sustained tonus: any set of smooth muscle fibres associated with striated muscle fibres for a similar purpose.

catch-net (*Elec. Eng.*). A wire netting placed under high-voltage transmission lines where they pass over public roadways, railways, etc., to prevent danger due to a broken live conductor.

catch-pit (*Civ. Eng.*). A small pit constructed at the entrance to a length of sewer or drain pipe in order to catch and retain matter which would not easily pass through the pipes. Also called a CATCH-BASIN.

catch plate (*Eng.*). The end flange of a lathe-head speed cone, or of an internal plate driven by the cone, through a hole in which a peg takes the drive to the lathe mandrel. The peg is withdrawn when the back gear is to be used.

catch props (*Mining*). In a coal-mine, props put in advance of the main timbering for safety; i.e. *watch props* or *safety props.*

catch-water drain (*Civ. Eng.*). A drain intercepting water flowing naturally from high land and conducting it in any desired direction.

catch-work (*Hyd. Eng.*). A system of water channels which may be used for flooding land.

catcher (*Thermionics*). The element in a thermionic valve which abstracts or catches the energy in a bunched electron stream as it passes through it. See **buncher.**

catchment area (or **basin**) (*Civ. Eng.*). The area from which water runs off to any given river valley.

cat'echol (*Chem.*). Pyrocatechin, $C_6H_4(OH)_2$ (1, 2); colourless crystals; m.p. 104° C., b.p. 240° C. It is *o*-dihydroxybenzene, a dihydric phenol. Occurs in fresh and fossil vegetable matter and in coal-tar. Important are its derivatives *guaiacol* (q.v.) and *adrenaline* (q.v.).

cat'echu (*Photog.*). A dark-brown extract of Indian plants, rich in tannin; used for toning platinum prints.

catena'rian arch (*Build.*). An arch having the shape of an inverted catenary, or hanging chain.

cat'enary, *or* ka-tēn'— (*Maths., etc.*). The curve assumed by a perfectly flexible, inextensible, infinitely slender cord, suspended at its ends. *Common catenary* is the curve assumed by a wire or a rope of uniform weight under the influence of gravity, when the forces are parallel and proportional to its length.

catenary construction (*Elec. Eng.*). A method of construction used for overhead contact wires of traction systems. A wire is suspended, in the form of a catenary, between two supports, and the contact wire is supported from this by means of droppers of different lengths arranged so that the contact wire is horizontal. See **compound catenary construction.**

cat'enate, caten'ulate (*Bot.*). (Of spores and similar structures) arranged in chains.

catenation (*Cyt.*). The arrangement of chromosomes in chains or in rings.

caterpillar (*Eng.*). A device for increasing the tractive effort and mobility of a tractor or other road vehicle. The road wheels are replaced by chain wheels, which carry and drive a pair of endless chains or articulated tracks of large flat steel plates, often provided with removable projecting pieces for increasing the adhesion on soft and irregular ground.

caterpillar (*Zool.*). A type of eruciform larva, found in *Lepidoptera* and *Tenthredinidae,* which typically possesses abdominal locomotor appendages (prolegs).

cathar'sis (*Psycho-an.*). The purging of the effects of a pent-up emotion by bringing them to the surface of consciousness: for example, the 'purging' of the mind obtained when a patient freely expresses himself to his physician.

cathartic (*Med*). Purgative. A drug which promotes evacuation of the bowel.

Catherine wheel (*Build.*). See **rose window.**

cath'eter (*Med.*). A rigid or flexible tube for admitting or removing gases or liquids through channels of the body, especially for removing urine from the bladder.

cathetom'eter (*Phys*, *etc.*). An instrument used for measuring vertical distances not exceeding a few centimetres It consists of a small telescope held horizontally in a cradle, which can move up and down a vertical pillar carrying a divided scale, the position of the cradle being read by means of a vernier. Images of the two points whose vertical separation is required are brought in succession to the cross-wires of the telescope eyepiece and the separation is obtained from the difference in the vernier readings. Also called a READING MICROSCOPE (or TELESCOPE)

cath'etron (*Elec. Eng*). A grid-controlled mercury-arc rectifier in which the control grid is placed outside the evacuated tube. Sometimes spelt KATHETRON.

cathex'is (*Psycho-an.*). A charge of mental energy attached to any particular idea or object.

cathode (*Chem*). The electrode at which an electric current leaves an electrolyte or gas — (*Thermionics*) The source of electrons in a thermionic or gas-discharge tube.

cathode copper (*Met*). The product of electrolytic refining. Before use the cathodes are melted, oxidised, poled, and cast into wire-bars, cakes, billets, etc.

cathode coupling (*Radio*). Coupling effected to or from a thermionic valve by means of an impedance connected between the cathode and the negative terminal of the high-tension supply.

cathode current (*Thermionics*). The total current from the cathode to all other electrodes in a thermionic tube.

cathode deposit (*Chem*). The substance, generally a metal, formed on the cathode during electrolysis.

cathode sputtering (*Thermionics*). See **sputtering.**

cathode rays (*Phys.*). Streams of negatively charged particles (electrons) emitted normally from the surface of the cathode during an electrical discharge in a rarefied gas. The velocity of the electrons is proportional to the square root of the potential difference through which they pass, and is equal to 595 km. per sec. for a p.d. of 1 volt.

cathode ray camera (*Cathode Ray Tubes*). A combination of cathode ray tube and moving-film camera. The photographic film may be internal or external to the vacuum chamber.

cathode ray direction-finder (*Radio*). An arrangement by which the direction of arrival of an incoming signal is shown by the inclination of a line on the calibrated screen of a cathode ray tube.

cathode ray furnace (*Phys.*). A device whereby a small specimen may be raised to a very high temperature by focusing on it an intense beam of cathode rays.

cathode ray indicator (*I.C. Engs.*). An engine indicator using a *cathode ray tube* (q.v.) for recording the diagram. The electron beam is deflected by voltages proportional to cylinder pressure and to time respectively, giving an indicator diagram on a time base; suitable for the highest speeds, since it is free from all inertia.

cathode ray oscillograph (*Phys.*). A Braun tube fitted with two pairs of parallel plates, for applying mutually perpendicular transverse electrical fields to the cathode ray beam. Since the deflections of the bright spot on the fluorescent screen due to these two fields are at right-angles to each other, it is possible to cause the spot to trace any desired curve by applying suitably varying potentials to the two sets of plates. The instrument plays an important part in television receivers.

cathode ray tube (*Radio, Television, Thermionics*). A device in which a narrow beam of electrons, emitted from an *electron gun* (q.v.), impinges on a fluorescent screen or photographic surface. The beam is subjected to transverse magnetic and/or electrostatic fields, whose intensities control the position of the luminous spot or photographic image. The device is much used in the delineation of wave-forms of electric currents and voltages, and in television.

cathode ray voltmeter (*Cathode Ray Tubes*). A cathode ray tube of known deflectional sensitivity, employed as a voltmeter. It indicates the crest values of the voltage applied to the deflector plates.

catho'dophone (*Acous.*). A microphone utilising the silent discharge between a heated oxide-coated filament in air and another electrode. This discharge is modulated directly by the motion of the air particles in a passing sound-wave.

cathog'raphy, cathodog'raphy (*Photog*). The practice of X-ray photography, i.e. the making of *skiagraphs* (q.v.).

cath'olyte (*Elec., etc.*). See **catolyte.**

cation, kat'ī-on (*Elec., etc.*). The ion in an electrolyte which carries the positive charge and which migrates towards the cathode under the influence of a potential difference.

catkin (*Bot.*). A somewhat specialised inflorescence, consisting of a number of sessile flowers of simple construction, arranged around a common stalk, and usually all staminate or all pistillate. The catkin falls as a unit when pollen has been shed or the seeds have been liberated.

cat'olyte, cath'olyte (*Elec., etc*). That portion of the electrolyte of an electrolytic cell which is in the immediate neighbourhood of the cathode.

catothe'cium (*Bot.*). An inverted perithecium in which the asci hang down from the base of the organ.

Catskill Beds (*Geol.*). An Old Red Sandstone phase in the Upper Devonian of N. America, typically exposed in the Catskill Mts., and reaching a thickness of 5000 ft. of non-marine red sandstones capped by white sandstones in Pennsylvania. See also **Chemung Group.**

cattle plague (*Vet.*). See **rinderpest.**

Cauchy's dispersion formula, kŏ-shĕ (*Light*).

$$\mu = A + \frac{B}{\lambda^2} + \frac{C}{\lambda^4} + \ldots$$

An empirical expression giving an approximate relation between the refractive index μ of a medium and the wavelength λ of the light; A, B, and C being constants for a given medium.

caud'a (*Zool.*). The tail, or region behind the anus: any tail-like appendage: the posterior part of an organ, as the *cauda equina*, a bundle of parallel nerves at the posterior end of the spinal cord in Vertebrates.—*adjs.* **caudal, caudate.**

caudad (*Zool.*). Situated near, facing towards, or passing to, the tail region.

Cauda'ta or **Urode'la** (*Zool.*). An order of *Amphibia* lacking scales, but possessing four pentadactyl limbs and a prominent tail in the adult state; gills or gill-slits may or may not be present. Newts, Salamanders, etc.

caudate (*Bot., Zool.*). Bearing a tail-like appendage.

caudicle (*Bot.*). The stalk composed of mucilaginous threads which attaches the pollen mass of an orchid to the rostellum.

Cauer filter, kow′er (*Elec. Comm.*). A filter which has sections designed from impedance considerations according to Cauer's filter theory.

cauking joint (*Join.*). A joint sometimes used to fix a tie-beam to a wall plate; it combines features of the dove-tail and tenon and mortise joints.

caul (*Furn.*). A curved form for pressing veneers.

caul (*Zool.*). In the higher Vertebrates, the amnion: more generally, any enclosing membrane

cauldron subsidence (*Geol.*). The subsidence of a cylindrical mass of the earth's crust, bounded by a circular fault up which lava has commonly risen to fill the cauldron. Good examples have been described from Scotland (Ben Nevis and the Western Isles).

caules′cent (*Bot.*). Having a stalk or a stem.

caul′icole, caulic′olous (*Bot.*). Growing on the stem (especially herbaceous stem) of another plant; usually refers to fungi.

cauliflor′y (*Bot.*). The production of flowers on old stems from dormant buds.

caul′ine (*Bot.*). (1) Growing from the stem, and not from the base of the plant.—(2) Appertaining to the stem.—(3) Formed from the internal tissues of the stem.

cauline bundle, cauline vascular bundle (*Bot.*). A vascular bundle formed entirely from the tissues of the stem. A set of such bundles forms the *cauline vascular system.*

caulking (*Carp.*). See **cogging.**

caulking (*Civ. Eng., etc.*). The operation of making a joint or seam tight to withstand pressure; performed by stopping the joint with tow or other filling material and ramming it home.

caulking or **calking** (*Eng.*). The process of closing the spaces between overlapping riveted plates by hammering the exposed edge of the upper plate into intimate contact with the lower plate.

caulking (or **calking**) **pieces** (*Eng.*). In some steam-turbines, distance pieces inserted between adjacent blades and secured by caulking.

caulking (or **calking**) **tool** (*Eng.*). A tool, similar in form to a cold chisel but having a blunt edge, for deforming the metal rather than cutting it; used in caulking riveted joints.

caulocar′pic (*Bot.*). Said of a plant which, after flowering, lives through the winter, and flowers again in the next or in a subsequent year.

caul′ome (*Bot.*). A general term denoting all organs belonging to the shoot.

causal′gia (*Med.*). Intense burning pain in the skin after injury to the nerve supplying it.

causeway (*Civ. Eng.*). A road carried by an embankment or a retaining wall across marshy land or water. A Scottish term for *sett paving* * (q.v.).

caustic (*Med., etc.*). Destructive or corrosive to living tissue: an agent which burns or destroys living tissue.

caustic curve (*Light*). A curve to which rays of light are tangential after reflection or refraction at another curve.

caustic lime (*Chem.*). The residue of calcium oxide, obtained from freshly calcined calcium carbonate; it reacts with water, evolving much heat, and producing slaked lime (calcium hydroxide, hydrate of lime, or hydrated lime). See also **lime.**

caustic potash (*Chem.*). A term used in chemistry for potassium hydroxide (KOH). The name *potash* is derived from 'ash' (meaning the ash from wood) and 'pot' from the pots in which the aqueous extract of the ash was formerly evaporated.

caustic soda (*Chem.*). Sodium hydroxide, NaOH, a deliquescent substance, with a soapy feel, whose solution in water is strongly alkaline; it is a common reagent in the laboratory. It is manufactured by treating quicklime with hot sodium carbonate solution; and its main industrial use is in the manufacture of soap.

caustic surface (*Light*). A surface to which rays of light are tangential after reflection or refraction at another surface.

cave breccias (*Geol.*). Breccias formed of fragments falling from the sides and roofs of caves.

cave earth (*Geol.*). A deposit formed of the finer-grained debris of cave walls and roofs, mixed in some cases with a certain amount of water-borne sediment.

Cavendish experiment (*Elec. Eng.*). An experiment to demonstrate that all charges reside on the surface of a conductor; first performed by Henry Cavendish (1731-1810).

Cavendish experiment (*Phys.*). An experiment carried out by Cavendish to determine the constant of gravitation. A form of torsion-balance was used to measure the very small forces of attraction between lead spheres.

cavern (*Geol.*). A chamber in a rock. Caverns are of varying size, and are due to several causes, the chief being solution of calcareous rocks by underground waters, and marine action.

cavernic′olous (*Ecol.*). Cave-living.

caverno′sus, cavernous (*Zool.*). Honeycombed: hollow: containing cavities, e.g. *corpora cavernosa.*

cavernous breathing (*Med.*). Low-pitched hollow sound produced in a cavity pathologically formed in the lung.

cavetto (*Arch.*). A hollow moulding, quarter round.

cav′il (*Masonry*). A small stone axe resembling a *jedding axe* (q.v.).

cavilling (*Mining*). The drawing of lots for working places (usually for three months) in the coal-mine.

cavings (*Agric. Mach.*). The short straw which is thrown out from a threshing-machine with the chaff.

cavitation (*Eng.*). The formation of a cavity between the downstream surface of a moving body and a liquid normally in contact with it, as, for example, behind the blades of a ship's propeller.

cavitation (*Med.*). The formation of cavities in any structure of the body, especially the lungs.

cavity effect (*Acous.*). The enhancement of response in a microphone due to acoustic resonance in a shallow cavity in front of the diaphragm.

cavity radiation (*Heat*). The radiation emerging from a small hole leading to a constant temperature enclosure. Such radiation is identical with *black-body radiation* (q.v.) at the same temperature, no matter what the nature of the inner surface of the enclosure.

cavity resonance (*Acous.*). The enhancement of air flow for certain frequencies, due to neutralisation of the mass (or inertia) reactance with the stiffness reactance of air in a partially enclosed space.

cavity walls (*Build.*). Hollow walls, normally built of two 4½ in. stretcher-bond walls with a 2 in. gap between, tied together with wall ties. Cavity walls increase the thermal resistance and prevent rain from driving through to the inner face.

ca′vum (*Zool.*). A hollow or cavity: a division of the concha.

cavus (*Med.*). See **pes cavus.**

Caxton (*Typog.*). A term applied to any book produced by William Caxton (1422-91).

Cb (*Chem.*). The symbol for *columbium.*

C.B. (*Elec. Comm.*). The abbrev. for *central* (or *common*) *battery* (q.v.).

C.B.S. (*Elec. Comm.*). The abbrev. for *central* (or *common*) *battery signalling* (q.v.)

c.c. The abbrev. for *cubic centimetre*, the unit of volume in the metric system.

C.C.I. (*Elec. Comm.*). The abbrev. for *Comité Consultatif International* (q.v.).

C.C.I.F. (*Elec. Comm.*). The abbrev. for *Comité Consultatif International Téléphonique* (*Fernsprech*).

C.C.I.R. (*Elec. Comm.*). The abbrev. for *Comité Consultatif International des Radiocommunications.*

C.C.I.T. (*Elec. Comm.*). The abbrev. for *Comité Consultatif International Télégraphique.*

Cd (*Chem.*). The symbol for *cadmium.*

C.D. (*Chem.*). An abbrev. for *current density.*

C.D.F. (*Elec. Comm.*). Abbrev. for *combined distribution frame* (q.v.).

Ce (*Chem.*). The symbol for *cerium.*

cecid'ium (*Bot*). See **gall.**

cedar-tree laccolith (*Geol.*). A multiple laccolith; i e. a series of laccoliths, one above the other, forming parts of a single mass of igneous rock.

ceiling (*Build.*). The upper surface of a room.

ceiling (*Aero.*). ABSOLUTE CEILING, the height at which the rate of climb of an aircraft, in standard atmosphere, would be zero. It is the maximum height attainable by an aircraft under standard conditions.—SERVICE CEILING, the height at which the rate of climb of an aircraft has fallen to a certain agreed amount (in British practice, 100 feet per minute).

ceiling fan (*Eng.*). A low-speed electric fan which has a wide sweep and is capable of displacing a large volume of air at low velocity; suspended from the ceiling in rooms where, for comfort, the rate of air change must be increased.

ceiling joist (*Build.*). A joist to which the plastering laths of a ceiling are fixed; it is nailed and notched to the binding joists of the floor above.

ceiling plate (*Elec. Eng.*). A metal plate for fixing to a ceiling, from which a pendant electric light fitting may be suspended. Arrangements are embodied in it to enable the flexible cord of the fitting to be connected to the wiring of the installation.

ceiling rose (*Elec. Eng.*). An enclosure of insulating material for attachment to the ceiling; it is equipped with terminals from which a flexible cord carrying an electric light fitting may be suspended. The terminals are also arranged for connexion to the wiring of the installation.

ceiling switch (*Elec. Eng*). A switch located in the ceiling but operated by a pull on a cord reaching down into the room. Also called a PULL SWITCH.

ceiling voltage (*Elec. Eng.*). A term used to denote the maximum voltage which a machine is capable of giving.

celadon (*Pot.*). (1) A sea-green colour. *Celadon fleuré* has raised decoration of this colour.—(2) Porcelain of pale or greyish-green colour.

Celastoid (*Plastics*). A proprietary thermoplastic made from cellulose acetate; sp. gr. 1·29-1·56, moulding temp. 267-305° F., breakdown value in volts per mm. 45,000.

-cele, -sēl (*Med.*). A suffix derived from the Greek *kēlē*, tumour, hernia.

celestial equator (*Astron.*). The great circle in which the plane of the earth's equator cuts the celestial sphere; the primary circle to which the co-ordinates right ascension and declination are referred.

celestial mechanics (*Astron.*). See **gravitational astronomy.**

celestial poles (*Astron.*). The two points in which the earth's axis, produced indefinitely, cuts the celestial sphere.

celestial sphere (*Astron.*). An imaginary sphere, of indeterminate radius, of which the observer is the centre. On the surface all stars, independently of their real distance, are points specified by two co-ordinates, referred to some chosen great circle of the sphere.

cel'estine (*Min.*). Strontium sulphate, crystallising in the orthorhombic system; occurs in association with rock-salt and gypsum; also in the sulphur deposits of Sicily, and in nodules in limestone The main supply for the world's markets is from residual clays.

cell (*Biol.*). One of the specialised units, consisting of nucleus and protoplasm, which compose the bodies of plants and animals; in the former usually surrounded by a non-living wall: in plants, the term is also used to denote the space occupied by the protoplasm with the wall around it

cell (*Bot.*) (1) The cavity containing pollen in an anther lobe.—(2) One chamber in an ovary.

cell (*Zool.*). One of the spaces into which the wing of an Insect is divided by the veins.

cell cavity (*Bot.*). See **lumen.**

cell division (*Cyt.*). The splitting of a cell into daughter cells. See **amitosis, meiosis, mitosis.**

cell inclusion (*Cyt.*). Any non-living material present in the cytoplasm, whether organic or inorganic.

cell lineage (*Zool*). The detailed sequence of events during the cleavage of the ovum, and the history and fate of each of the blastomeres.

cell organ (*Cyt.*). A specialised protoplasmic part of a cell having a particular function, as the Golgi apparatus.

cell plate (*Bot.*). A delicate membrane formed across the equator of the achromatic spindle as cell division proceeds; it provides the foundation of the wall which separates the daughter cells resulting from the division.

cell sap (*Cyt.*). The fluid constituents of a cell.

cell tissue (*Bot.*). A group of cells formed by division of one or a few original cells, remaining associated and functioning as a whole.

cell wall (*Cyt.*). The membrane or other autogenous structure confining the contents of a cell.

cell (*Elec.*). The unit of a battery, in which chemical action takes place between two electrodes, an anode and a cathode, both separately in contact with an electrolyte, with a resulting establishment of a potential difference between the electrodes. The electrodes are of different metals or of carbon. Sometimes there are two electrolytes, differing either in composition or concentration, and separated by a semipermeable membrane.

See **Bunsen—**
cadmium—
Clark—
Codd—
Daniell—
dry—
electrolytic—
Fuller—
galvanic—
Grove—
Grove's gas—
Lalande—
Leclanché—
primary—
secondary—
standard—
storage—
Weston—

cell amplification (*Photo-electronics*). The increase in sensitivity in a gas-filled photo-electric cell, as compared with the corresponding high-vacuum cell, due to ionisation of the gas caused by the primary photo-electrons. Also called GAS AMPLIFICATION.

cell inspection lamp (*Elec. Eng.*). An electric filament lamp provided with narrow bulb so that it can be used for the examination of an accumulator by insertion between the plates.

cell, photo-electric. See **photo-electric cell, Photox cell.**

cell tester (*Elec. Eng.*). A portable voltmeter for checking voltage of accumulator cells.

cell, unit (*Chem.*). See **unit cell.**

cellase (*Chem.*). An enzyme, found in apricot kernels, which hydrolyses *cellobiose* (q.v.).

cellobi'ose or **cellose** (*Chem*). $C_{12}H_{22}O_{11}$, a disaccharose; obtained by the incomplete hydrolysis of cellulose.

Cel'lomold (*Plastics*). A proprietary cellulose-acetate plastic powder widely used for injection moulding.

Cel'lophane. Trade-name for transparent sheets of wrapping material made of *viscose* (q.v.).

cellose (*Chem.*). See **cellobiose.**

Cel'losolve (*Plastics*). Hydroxy-ether, glycol monoethyl ether, $C_2H_5O\,CH_2{\cdot}CH_2OH$, a colourless liquid used as a solvent in the plastics industry. It is miscible with water, alcohol, and ether, and boils at 135 3° C.

cel'lular. *Adj.* from *cell.*

cellular (*Textiles*). The name applied to an open texture obtained by the use of a gauze weave; used mainly as a shirting material.

cellular concrete (*Build.*). Concrete in the body of which bubbles of air are induced, either by chemical or by mechanical means, in the process of manufacture, thereby producing a concrete of low unit weight.

cellular horn (*Acous*). A horn for a high-frequency loudspeaker (tweeter), in which the path from the throat to the outer air is by a number of expanding channels of equal length, so that marked directivity, arising from the short wavelengths in relation to the width of the total opening, is not apparent.

cellular spore (*Bot.*). A multicellular body which is set free like a spore, and in which each cell is able to germinate separately by means of a germ tube and to give a new plant.

cellular structure (*Met.*). See **network structure.**

cellular tissue (*Bot*). A tissue composed of cells.

cellular-type switchboard (*Elec. Eng.*). A switchboard in which each switch with its associated apparatus is contained in a separate cell of fireproof material. Also called a CUBICLE-TYPE SWITCHBOARD.

cel'lulase (*Bot.*). See **cytase.**

cellulation (*Zool.*). The reformation of cells in injured tissue.

cel'lulin (*Bot.*). A refractive substance, probably resembling cellulose in composition, present in the hyphae of some aquatic fungi.

cel'lulith. A substitute for ebonite, produced by drying wood pulp which has been ground to a homogeneous mass.

celluli'tis (*Med.*). A spreading infection of the subcutaneous tissues with pyogenic bacteria.—For *pelvic cellulitis* see **parametritis.**

cel'luloid (*Plastics*). A well-known thermoplastic made from nitro-cellulose, camphor, and alcohol; sp. gr. 1·35-1·85, moulding temp. 85-120° F., breakdown value in volts per mm. 20,000-45,000. It is elastic and very strong, and can be produced in very thin sheets. Its uses are very numerous.

celluloid film (*Photog.*). The normal flexible photographic film, consisting of an emulsion coated on nitrate or cellulose *base* (q.v.).

cel'lulose (*Chem.*). $(C_6H_{10}O_5)_x$, the most complicated polyose, forming the walls of the cells in all plants. The chief source of cellulose is wood, cotton, and other fibrous materials (e.g. flax, hemp, nettle, etc.). Pure cellulose is obtained by removing all incrustations of lignin resins and other organic and inorganic matter by treatment with alkali, acids, sodium sulphite, etc. Cellulose is soluble in cuprammonium hydroxide (*Schweitzer's reagent*, q.v.), ammoniacal copper carbonate, a solution of zinc oxide in conc. hydrochloric acid. It is the raw material for the manufacture of paper, artificial silk, cellulose lacquers, films. Cellulose can undergo many chemical transformations; e.g., strong acids transform it into *amyloid* (q.v.); it can be hydrolysed and oxidised (cellulose hydrates, hydrocelluloses, oxycelluloses) and esterified (*cellulose acetate*, q.v.; *cellulose nitrate*, q.v.; benzyl-cellulose; *cellulose xanthate*, q.v.).

cellulose acetates (*Chem.*). Acetylcelluloses. These are acetic acid esters of cellulose, obtained by the action of glacial acetic acid, acetic anhydride, and sulphuric acid, upon cellulose. They are considerably less inflammable than cellulose nitrates, and are an important raw material for films, windscreens, gas-mask windows, artificial silk, lacquers, etc.

cellulose esters (*Chem.*). Cellulose derivatives obtained by esterification with nitric acid, acetic acid, etc.

cellulose hydrates (*Chem.*). Cellulose products closely resembling cellulose, extremely hygroscopic, but without reducing properties, obtained by the action of cold concentrated caustic soda on cellulose, e.g. cotton. The latter process, starting with cotton, is used for producing 'mercerised cotton.'

cellulose lacquers (*Chem.*). Lacquers prepared by dissolving nitro-cellulose or acetylcellulose in a mixture of suitable solvents, with the admixture of resins and plasticisers and, if required, of pigments or dyestuffs.

cellulose nitrates (*Chem.*). See **nitro-celluloses.**

cellulose trabecula (*Bot*). A strand of cellulose crossing the lumen of a cell.

cellulose xanthate (*Chem.*). $[C_6H_8O_3(ONa){\cdot}OCS_2Na]_n$, an acid salt of cellulose-dithiocarbonic acid, obtained by treating cellulose with concentrated caustic soda, with subsequent dissolution in carbon disulphide. The resulting product is called *viscose.*

Celotex (*Acous*). Artificial building-board used for acoustic absorption control; made from sugar-cane fibre (bagasse), compressed and baked.

Celsius scale (*Heat*). A synonym for *Centigrade scale.* The original Celsius scale of 1742 was marked zero at the boiling-point of water and 100 at the freezing-point, the scale being inverted by Christin in 1743.

Celtic twills (*Woollen*). A mat or hopsack weave with a twilled appearance. Also known as TWILLED MATS.

Celtic weave (*Textiles*). See **hopsack weave.**

cement (*Build., Civ. Eng., etc.*). A material for uniting other materials or articles. It is generally plastic at the time of application, but hardens when in place.

cement (*Zool*) In Mammalian teeth, a layer of lamellated bone covering the dentine beyond the enamel.

cement clay (*Geol.*). A clay rock containing a varying quantity of calcium carbonate, hence used for the manufacture of cement.

cement copper (*Met.*). Impure copper, obtained when the metal is precipitated by means of iron from solutions resulting from leaching.

cement fillet (*Build.*). A substitute for metal flashings in the angles between, say, a chimney stack and roof, weatherproofing being provided by running in a band of cement mortar. Also called a WEATHER FILLET.

cement grout (*Civ. Eng.*). A fluid cement mixture for filling crevices.

cement gun (*Civ. Eng.*). An apparatus for spraying fine concrete or cement mortar by pneumatic pressure.

cement joggle (*Build.*). A key formed between adjacent stones in parapets, etc. by running cement mortar into a square-section channel cut equally into each of the jointing faces, thereby preventing relative movement.

cement mortar (*Build., Civ. Eng*). A hydraulic mortar composed of Portland cement (or other siliceous cement) and sand.

Cementstone Group (*Geol.*). The lowest division of the Calciferous Sandstone Series of Scotland, comprising shales and sandstone, as well as compact earthy limestones (cementstones).

cementation. The setting of a plastic.

cementation (*Bot.*). The union of fungal hyphae by means of a sticky excretion.

cementation (*Civ. Eng.*). See **grouting.**

cementation (*Met.*). Usually, the process of raising the carbon content of steel by heating in a carbonaceous medium. (Also called CASE-HARDENING, CARBURISATION, CARBONISATION.) Generally, any process in which the surface of a metal is impregnated by another substance.

cemented (or **sintered**) **carbides** (*Met.*). Powdered carbides of tungsten, tantalum, or titanium cemented into solid masses by mixing with powdered cobalt or nickel, then compressing and sintering. Used instead of high-speed steel to form cutting tip of cutting-tools, and in parts subjected to heavy wear. See **sintered carbides*.**

cementing materials in rocks (*Geol*). The materials which bind any loose sediment into a coherent rock. The commonest cements are, respectively, ferruginous, calcareous, and siliceous.

cementite (*Met.*). The iron carbide (Fe_3C) constituent of steel and cast-iron (particularly white cast-iron). Very hard and brittle.

cen'chri (*Zool.*). Two pale-coloured membranous areas of unknown function, situated on the mesothorax of Saw-Flies (*Tenthredinidae*).

censer mechanism (*Bot*). A means of seed liberation in which the seeds are shaken out of the fruits as the stem of the plant sways in the wind.

censor, censorship (*Psycho-an.*). A powerful unconscious inhibitive mechanism in the mind, which prevents anything painful to the conscious aims of the individual from emerging into consciousness. It is responsible for the distortion, displacement, and condensation present in dreams. See also **superego.**

cent (*Acous.*). A unit of pitch or frequency difference for musical purposes; equal to one-hundredth of a semi-tone.

center, centering. Variants of **centre, centring**; used chiefly in America.

Centigrade scale (*Heat*). The most widely used method of graduating a thermometer. The fundamental interval of temperature between the freezing and boiling points of water is divided into 100 equal parts, each of which is a *Centigrade degree*, and the freezing point is made the zero of the scale. To convert a temperature on this scale to the Fahrenheit scale, multiply by $\frac{9}{5}$ and add 32. See also **Celsius scale.**

Centigrade heat unit (*Eng.*). The same as *pound-calorie* (q.v.).

centimetre candle (*Light*). See **phot.**

centimetre-gramme-second unit (*Elec. Eng., etc.*). See **c.g.s. unit.**

centimetre waves (*Radio*). Electromagnetic waves whose wavelength in free space is between 1 centimetre and 1 metre. Also called MICRO-WAVES.

cen'tonate (*Bot.*). Looking like patchwork, because of the presence of blotches of diverse colours.

central battery (*Elec. Comm.*). One large battery provided for power supply for telephone and telegraph circuits, instead of one small supply (e.g. wet batteries on subscribers' premises) for each circuit.

central battery signalling (*Teleph.*). The use of a large battery at the telephone exchange for signalling to the exchange, with a local battery for the subscriber's transmitter.

central body (*Bot.*). See **coenocentrum.**

central body (*Zool.*). In Insects, the median commissure connecting the protocerebral lobes of the brain.

central capsule (*Zool.*). In *Radiolaria*, a pseudochitinous structure of varying shape, enclosing the nucleus and some cytoplasm with oil bubbles.

central cell (*Bot.*). The cell at the base of the archegonium in the *Gymnospermae*, containing the egg and the ventral canal cell.

central cylinder (*Bot.*). See **stele.**

central heating (*Build.*). A system of heating a building, in which water is heated by a boiler in a central position, and hot water or steam is circulated throughout the building through pipes and radiators.

central nervous system (*Zool.*). The main ganglia of the nervous system with their associated nerve cords, consisting usually of a brain or cerebral ganglia and a dorsal or ventral nerve cord which may be double, together with associated ganglia.

central office (*Teleph.*). See **local exchange.**

central'e (*Zool.*). A centrally situated bone of the basipodium.—*pl.* **centra'lia.**

centre (*Civ. Eng.*). A timber frame built as a temporary support during the construction of an arch or dome.

centre (*Surv.*). To set up a surveying instrument vertically above a station point.

centre arbor (*Horol*). The arbor in the train of a watch or clock which is planted in the centre of the plates. Usually, this arbor makes one turn per hour.

centre-bit (*Tools*). A wood-boring tool having a projecting central point and two side wings, one of which scribes the boundary of the hole to be cut, while the other removes the material.

centre-contact cap (*Elec. Eng.*). A bayonet cap, fitted to an electric lamp, in which the outer wall forms one of the contacts, the other being a central projection.

centre-contact holder (*Elec. Eng.*). A lamp holder, with a centre spring contact, designed for receiving lamps with centre-contact caps.

centre drill (*Eng*). A small drill used for drilling the holes in the end of a bar to be mounted between centres in a machine tool; shaped so as to produce a countersunk hole.

centre flower (*Plast.*). A central ceiling ornament formed in plaster or cast metal. Also called CENTRE PIECE.

centre keelson (*Ship Constr.*). See under **keelson.**

centre nailing (*Build.*). A method of nailing slates on a roof; the nail is driven in any one slate just above the line of the head of the slate in the course below. Cf. *head nailing.*

centre of a lens (*Light*). A point on the principal axis of a lens, through which passes any ray whose incident and emergent directions are parallel.

centre of action (*Meteor.*). A position occupied, more or less permanently, by an anticyclone or a depression, which largely determines the weather conditions over a wide area. The climate of Europe is dependent on the Siberian anticyclone and the Icelandic depression.

centre of buoyancy (*Hyd.*). The centre of gravity of the liquid displaced by a floating body. In Ship Construction there are two centres of buoyancy: the *transverse centre of buoyancy*, which, in a vessel of two symmetrical halves, is on the centre line of the vessel, and the *longitudinal centre of buoyancy.*

centre of curvature. The point of intersection of normals drawn to a curve at two consecutive points. For a spherical surface, such as is encountered in mirrors and lenses in optics, the centre of curvature is the centre of the sphere of which the surface is a part.

centre of flotation (*Hyd.*). The centroid of the water plane area of a floating body.

centre of gravity (*Mech.*). That point in a body at which its weight may be taken to act, and at which the body may be supported in neutral equilibrium.

centre of mass (*Mech.*). The point in a body through which acts the resultant resisting force due to the body's inertia when it is accelerated. Coincident with the *centre of gravity.*

centre of oscillation (*Phys.*). A point in a compound pendulum which, when the pendulum is at rest, is vertically below the point of suspension at a distance equal to the length of the equivalent simple pendulum (that is, the simple pendulum having the same period). If the pendulum is suspended at the centre of oscillation, its period is the same as before.

centre of pressure (*Aero.*). The point at which the resultant of the aerodynamic forces (lift and drag) intersects the chord line of the aerofoil. Its distance behind the leading edge is usually given as a fraction of the chord length.

centre of pressure (*Hyd., Phys*). That point in a surface immersed in a fluid at which the resultant pressure over the immersed area may be taken to act.

centre of symmetry (*Crystal.*). A point within a crystal such that all straight lines that can be drawn through it pass through a pair of similar points, lying on opposite sides of the centre of symmetry and at the same distance from it. Thus, faces and edges of the crystal occur in parallel pairs, on opposite sides of a centre of symmetry.

centre piece (*Plast.*). See **centre flower.**

centre pinion (*Horol.*). The first pinion in a watch or clock train, driven by the great wheel.

centre-point steering (*Automobiles*). The relative positioning of the steered wheels and the swivel pins so as to obtain coincidence between the point of intersection of the swivel pin axis with the road and the plane of the wheel.

centre-pole suspension (*Elec. Eng.*). That method of supporting the overhead contact wire of a tramway system in which the supporting poles are placed between the two tracks.

centre pop (*Furn.*). A device used in dowelling work.

centre punch (*Eng.*). A punch with a conical point, used to mark or 'dot' the centres of holes to be drilled, etc.

centre-slot system (*Elec. Eng.*). A name sometimes given to the conduit system of electric traction, in which the slot of the conduit is placed centrally between the running rails.

centre spread (*Typog.*). A design occupying the area of two pages in the centre opening of a booklet or journal.

centre square (*Eng.*). A device for marking the centres of circular objects and bars. The bar is placed in the angle of the square, which is bisected by a blade that serves as a guide for scribing a diametral line.

centre stitching (*Woollen*). A method of stitching used in attaching the face and backing textures in double-cloth, when these are of different material or colour.

centre wheel (*Horol.*). The wheel mounted on the arbor of the centre pinion. It usually makes one turn per hour, so that any calculations relating to the train or number of vibrations made by the balance are taken from this wheel.

centre-zero instrument (*Elec. Eng.*). An indicating instrument which has the zero at the centre of the scale and can therefore read both positive and negative values of the quantity indicated.

centreless grinding (*Eng.*). A method of grinding cylindrical objects. The work is supported on a rest, between a pair of abrasive wheels revolving at different speeds in opposite directions, instead of between centres as in normal practice.

centric diatom (*Bot.*). A diatom in which the valves are built on a radial plan; these diatoms are mostly marine.

centric oosphere (*Bot.*). A fungal oösphere in which one or two layers of small globules of oil completely surround the central protoplasm.

centrif'ugal (*Zool.*). See **efferent.**

centrifugal brake (*Eng*). An automatic brake used on cranes, etc., in which excessive speed of the rope drum is checked by revolving brake shoes which are forced outwards into contact with a fixed brake drum by centrifugal force.

centrifugal casting (*Foundry*). The casting of large pipes, cylinder liners, etc., in a rotating mould of sand-lined or water-cooled steel. The metal is introduced by a long spout, the mould being traversed longitudinally, often by a hydraulic cylinder, during pouring. It results in dense, sound castings.

centrifugal clutch (*Eng.*). A type of clutch in which the friction surfaces are engaged automatically at a definite speed of the driving member, and thereafter maintained in contact, by the centrifugal force exerted by weighted levers.

centrifugal compressor (*Eng*). A form of pump for compressing gases; it imparts pressure energy through the agency of centrifugal force, in the same way as a *centrifugal pump* (q.v.).

centrifugal fan (*Eng.*). A fan with an impeller of paddle-wheel form, in which the air enters axially at the centre and is discharged radially by centrifugal force. Also called PADDLE-WHEEL FAN.

centrifugal force, centrip'etal force (*Mech.*). A body constrained to move along a curved path reacts against the constraint with a force directed away from the centre of curvature of its path. This force is called the *centrifugal force.* It is equal and opposite to the force directed towards the centre of curvature which is deviating the body from a straight path. This is the *centripetal force.* They are both equal to the product of the mass of the body and its *centripetal acceleration* (q.v).

centrifugal inflorescence (*Bot.*). See **cyme.**

centrifugal pump. A pump for increasing the pressure of a liquid through the agency of centrifugal force. The liquid is drawn into the centre of a rotating impeller, through which it flows radially under centrifugal force. Its kinetic energy is then converted into pressure energy in the casing or diffuser.

centrifugal starter (*Elec. Eng.*). A device used with small induction motors; it consists of a centrifugally operated switch on the rotor, which automatically cuts out starting-resistance or performs some other operation as the motor runs up to speed.

centrifugal tension (*Eng.*). The force per unit area of cross-section induced, in consequence of centrifugal force, in the material of a rotating rim, loop, or driving belt.

centrifugal thickening (*Bot.*). The deposition of layers of wall material on the outside of a cell wall, a process possible only when the cell lies free from its neighbours; the sculpturing on walls of pollen grains is formed by centrifugal thickening.

centrifugal xylem (*Bot.*). Xylem in which differentiation proceeds in succession towards the periphery of the stem or root.

cen'trifuge. Apparatus rotating at very high speed, designed to separate solids from liquids, or liquids from other liquids dispersed therein. It is essential that there should be a difference in the specific gravity of the substances to be separated. Examples of industrial uses: cream from milk, clarifying of lacquers.

centring or **centering** (*Civ. Eng.*). The general term applied to centres used in constructional work.

centring or **centering** (*Eng.*). (1) The marking of the centres of holes to be drilled in a piece of metal.—(2) The adjusting of work in a lathe so that its axis coincides with the lathe axis.

cen'triole (*Cyt.*). A central granule within the centrosome.

centrip'etal (*Zool.*). See **afferent.**

centripetal acceleration (*Mech.*). The acceleration, directed towards the centre of curvature of the path, which is possessed by a body moving along a curved path with constant speed. Its value is v^2/R, where v is the speed and R the radius of curvature.

centripetal force (*Mech.*). See under **centrifugal force.**

centripetal inflorescence (*Bot.*). See **raceme.**

centripetal thickening (*Bot.*). The deposition of layers of wall material on the inner side of the wall of a cell—the common process in a developing cell.

centripetal xylem (*Bot*). Xylem in which differentiation proceeds in succession towards the centre of the axis.

centrocli'nal dip (*Geol.*). A structure in which the rocks dip from all sides towards a central point, giving a basin-like arrangement.

centrodes'mose (*Cyt.*). A delicate thread of stainable material connecting the centrosomes at the time of nuclear division.

centrodes'mus (*Cyt.*). See **attraction spindle.**

centrodor'sal (*Zool.*). In stalkless *Crinoidea*, an ossicle situated in the middle of the aboral side and representing the stump of the stalk.

centrolecithal, —les'i-thal (*Zool.*). Having the yolk in the centre.

centron (*Zool.*). See **neuron.**

cen'troplasm (*Bot*). A mass of plasm of obscure nature lying in the centre of a cell of one of the *Myxophyceae.*

cen'trosome (*Cyt.*). A minute protoplasmic cell-inclusion associated with the nucleus and dividing with it. Centrosomes are of widespread occurrence in the cells of animals, but they appear to be confined to the *Thallophyta* among plants.

cen'trosphere (*Zool.*). See **attraction sphere.**

centrothe'ca (*Zool.*). See **idiozome.**

centrum (*Bot.*). A group of asci and nutritive cells associated with them, occurring in the perithecia of some *Pyrenomycetes.*

centrum (*Zool.*). The basal portion of a vertebra which partially or entirely replaces the notochord, and from which arise the neural and haemal arches, transverse processes, etc.

cepa'ceous (*Bot.*). Smelling or tasting like onion or garlic.

cephaeline, sef-ā'el-ēn (*Chem.*). $C_{28}H_{38}O_4N_2$, an alkaloid of unknown constitution, occurring in the roots of the Ipecacuanha species; colourless needles, m.p. 115°-116° C., soluble in alcohol or chloroform, insoluble in water. It resembles emetine in its physiological action, but it is more toxic.

cephal-, cephalo- (Greek *kephalē*, head). A prefix used in the construction of compound terms; e.g. *cephalothorax* (q.v.).

ceph'alad (*Zool.*). Situated near, facing towards, or passing to, the head region.

cephal'ic (*Zool.*). Pertaining to, or situated on or in, the head region.

ceph'alin (*Chem.*). A phosphatide found in the brain substance, miscible with water, from which it can be precipitated by acetone. Its constitution is still uncertain. On hydrolysis it yields glycerine, fatty acids, phosphoric acid, aminoethyl alcohol, and a nitrogenous base.

cephalisation (*Zool.*). The specialisation of the anterior end of a bilaterally symmetrical animal as the site of the mouth, the principal sense-organs, and the principal ganglia of the central nervous system: the formation of a head.

cephalobra'chial (*Cyt.*). Said of a chromosome which bears a small, rounded extension at one end.

ceph'alocele (*Med.*). Protrusion of the membranes of the brain, with or without the substance of the brain, through a hole in the skull.

Cephalochor'da (*Zool.*). A subphylum of *Chordata* having a persistent notochord, metameric muscles and gonads, a pharynx having a very large number of gill-slits and surrounded by an atrial cavity, and lacking paired fins, jaws, brain, and skeletal structures of bone or cartilage; there is an asymmetrical larval stage; marine sand-living forms. Lancelets.

cephalo'dium (*Bot.*). (1) An irregular outgrowth from the thallus of a lichen, usually containing blue-green algae.—(2) A group of algal cells different from those characteristic of the lichen, and lying as an intrusion within the thallus.

Cephalop'oda (*Zool*). A class of bilaterally symmetrical marine *Mollusca* in which the anterior part of the foot is modified into arms or tentacles, while the posterior part forms a funnel leading out from the mantle-cavity, the mantle is undivided, and the shell is a single internal plate, or an external spiral structure, or absent. Squids, Octopods, and Pearly Nautilus.

cephalotho'rax (*Zool.*). In some *Arthropoda*, a region of the body formed by the fusion of the head and the thorax.

Cepheid parallax, sef'ē-id (*Astron.*). See **period luminosity curve.**

Cepheid variables (*Astron.*). A class of variable star of short period, whose light curve is of a certain well-defined form, and of which the star δ Cephei is the prototype.

cera-, cerat-, cerato-. See **kera-, kerat-, kerato-.**

cera'ceous (*Bot*). Resembling crude beeswax in appearance or in colour.

ceram'ic insulator (*Elec. Eng.*). An insulator made of a ceramic material; e.g. porcelain. Such insulators are generally used for outdoor installations.

ceramics (*Pot.*). Fictile art, relating to the manufacture of any type of pottery or porcelain.

cer'anoid (*Bot.*). Bearing branches shaped like horns.

cerar'gyrite (*Min.*). Silver chloride, crystallising in the cubic system. It is usually the product of secondary action, and occurs commonly in massive or wax-like forms, associated with native silver or silver ores. Also CHLORARGYRITE, HORNSILVER.

cera'ta (*Zool.*). In nudibranch *Gastropoda*, respiratory papillae of the mantle.

ce'rate paste (*Photog.*). See **encaustic paste.**

ceratobran'chial (*Zool.*). An element of a branchial arch lying between the epibranchial and the hypobranchial.

ceratohy'al (*Zool.*). An element of the hyoid arch corresponding to the ceratobranchials of the branchial arches.

ceratotrich'ia (*Zool.*). Unjointed fibrous dermotrichia of horny consistency, occurring in Fish with a cartilaginous skeleton. Cf. *lepidotrichia.*

cer'cal (*Zool.*). Pertaining to the tail.

cerca'ria (*Zool.*). The final larval stage of *Trematoda* which develops directly into the adult; usually characterised by the possession of a round or oval body, bearing eye-spots and a sucker, and a propelling tail.

cercariaeum, —kăr′i-ē-um (*Zool.*). A cercaria in which the tail is lacking.

cercus (*Zool.*). In some *Arthropoda,* a multiarticulate appendage at the end of the abdomen.

cere, sĕr (*Zool.*). In Birds, the soft skin covering the base of the upper beak.—*adj.* **cerous.**

cerebel′lum (*Zool.*). A dorsal thickening of the hind-brain in Vertebrates.—*adj.* **cerebellar.**

cerebr-, cerebro- (Latin *cerebrum,* brain). A prefix used in the construction of compound terms; e.g. *cerebrospinal,* pertaining to the brain and spinal cord.

cere′bral (*Zool.*). Pertaining to the brain; pertaining to the *cerebrum.*

cerebral hemispheres (*Zool.*). See **cerebrum.**

cereb′riform (*Bot.*). Shaped somewhat like a brain.

cere′brogan′glion (*Zool.*). The 'brain' or supraoesophageal ganglia of metameric Invertebrates.

cer′ebrosides (*Chem.*). A group of substances, found in nervous tissue, which contain no phosphoric acid, but which on hydrolysis yield (among other substances) galactose. The two most important cerebrosides are *phrenosin* and *kerasin.*

cerebrospi′nal (*Zool.*). Pertaining to the brain and the spinal cord.

cerebrospinal fluid (*Physiol.*). The clear colourless fluid which bathes the surfaces of the brain and spinal cord. It is of alkaline reaction, sp. gr. about 1·006-1·008, and contains a small amount of dextrose, albumins, and inorganic salts, as well as traces of globulin.

cere′brum (*Zool.*). A pair of hollow vesicles forming part of the forebrain in Vertebrates.

cer′esine wax (*Diel., etc.*). Bleached or refined *ozokerite* (q.v.), obtained by heating the latter with charcoal and concentrated sulphuric acid. Used in cable compounds, joint boxes, and impregnating windings; also used, in gramophone-disc manufacture, in the composition of waxes on which the original recordings are made.

cerif′erous (*Bot., Zool.*). Wax-bearing, wax-producing.

ce′rin (*Bot.*). A substance occurring in bottle cork in the form of needle-shaped crystals.

ce′rium (*Met.*). A steel-grey metallic element, one of the 'rare earth' metals. Chem. symbol Ce, at. wt. 140·13, at. no. 58, sp. gr. at 20° C. 6·9, m.p. 635° C., specific electrical resistivity 78 microhms per cm. cub. An alloy with iron and several rare elements is used as the sparking component in automatic lighters and other ignition devices. It is also a constituent (0·15%) in the aluminium base alloy ceralumin. Compounds of cerium, particularly the oxide and fluoride, are being applied with success to increasing the luminosity of high current-density arc carbons.

cerium dioxide (*Chem.*). CeO_2. See **cerium.**

cerium fluoride (*Chem.*). See **cerium.**

cer′nuous (*Bot.*). Drooping, nodding.

cero′ma (*Zool.*). A synonym for *cere.*

ce′rous (*Zool.*). See **cere.**

certation (*Bot.*). Difference in rate of growth of pollen grains which differ in genetic constitution, resulting in competition when pollen of more than one type is placed at the same time on the same stigma.

ceru′men (*Zool.*). A dark-coloured substance formed by certain Bees (*Melipona, Trigona*), composed of wax mixed with resin or earth: in Mammals, a waxy substance secreted by the ceruminous glands.

ceru′minous glands (*Zool.*). Modified sweat glands occurring in the external auditory meatus of Mammals and producing a waxy secretion.

ce′russite (*Min.*). Lead carbonate, crystallising in the orthorhombic system; it occurs in association with other lead ores.

cervicec′tomy (*Surg.*). Surgical removal of the cervix uteri.

cervici′tis (*Med.*). Inflammation of the cervix uteri.

cer′vicum (*Zool.*). In Insects, the neck or flexible intersegmental region between the head and the pro-thorax: in higher Vertebrates, the neck or narrow flexible region between the head and the trunk.—*adj.* **cer′vical** (*or* ser-vī′kal). Pertaining to the neck or to the cervix uteri.

cervine (*Bot.*). Dark-tawny.

cer′vix u′teri (*Med.*). The neck of the uterus, situated partly above and partly in the vagina.

Cesa′rean section (*Obstet.*). See **Caesarean section.**

cesium (*Chem.*). See **caesium.**

cesspipe (*San. Eng.*). A discharge pipe for waste water, particularly from a cesspool.

cesspit (*Sewage*). See **cesspool.**

cesspool (*Plumb.*). A small square wooden box, lined with lead, which serves as a cistern in a parapet gutter at a point where roof water is discharged into a down pipe.

cesspool (*Sewage*). A brick-lined underground pit for the reception of sewage from houses not otherwise served in respect of means of sewage disposal. Also called a CESSPIT.

Cesto′da (*Zool.*). A class of *Platyhelminthes,* all the members of which are endoparasites; there is a tough cuticle; the alimentary canal is lacking; hooks and suckers for attachment occur at what is considered to be the anterior extremity; eye-spots never occur. Tape Worms.

Cestoidea, ses-to-id′e-a (*Zool.*). An order of *Tentaculata,* comprising a number of ribbon-like forms which have the body compressed in the stomodaeal plane, and in which tentacles are replaced by tentacular filaments. Venus' Girdles.

Ceta′cea (*Zool.*). An order of large aquatic carnivorous Mammals; the fore-limbs are fin-like, the hind-limbs lacking; there is a horizontally flattened tail-fin; the skin is thick with little hair, there are two inguinal mammae flanking the vulva, and the neck is very short. Whales, Dolphins, and Porpoises.

ce′tolith (*Ocean.*). A stony body, sometimes obtained during dredging in deep water, representing the fused otic bones of whales.

cet′yl alcohol (*Chem.*). *n*-Hexadecyl alcohol. The palmitic ester is the chief constituent of *spermaceti* (q.v.).

cev′adine (*Chem.*). $C_{32}H_{49}O_9N$, an alkaloid of unknown constitution, isolated from sabadilla seeds. It crystallises in rhombic prisms with two molecules of alcohol, which it loses at 130°-140° C.; m.p. (anhydrous) 205° C.

Ceylonese chrysolite (*Min.*). See **chrysolite.**

Ceylonese peridot (*Min.*). The trade name for a yellowish-green variety of the mineral tourmaline, approaching olivine in colour; used as a semi-precious gemstone.

Ceylonese ruby (*Min.*). True ruby does occur, rather rarely, in Ceylon, together with much commoner ruby-spinel. Much of the gemstone material sold under this name is spinel.

Ceylonese zircon (*Min.*). True zircon occurs in Ceylon, but frequently this is not differentiated from tourmaline of the same colour. *Ceylonian* (sic) *zircon* is the name given by jewellers to the fire-red, yellow, yellowish green, and grey zircons.

ceylonite (*Min.*). See **pleonaste.**

C.F.R. engine. A specially designed petrol engine, standardised by the Co-operative Fuel Research Committee, in which the knock-proneness or detonating tendency of volatile liquid fuels is determined under controlled conditions and specified as an *octane number*. See **detonation, octane number.**

c.g.s. unit (*Elec. Eng., Phys.*). An abbrev. for *centimetre-gramme-second unit*, a unit in a system based on the centimetre, the gramme, and the second, as *fundamental units* (q.v.). Commonly used in theoretical work in electrical engineering.

chabazite, kab'— (*Min.*). A hydrated silicate of aluminium, calcium, and potassium, crystallising in the trigonal system (rhombohedral habit) and belonging to the zeolite group.

chaeta, kē'ta (*Zool.*). In Invertebrates, a chitinous bristle, embedded in and secreted by an ectodermal pit.

chaeta sac (*Zool.*). The ectodermal pit which secretes a chaeta.

chaetif'erous, chaetoph'orous (*Zool.*). Bearing bristles.

Chaetog'natha (*Zool.*). A phylum of hermaphrodite *Coelomata*, having the body divided into three distinct regions—head, trunk, and tail; the head bears two groups of sickle-shaped setae; small, almost transparent forms, of carnivorous habit, occurring in the surface waters of the sea. Arrow Worms.

chaetoplank'ton (*Bot.*). Small aquatic organisms in which the power of floating is increased by the augmented surface provided by spinous outgrowths from the cells.

Chaetop'oda (*Zool.*). A group of *Annelida*, the members of which are distinguished by the possession of conspicuous setae; it includes the *Polychaeta* (q.v.) and the *Oligochaeta* (q.v.).

chae'totaxy (*Zool.*). The arrangement of bristles or chaetae.

chaffy (*Bot.*). Covered with tiny, membranous, non-green scales.

Cha'gas' disease (*Med.*). See **schizotrypanosomiasis.**

chain (*Chem.*). A series of atoms linked together, generally in an organic molecule. Chains may consist of one kind of atoms only (e.g. carbon chains), or of several kinds of atoms (e.g. carbon-nitrogen chains). There are open-chain and closed-chain compounds (ring or cyclic compounds).

chain (*Elec. Comm.*). See **electrical chain.**

chain (*Eng.*). A series of interconnected metal links forming a flexible cable, used for sustaining a tensile load. See **driving chain, roller chain, cable.**

chain (*Surv., etc.*). An instrument used for the measurement of length. It consists of 100 pieces of straight iron or steel wire, looped together end-to-end, and fitted with brass swivel handles at both ends, the overall length being one chain. See **Gunter's chain, engineer's chain, link.**

chain or **chaine** (*Woollen*). A name sometimes applied to warp, more particularly to warp made by hand.

chain barrel (*Eng.*). A cylindrical barrel, sometimes grooved, on which surplus chain is wound, as in certain types of crane.

chain-bond (*Build.*). The bonding together of a stone wall by means of a built-in chain or iron bar.

chain book (*Surv.*). See **field book.**

chain conveyor (*Eng.*). Any type of conveyor in which endless chains are used to support slats, apron, pans, or buckets, as distinct from the use of a simple band. See **apron conveyor, bucket conveyor.**

chain-coupling (*Rail.*). The connecting chain between two coaches, intended to come into use in case of disconnexion of the coupling proper.

chain grate stoker (*Eng.*). A mechanical stoker for boilers, in which the furnace grate consists of an endless chain built up from steel links.

chain harrow (*Agric. Mach.*). An implement resembling a flexible mat, formed by a mesh of strong wrought-iron links; flexible tined harrows are similar to chain harrows, but the ends of the links form straight tines. See **harrow.**

chain hook (*Horol.*). The hook at either end of a *fusee chain* (q.v.), by means of which the chain is hooked to the fusee and to the barrel.

chain insulator (*Elec. Eng.*). See **suspension insulator.**

chain lockers (*Ship Constr.*). The subdivisions within a ship's hull for the housing of the anchor cables. They are usually divided on the centre line to form separate compartments for port and starboard cables. They are fitted with cable clenches to hold fast the ends of the cable so as to prevent running out entirely.

chainman (*Surv.*). A man whose task it is to manipulate the chain in chaining operations.

chain of locks (*Hyd. Eng.*). A system of connected lock chambers, the communicating gates serving in each case as tail gates for the next higher, and as head gates for the next lower, lock-chamber.

chain pump (*Eng.*). A method of raising water through small lifts by means of discs attached to an endless chain which passes upwards through a tube; a chain alone may be used.

chain reaction (*Chem.*). A reaction in which a large number of molecules or atoms take part in succession.

chain riveting (*Eng.*). The arrangement of rivets in a plate joint in parallel rows so that rivets in adjacent rows are in line and not staggered.

chain screen (*Glass*). A screen made up of lengths of chain hanging close together from a bar; used for protection against furnace heat whilst bars and other tools are pushed through and manipulated during working on the inside of a furnace for pot-setting or repairs.

chain survey (*Surv., etc.*). A survey in which lengths only are measured (by means of a chain) and no angular measurements are made.

chain timbers (*Build.*). Strengthening timbers used in building brick walls circular in plan.

chain tongs (*Plumb.*). A pipe-turning appliance consisting of a bar having near one end sharp teeth, which are forced against the pipe by a chain wound round the pipe and secured to the bar.

chain warp (*Cotton Weaving*). A warp which, for convenience, has been converted into a five-strand link by a linking machine.

chain winding (*Elec. Eng.*). A winding used on a.c. machines, in which the coils are interlinked with each other like the links of a chain. Also called a BASKET WINDING.

chaine (*Woollen*). See **chain.**

chaining (*Surv., etc.*). The operation of measuring distances in surface surveys by means of a standard chain 22 yards long.

chair (*Glass*). (1) The 'chair' with long arms on which the glass-maker rolls his blowpipe whilst fashioning the ware.—(2) The set of men who work together in the hand process of fabrication.

chair (*Rail.*). The cast-iron support which is spiked to the sleeper and used to secure a bull-head rail in position.

chair rail (*Carp.*). A wooden rail fastened around the wall of a room at such a height as to afford protection against impact and rubbing from the backs of chairs.

chala'za (*Bot.*). The basal portion of the nucellus of an ovule.

chalaza (*Zool.*). One of two spirally-twisted spindle-like cords of dense albumen which connect the yolk to the shell membrane in a bird's egg.

chala'zogam'y (*Bot.*). The entry of the pollen tube through the chalaza of the ovule.

chalcan'thite (*Min.*). Hydrated copper sulphate, $CuSO_4 \cdot 5H_2O$, crystallising in the triclinic system; it occurs as an alteration product of copper pyrite and other copper ores. See **blue vitriol.**

chalced'ony (*Min.*). A cryptocrystalline variety of silica, possibly to be regarded as a mixture of crystalline and amorphous silica. It occurs filling cavities in lavas, or associated with flint.

chal'cocite (*Min.*). A greyish-black metallic sulphide of copper, Cu_2S, which crystallises in the orthorhombic system; it occurs in veins and beds with other copper ores, but is not very abundant. Also called COPPER GLANCE, REDRUTHITE.

chalcopy'rite or **copper pyrite** (*Min.*). Sulphide of copper and iron, crystallising in the tetragonal system; the commonest ore of copper, occurring in mineral veins. The crystals are brassy yellow, often showing superficial tarnish or iridescence.

chalcostib'ite or **wolfs'bergite** (*Min.*). Sulphide of copper and antimony, occurring in the orthorhombic system.

chalco'trichite (*Min.*). A red, semi-translucent variety of cuprite, characterised by its capillary habit.

chalet, shal'ā (*Build.*) A type of country house, distinguished by having a steeply pitched roof, outside balconies, galleries, and staircase; generally built of wood.

chal'ice (*Zool.*). A flask-shaped gland consisting of a single cell, especially numerous in the epithelia of mucous membranes.

chalk (*Geol.*). A fine-grained and relatively soft foraminiferal limestone of Cretaceous age.

chalk bag (*Furs*). A bag containing chalk, used in pouncing cutting lines.

chalk gland (*Bot.*). A secreting organ, present on some leaves, around which a deposit of calcium carbonate accumulates.

chalk line (*Build., Civ. Eng.*). A length of well-chalked string used to mark straight lines on work by holding it taut in position close to the work and plucking it.

Chalk Marl (*Geol.*). The lowest lithological division of the English Chalk, in which the calcareous matter is mixed with up to 30% of muddy sediment.

chalking (*Dec.*). Disintegration of a painted surface by powdering.

chalon'ic (*Zool.*). Inhibitory, depressor; used especially of certain internal secretions (*chalones*).

chalybeate waters, ka-lib'ē-āt (*Geol.*). Natural waters containing iron salts in solution.

chal'ybite (*Min.*). Iron carbonate, crystallising in the trigonal system (rhombohedral habit). It occurs in an impure form as beds and nodules (clay-ironstone), as well as in crystal aggregates in mineral veins. It is an ore of iron. Also called SIDERITE, SPATHIC IRON.

cham'aephyte (*Bot.*). A plant which, during the period of perennation, has its buds at or just above the surface of the soil.

chamber (*Artillery*). That part of the bore which houses the propellant charge. See **B.L. guns, cartridge.**

chamber (*Chem.*). A very large box-shaped compartment, lined with lead, in which take place the chemical reactions occurring during the manufacture of sulphuric acid.

chamber (*Hyd. Eng.*). The space between the upper and lower gates of a canal lock.

chamber acid (*Chem.*). Sulphuric acid of the concentration and condition in which it leaves the acid chambers.

chamber crystals (*Chem.*). Crystals of nitrososulphuric acid which condense on the walls of the sulphuric acid chamber under certain conditions of manufacture.

chamber process (*Chem.*). A process for the manufacture of sulphuric acid, in which the reactions between the air, sulphur dioxide, and nitric acid gases necessary to produce the sulphuric acid take place in large chambers.

chambered (*Bot.*). Said of an ovary which is not completely divided into separate compartments by the incomplete partitions projecting inwards from the walls.

chambered level tube (*Surv.*). A level tube fitted at one end with an air chamber. By tilting the tube, air may be added to or taken from the bubble, whose length (which tends to be shortened by rise of temperature) may thus be regulated to maintain the sensitivity of the instrument.

chamfer (*Carp., Join., etc.*). The surface produced by bevelling an edge or corner.

chamfer plane (*Carp.*). A plane fitted with adjustable guides to facilitate the cutting of any desired chamfer.

chamois leather, sham'i (*Leather*). The flesh split of a sheepskin, treated with cod liver oil, squeezed, and then washed and lightly bleached; used for cleaning and polishing, and in clothing. Also called WASH LEATHER.

chamosite, sham'— (*Min.*). A silicate of iron occurring in oölitic and other bedded iron ores.

Champlain'ian (*Geol.*). The general name for the strata of Middle Ordovician age in eastern N. America, the type area being Lake Champlain.

champlevé, shahn^{g}-le-vā (*Dec.*). Enamel formed with vitreous powders inlaid in channels cut in the metal base.

Chance glass (*Photog.*). Deep-blue glass for lenses which are required to transmit ultra-violet rays but to cut out other rays.

Chance's Euphon quilt, Chance's glass silk (*Acous.*). See **Euphon quilt.**

chancre, shan'ker (*Med.*). The hard swelling which constitutes the primary lesion in syphilis.

chanc'roid (*Med.*). Non-syphilitic ulceration of the genital organs due to venereally contracted infection.

change-coil instrument (*Elec. Eng.*). A moving-iron electric measuring instrument having two or more replaceable coils to give different ranges.

change face (*Surv.*). To rotate a theodolite telescope about its horizontal axis so as to change from 'face left' to 'face right,' or vice versa. See **transit.**

change of state (*Chem.*). A change from solid to liquid, solid to gas, liquid to gas, or vice versa.

change-over (*Cinema.*). The transference of projection from one machine to another at the end of one reel and the start of the next, without an apparent break in the sequence.

change-over contact (*Teleph.*). The group of contacts in a relay assembly, so arranged that, on operation, a moving contact separates from a back contact, is free during transit, and then makes contact with a front contact. See **make-before-break contact.**

change-over switch (*Elec. Eng.*). A switch for changing a circuit from one system of connexions to another.

change point (*Surv.*). A staff station to which two sights are taken, the first a foresight from one set-up of the level, the second a backsight from the next set-up of the level. Sometimes called a TURNING POINT.

change-pole motor (*Elec. Eng.*). An induction motor with a switch for changing the connexions of the stator winding to give two alternative numbers of poles, so that the motor can run at either of two speeds.

change-speed motor (*Elec. Eng.*). A motor which can be operated at two or more approximately constant speeds; e.g. a change-pole motor.

change wheels (*Eng.*). The gear-wheels through which the lead screw of a screw-cutting lathe is driven from the mandril, the reduction ratio being varied by changing the wheels. See **screw-cutting lathe.**

changing bag (*Photog.*). A light-tight bag to accommodate a camera and sensitive photographic material, so that the former can be loaded or unloaded with the latter in daylight.

changing box (*Photog.*). A camera attachment permitting plates or films to be successively exposed.

channel (*Elec. Comm.*). The electrical transmission circuit which permits the communication of information without interference from other channels, either from those passing in the opposite direction in the same frequency band, or in either direction in other frequency bands.

See **simplex—** **multi—**
duplex— **broadcast—**
single— **forked—**

channel (*Eng.*). A standard form of rolled steel section, consisting of three sides at right-angles, in channel form. See **rolled steel sections.**

channel (*Radio*). The range of frequencies occupied by a modulated transmission. With double sideband amplitude modulation, its width in cycles is twice the value of the highest modulating frequency.

channel gulley (*San. Eng.*). A trapped gulley fitted with a channel, about 18 in. long, through which sink wastes must pass before reaching the gulley proper In the process, grease in the wastes congeals on the sides of the channel and may be removed.

channel, open (*Hyd.*). See **open channel.**

channel pipe (*Build.*). An open drain of half or three-quarter circular section, used in inspection or intercepting chambers.

channelled (*Bot.*). Elongated and hollowed somewhat like a gutter, as many leaf stalks.

chantlate (*Build.*). A projecting strip of wood fixed to the rafters at the eaves and supporting the normal roof covering; it serves to carry the drip clear of the wall.

chapel (*Typog.*). An association of journeymen printers (and, in certain districts, apprentices), who elect a 'father' to watch their interests.

chaplash (*Timber*). A yellow-brown wood which seasons well and is durable. It is suitable for builders' and joiners' work.

chapters (*Horol.*). The Roman figures used on the dials of watches and clocks to mark the hours.

character (*Biol.*). (1) Any well-marked feature which helps to distinguish one species from another.—(2) In genetics, any one readily defined feature which is transmitted from parent to offspring.

character (*Psychol.*). The quality of the whole organised self, consisting of both sentiments and dispositions; concerned mainly with the moral side of man's nature and the more enduring traits of ethical and social significance.

character trait (*Psycho-an.*). A distinguishing behaviour pattern in an individual. Character traits may be classified into four groups: (1) physiological, e.g. cycloid behaviour pattern; (2) simple, e.g. inferiority when treated as inferior; (3) reactive, e.g. superiority as reaction against being treated as inferior; and (4) psychoneurotic, e.g. repressed inferiority coming out under certain conditions, evidenced, for example, by blushing.

characteristic impedance of an antenna (*Radio*). The impedance with which certain forms of antennae (e.g. wave and rhombic antennae) must be terminated to prevent the formation of standing waves.

characteristic impedance of a line (or **filter)** (*Elec. Comm.*). The apparent impedance of an infinitely long line at any point, or of an infinite number of filter sections. The same as the *image impedance*, when the line or filter is also terminated in its image impedance. Also called IMPEDANCE LEVEL. See **surge impedance.**

Charad'riifor'mes (*Zool.*). An order of *Alectoromorphae* adapted to a life in open country near water; some are marine forms; most are strong fliers; there are usually eleven primary remiges. Bustards, Plovers, Jacanas, Gulls, Terns, Auks, Sand-grouse, Pigeons, and Doves.

Chara'les, Char'ophy'ta (*Bot.*). A small group of aquatic plants, showing many algal characters, but of uncertain position. They have main shoots bearing many whorls of lateral branches on which the reproductive organs are developed, these being antheridia liberating motile sperms, and oögonia each with a single egg. The plants occur in fresh and in brackish water, and are often heavily calcified, a circumstance to which they owe the popular name of *stoneworts.*

charcoal (*Chem.*) The residue from the destructive distillation of wood or animal matter with exclusion of air; contains carbon and inorganic matter.

charcoal (*Tinplates*). Originally, tin plates made from wrought-iron produced in a charcoal furnace. Now, when mild steel is used, the term is applied to plates with a thicker tin coating. See **cokes.**

charcoal blacking (*Foundry*). *Blacking* (q v.) made from powdered charcoal, which is dusted over the surface of a mould to improve the smoothness of the casting.

charcoal iron (*Met., etc.*). Pig-iron made in a blast-furnace using charcoal instead of coke. Sometimes also wrought-iron made from this.

charge (*Elec. Comm.*). A colloquialism for *to make alive*, or switch on power, when none is taken.

charge (*Elec. Eng.*) The quantity of electricity on a body, i.e. the excess or deficiency of negative electrons. Also commonly used in connexion with accumulators to denote the quantity of electricity corresponding to the internal chemical change, the process being known as *charging the accumulator.* See **bound charge.**

charge-indicator (*Elec. Eng.*). See **potential-indicator.**

charging current (*Elec. Comm., Elec. Eng.*). (1) The current passing through an accumulator during the conversion of electrical energy into stored chemical energy.—(2) The impulse of current flowing into a condenser when a steady voltage is suddenly applied.—(3) The alternating current which flows into a condenser when an alternating voltage is applied.—(4) The alternating current which flows when an alternating voltage is applied to a transmission line.—(5) The impulse of current accompanying the alternating current when an alternating voltage is suddenly applied to a circuit which is not entirely resistive.

charging resistor (*Elec. Eng.*). A resistance inserted in series with a switch to limit the rate of rise of current when making the circuit.

charging voltage (*Elec. Eng.*). The voltage required to pass the correct charging current through an accumulator; it is usually about 2·5 volts per cell.

Charles's law (*Heat*). 'The volume of a given mass of any gas, kept at constant pressure, increases by $\frac{1}{273}$ of the volume at 0° C. for each degree rise of temperature.' This law, also known as GAY-LUSSAC'S LAW, is equivalent to saying that all gases have the same value for the coefficient of expansion at constant pressure. The law is not exactly followed.

Charlier's operation (*Vet.*). Ovariectomy of a cow through the vagina.

Charlton white (*Dec.*). A white paint compounded of 70% barium sulphate, 15% zinc sulphate, and 1·5% zinc oxide.

Charnian Series (*Geol.*). Rocks of sedimentary and pyroclastic type referred to the Pre-Cambrian; occurring in the Charnwood Forest district of Leicestershire.

char'nockite (*Geol.*). A coarse-grained granitic rock, consisting of perthitic feldspars, blue quartz, and orthopyroxene; it occurs typically in Madras and is named after the founder of Calcutta, Job Charnock.

Charnoid direction (*Geol.*). The direction assumed by the Charnian (Pre-Cambrian) folds and associated structures of England. It is typically N.W.-S E., though subject to variation. Later movements have followed this direction in many cases.

Charpy test (*Met.*). A notched-bar or impact test in which a notched specimen, fixed at both ends, is struck behind the notch by a striker carried on a pendulum. The energy absorbed in fracture is obtained from the height to which the pendulum rises.

chart-recording instrument (*Elec. Eng.*). See **graphic instrument.**

charta'ceous (*Bot.*). Papery in texture.

Chartered Civil Engineer (*Civ. Eng.*). A style or title which may be used by a member or an associate member of the Institution of Civil Engineers.

Chartered Electrical Engineer (*Elec. Eng.*) A style or title which may be used by a member or associate member of the Institution of Electrical Engineers.

Chartered Mechanical Engineer (*Eng.*). A style or title which may be used by a member or an associate member of the Institution of Mechanical Engineers.

Chartered Surveyor (*Build., Civ. Eng.*). A style or title which may be used by a fellow or professional associate of the Chartered Surveyors' Institution.

chartography (*Surv.*). See **cartography.**

chase (*Build.*). A trench dug to accommodate a drain-pipe.

chase (*Masonry*). A groove chiselled in the face of a wall to receive pipes, etc.

chase (*Typog.*). An iron frame into which type is locked by means of wooden wedges or metal quoins. The term *in chase* is applied to a book which is imposed ready for printing.

chase-mortising (*Carp., Join.*). A method adopted to frame a timber in between two others already fixed, a sloping chase being cut to the bottom of the mortise so that the cross-piece may be got into position.

chase wedge (*Plumb.*). A wooden wedge attached to a handle; used for bossing sheet-lead.

chaser (*Cinema.*). A low-grade film to induce audiences to leave the cinema and so permit entrance of others waiting.

chaser (*Eng.*). A lathe tool the cutting edge of which is serrated to the profile of a screw-thread; used to finish accurately screw-threads cut in the lathe.

chas'mocleis'togam'ous (*Bot.*). Producing both chasmogamous and cleistogamous flowers.

chas'mogam'ous (*Bot.*). Having large conspicuous flowers which open and are pollinated by the wind or by insects.

chas'mophyte (*Bot.*). A plant inhabiting rocky places, and rooting in a crevice containing a mixture of mineral and organic debris.

Chatauquan Division (*Geol.*). See **Chautauquan Division.**

chatoy'ancy (*Min.*). The characteristic optical effect shown by cat's-eye and certain other minerals, due to the reflection of light from minute aligned tubular channels, perhaps 25,000 to the square cm. When cut *en cabochon* such stones exhibit a narrow silvery band of light which changes its position as the gem is turned.

Chattanoo'ga Shale (*Geol.*). See **Berea Sandstone.**

chatter (*Eng.*). Vibration of a cutting tool or of the work in a machine; caused by insufficient rigidity of either, and results in noise and uneven finish.

Chatterton's compound (*Chem.*). An adhesive insulating substance consisting largely of gutta-percha; used as a cement or filling, especially in cable jointing.

Chautauquan (or **Chatauquan**) **Division,** shat-awk'wan (*Geol.*). The highest beds of the Upper Devonian, equivalent to the Chemung and Catskill Groups in the U.S.A.

cheating (*Cinema.*) The alteration of walls or furniture during shooting, in order to get good camera angles.

check (*Join.*). The Scottish equivalent of ***rebate.***

check-lock (*Join.*). A device for locking in position the bolt of a door lock.

check multiple (*Auto. Teleph.*). The multiple for reversed dialling by an operator, to check the number given to her by a subscriber; characterised by the omission of guarding on engagement of line.

check nut (*Eng., etc.*). See **lock nut.**

check rail (*Rail.*). A third rail laid on a curve alongside the inner rail and spaced a little from it, to safeguard rolling-stock against derailment due to excessive thrust on the outer rail. Also called GUARD RAIL, RAIL GUARD, SAFEGUARD, SAFETY RAIL, SIDE RAIL.

check receiver (*Radio*). See **monitoring receiver.**

check throat (*Join.*). A small groove cut in the face of a short step in the upper surface of a wooden window-sill, just behind the face of the sash. It serves to stop rain from driving up under the sash.

check valve (*Eng., etc.*). A non-return valve, closed automatically by fluid pressure; fitted in a pipe to prevent return flow of the fluid pumped through it. See **feed check valve, clack.**

checkweighman (*Mining*). A man who checks for the miners the amount of mineral mined by them.

checking (*Paint.*). A defect in a painted surface, characterised by the appearance of fissures in all directions.

checking motion (*Cotton Weaving*). Multiple movable boxes at one or both sides of a loom, for holding different colours of weft which may be brought into use as desired.

cheek (*Build.*). One of the sides of an opening.

cheek (*Carp.*). One of the solid parts on each side of a mortise.

cheek (*Hyd. Eng.*). The abutting surface of a mitre-sill.

cheek (*Zool.*). In Trilobites, the pleural portion of the head: in Mammals, the side of the face below the eye, the fleshy lateral wall of the buccal cavity.

cheek teeth (*Zool.*). See **grinding teeth.**

cheese (*Cables*). See **cable wax.**

cheese (*Woollen, etc.*). (1) Yarn wound on a cheese or split-driven winder.—(2) A small flanged warp beam used in worsted manufacture.

cheese-head screw (*Eng.*). A screw with a cylindrical head, similar in shape to a round cheese, slotted for a screw-driver.

cheilectro'pion (*Med.*). Turning outwards of the lip.

cheili'tis (*Med.*). Inflammation of the lip.

cheilog'nathus (*Med.*). See **harelip.**

cheiropom'pholyx (*Med.*). A skin disease in which vesicles filled with clear fluid suddenly appear on the hands, and (less rarely) on the feet.

cheiropterygium, —ter-ij′i-um (*Zool.*). A *pentadactyl* (q.v.) limb.

che′la (*Zool.*). In *Arthropoda*, any chelate appendage. —*adjs.* **chelif′erous, che′liform.**

che′late (*Zool.*). (Of *Arthropoda*) having the penultimate joint of an appendage enlarged and modified so that it can be opposed to the distal joint like the blades of a pair of scissors to form a prehensile organ. Cf. *subchelate.*

chelicerae, —is′er-ē (*Zool.*). In *Arachnida*, the only pair of pre-oral appendages, which are usually chelate.

Chelon′ethi (*Zool.*). An order of *Embolobranchiata* having a uniform prosoma and a segmented opisthosoma; there is no telson; the pedipalpi are large, chelate, and contain poison glands; respiration is by tracheae; the forelegs of the male are sometimes modified as sexual organs; small carnivorous forms found under stones, leaves, bark, and moss; they are distributed by flying insects, to which they cling by their pedipalps. False Scorpions.

Chelo′nia (*Zool.*). An order of *Reptilia* in which the body is encased in a horny capsule consisting of a dorsal carapace and a ventral plastron, the jaws are provided with horny beaks in place of teeth, and the lower temporal arcade alone is present. Tortoises and Turtles.

chemical affinity (*Chem.*). The force which binds atoms together in molecules. The affinity of a chemical reaction is measured by the maximum external work (change of free energy) obtainable from the reaction.

chemical analysis (*Chem.*). The splitting up of a material into its component parts or constituents by chemical methods, in order to determine the composition of the material.

chemical balance (*Chem.*). An instrument used in chemistry for weighing, to a high degree of accuracy, the small amounts of material dealt with.

chemical bond (*Chem.*). The unit of force joining two atoms together in a molecule. It generally consists of a pair of shared electrons.

chemical change (*Chem.*). A change involving the formation of a new substance.

chemical closet (*San. Eng.*). A suitably shaped container for use in conjunction with special deodorising and liquefying chemicals, when running water is not available.

chemical compound (*Chem.*). A substance composed of two or more elements in definite proportions by weight, which are independent of its mode of preparation. Thus the ratio of oxygen to carbon in pure carbon monoxide is the same whether the gas is obtained by the oxidation of carbon, the reduction of carbon dioxide, or by heating formic acid, oxalic acid or potassium ferrocyanide with concentrated sulphuric acid.

chemical constitution (*Chem.*). The number and arrangement of the atoms present in a molecule.

chemical elements. See *Table of Chemical Elements* in Appendix.

chemical energy (*Chem.*). The energy liberated in a chemical reaction.

chemical equation (*Chem.*). A symbolic representation of the changes occurring in a chemical reaction, based on the assumption that matter is neither created nor destroyed during the reaction.

chemical fade (*Cinema.*). A fade made by washing out the negative with a chemical (e.g. cyanide), so that, on printing, the effect of a normal fade is obtained.

chemical focus (*Photog.*). The point in an emulsion at which the lens provides a focus; it may differ from the point of visual focus with a lens insufficiently corrected for chromatic aberration.

chemical fog (*Photog.*). General reduction of a proportion of the silver halide in an emulsion, due to chemical decomposition or too vigorous development; it results in reduced contrast and elimination of complete transparency.

chemical hygrometer (*Phys.*). See **absorption hygrometer.**

chemical kinetics (*Chem.*). The study of the velocities of chemical reactions.

chemical lead (*Met.*). Lead of purity exceeding 99·9%; suitable for the lining of vessels used to hold sulphuric acid and other chemicals.

chemical precipitation (*Sewage*). The process of assisting settlement of the solid matters in sewage by adding chemicals (such as lime or alumino-ferric) before admitting the sewage to the sedimentation tanks.

chemical pulp (*Paper*). Pulp prepared by a chemical process, as distinguished from mechanical pulp, which is prepared by grinding.

chemical reaction (*Chem.*). A process in which one substance is changed into another.

chemical symbol (*Chem.*). A single capital letter, or a combination of a capital letter and a small one, which is used to represent either an atom or a gram-atom of a chemical element; thus the symbol for sodium is Na.

chemical toning (*Photog.*). The process of converting the silver image into, or replacing it by, a coloured substance by chemicals other than a dye.

chemical wood-pulp (*Paper*). Wood-pulp, obtained from wood by the sulphite, sulphate, or soda process.

chemically formed rocks (*Geol.*). Rocks formed by precipitation of materials from solution in water; e.g. calc-tufa, and various saline deposits.

chemilumines′cence (*Chem.*). The production of light without heat in certain chemical reactions.

chemise, she-mēz′ (*Masonry*). A wall built to line an earthbank.

chemisorption (*Chem.*). Irreversible adsorption in which the adsorbed substance is held on the surface by chemical forces.

chemistry (*Chem.*). The study of the composition of substances and of the changes of composition which they undergo. The main branches of the subject are *inorganic chemistry* (q.v.), *organic chemistry* (q.v.), and *physical chemistry* (q.v.).

chemonas′ty (*Bot.*). A change in the position or form of a plant organ in relation to a diffuse chemical stimulus.

chemorecep′tor (*Zool.*). A sensory nerve-ending, receiving chemical stimuli.

chemo′sis (*Med.*). Oedema of the conjunctiva.

chemosmo′sis (*Chem.*). The occurrence of chemical reactions through semi-permeable membranes.

chemosyn′thesis (*Bot.*). The formation of organic material by some bacteria by means of energy derived from chemical changes.

chemotax′is, chemotac′tism (*Bot., Zool.*). Movement of the whole organism in a definite direction in relation to a chemical stimulus.

chemotro′pism (*Bot., Zool.*). A growth movement or curvature of part of an organ in a definite direction owing to differential growth, due to the concentration of some chemical substance.

Chemung Group, shē-mung′ (*Geol.*). The highest division of the Upper Devonian in eastern N. America, consisting of marine shales and sandstones and equivalent to the Catskill beds to the east.

chenille, shen-ēl′ (*Textiles*). A special yarn with a rounded pile of worsted or silk; used for curtains, tablecloths, and millinery.

cheque paper (*Paper*). Paper chemically treated, so that it may show any tampering with documents printed on it.

chequer plate (*Eng.*). Steel plate used for flooring;

provided with a raised chequer pattern to give a secure foothold.

Chernetid'ea (*Zool.*). See **Chelonethi.**

chert (*Geol.*). A siliceous rock consisting of cryptocrystalline silica, and sometimes including the remains of siliceous organisms such as sponges or radiolaria. It occurs as bedded masses, as well as concretions, in limestone formations older than the Chalk.

Ches'apeake formation (*Geol.*). The most important division of the marine Miocene beds of the Atlantic coastal regions of N. America. It consists of sands and clays with an abundant molluscan fauna.

ches'sylite (*Min.*). See **azurite.**

chest saw (*Carp.*). A small handsaw without a back, and with six to twelve teeth to the inch.

Chester Group (*Geol.*). The general name for the strata of Upper Mississippian age developed in the Mississippi valley.

chestnut (*Timber*). A light- to dark-brown wood resembling oak; much used for fencing, posts, and rails.

cheval or **force de cheval,** she-val' (*Eng.*). The French unit of horse-power. It is equal to 4500 kilogramme-metres per minute or 32,549 ft.-lb. per minute, and is thus about 0·986 times the English unit.

chevaux de frise, she-vō' de frēz' (*Build.*). An iron or timber bar with projecting spikes, used as a defence precaution along the tops of walls and elsewhere.

Cheviot (*Textiles*). A quality term for yarns and fabrics manufactured from Cheviot or crossbred wools; also applied to the wool, demi-lustre, from Cheviot sheep.

chevron bones (*Zool.*). In some Vertebrates, V-shaped bones articulating with the ventral surfaces of the caudal vertebrae.

Cheyenne Sandstones, shī-en' (*Geol.*). Plant-bearing sandstones belonging to the Fredericksburg Series of the Comanchean in southern Kansas.

Cheyne-Stokes breathing (*Med.*). Alternating periods of apnoea and dyspnoea in disease of the heart, kidney, or brain, the dyspnoeic phase being gradual in onset and disappearance.

Chezy's formula (*Hyd.*). A formula for computing the velocity of flow in pipes and channels. This is given as proportional to the square root of the product of the hydraulic mean depth and the virtual slope.

chiaroscu'ro (*Photog.*). By analogy with sculpture, the disposition of light and shade in the pictorial composition of a photograph.

chias'ma (*Cyt.*). The exchange of material between paired chromosomes during nuclear division.

chiasma (*Zool.*). A structure in the central nervous system, formed by the crossing over of fibres from the right side to the left side and vice versa.

chiastobasid'ium (*Bot.*). A club-shaped basidium in which the spindles of the dividing nuclei lie at the same level across the basidium.

chias'tolite (*Min.*). A variety of andalusite occurring in metamorphic rocks; characterised by cruciform inclusions of carbonaceous matter.

chias'toneury, —nū'ri (*Zool.*). A condition, found in some Gastropods, in which the visceral nerve commissures are twisted into a figure of eight.

Chicago rail-bond (*Elec. Eng.*). See **crown rail-bond.**

chickenpox (*Med.*). Varicella. A common mild acute infectious disease in which papules, vesicles, and small pustules appear in successive crops, mainly on the trunk, face, upper arms, and thighs.

chickens (*Television*). Said of the signal corresponding to a line of scanning when the amplitude of the signal spuriously wanders towards black (with positive modulation); it arises from accumulation of charges on the mosaic of the electron camera.

chiffon, shif'on (*Textiles*). A very fine, soft silk dress material.

chigger or **chigoe,** chig'ō (*Vet.*). See **harvest mite.**

chila'ria (*Zool.*). In *Xiphosura*, a pair of small round plates of doubtful function, situated just behind the mouth, and possibly representing a seventh pair of appendages.

chilblains (*Med.*). See **erythema pernio.**

Chile nitre, Chile saltpetre (*Chem.*). A commercial name for sodium nitrate, $NaNO_3$.

chili, shē-lē (*Meteor.*). A sirocco-type hot and dry southerly wind blowing in Tunis.

Chilian mill (*Met.*). A type of ore-grinding machine in which crushing is done by heavy rollers running on a circular base plate or die ring.

chill (*Foundry*) An iron mould, or part of a mould, sometimes watercooled; used to accelerate cooling and give great hardness and density to the whole or part of a casting.

chill crystals (*Met.*). Small crystals formed by the rapid freezing of molten metal when it comes into contact with the surface of a cold metal mould.

chilled iron (*Met.*). Cast-iron cast in moulds constructed wholly or partly of metal, so that the surface of the casting is white and hard while the interior is grey.

chilling (*Paint.*). A deadening of the lustre of a freshly varnished surface, on exposure to a draught of cold air.

Chilognatha, kī-log'— (*Zool.*). An order of *Myriapoda* having the trunk composed of numerous double somites, each with two pairs of legs; the head bears a pair of uniflagellate antennae, a pair of mandibles, and a gnathocilarium representing a pair of partially fused maxillae; the genital opening is anterior; vegetarian animals of retiring habits. Millipedes.

Chilop'oda (*Zool.*) An order of *Myriapoda* having the trunk composed of numerous somites each bearing one pair of legs; the head bears a pair of uniflagellate antennae, a pair of mandibles, and two pairs of maxillae; the first body somite bears a pair of poison-claws; the genital opening is posterior; active carnivorous forms, some of considerable size and dangerous to Man; some are phosphorescent. Centipedes.

chimae'ra, chimera (*Bot.*). A plant in which there are at least two kinds of tissue differing in their genetic constitutions.
See **chromosomal—**
dichlamydeous—
diplochlamydeous—
haplochlamydeous—
mericlinal—
monochlamydeous—
periclinal—
polychlamydeous—
polyclinal—
sectorial—

chime (*Horol.*). A striking clock.

chimes (*Horol.*). The striking of rods, gongs, or tubes, to produce musical notes in a definite sequence.

chime barrel (*Horol.*). The cylinder on the periphery of which short vertical pins lift the hammers in a chiming clock, the pins being so arranged as to give the required sequence of notes.

chiming clock (*Horol.*). A clock which, in addition to striking the hours, chimes at the quarters.

chimney. A structure containing a passage for the conveyance of smoke or steam from a fire or engine.

chimney (*Bot.*). An upgrowth of epidermal cells above a stoma, forming a long pore.

chimney-back (*Build.*). The part of the wall at the back of a fireplace.

chimney bar (*Build.*). An iron bar supporting the arch over a fireplace opening.

chimney bond (*Build.*). The same as *stretching* *bond* (q.v.), which is generally used for the internal division-walls of domestic chimney-stacks, as well as for the outer walls (which, however, should be of 9 in. brickwork if possible).

chimney-breast (*Build.*). The part of the chimney between the flue and the room.

chimney can (*Build.*). A Scottish equivalent for *chimney pot.*

chimney jambs (*Build.*). The upright sides of a fireplace opening.

chimney lining (*Build.*). The tile flues within a chimney space.

chimney-piece (*Build.*). The ornamental dressings around a fireplace.

chimney pot (*Build.*). A metal or earthenware pipe fitted to the smoke outlet at the top of a flue. Cf. *cowl.*

chimney shaft (*Build.*). The part of a chimney projecting above a roof, or a chimney standing isolated like a factory chimney.

chimney stack (*Build.*). The unit containing a number of flues grouped together.

chim'onophi'lous (*Bot*). Growing chiefly during the winter.

chimopela'gic plankton (*Bot.*). Plankton occurring only during winter.

china (*Pot.*). The ceramic imitative of *porcelain.* Fine pottery having a hard, sonorous, semi-translucent body, made chiefly from kaolin, china stone and bone (bone ash).

china clay (*Geol.*). A hydrated silicate of aluminium, resulting from the decomposition of the feldspars in igneous rocks by pneumatolysis. It contains a high percentage of aluminium silicate—$Al_2O_3 \cdot 2SiO_2 \cdot 2H_2O$—and is of great value in ceramic industry. Also called KAOLIN, PORCELAIN CLAY. See also **porcelain.**

chinastone (*Geol.*). A kaolinitised granitic rock containing unaltered plagioclase. Also applied to certain limestones of exceptionally fine grain and smooth texture.

China wood oil (*Chem.*). *Tung oil* (q.v.).

chinchil'la (*Furs*). The dressed skin of a squirrel-like rodent (formerly found only at great altitudes in the Andes, but recently acclimatised in the Rocky Mountains). The fur, which is a variegated pale-grey, is of great commercial value.

chine (*Aero.*). The extreme outside longitudinal member of a flying-boat hull, or of a seaplane float. It runs approximately parallel to the keel.

chiné, shē-nā (*Textiles*). A fancy silk material in which the patterns are printed on the warp threads, before weaving.

Chinese cotton (*Textiles*). A cotton of short staple; of little value for spinning.

Chinese oil (*Chem.*). *Cassia oil* (q.v.).

Chinese red (*Paint.*). A basic chromate of lead pigment, also known as DERBY RED.

Chinese white (*Paint.*). Zinc oxide ground in water or oil.

chinook' (*Meteor.*). A föhn-like west wind blowing on the eastern side of the Rocky Mountains.

chip-axe (*Tools*). A small single-handed tool for chipping timber to rough size.

chip board (*Paper*). A board, usually made from waste paper, used in box-making.

Chippendale style (*Furn.*). Thomas Chippendale, English cabinet-maker, who flourished about the middle of the eighteenth century, had three styles: modified Gothic; rococo of Louis XV (characterised by cabriole legs, scrolled work, and riband designs); Chinese (fretwork and scrolls).

chipping (*Met.*). The removing of surface defects from semi-finished metal products by means of pneumatic chisels. Seams, laps, and rokes are thus eliminated.

chipping chisel (*Tools*). See **cold chisel.**

chirop'ody. The care and treatment of minor ailments of the feet.

Chirop'tera (*Zool.*). An order of aerial Mammals having the forelimbs specially modified for flight; mainly insectivorous or frugivorous nocturnal forms. Bats.

chiropteroph'ilous (*Bot.*). Pollinated by bats.

chisel (*Tools*). A steel tool for cutting wood, metal, or stone; it consists of a shank whose end is bevelled to a cutting edge. See **cold chisel.**

chiselled ashlar (*Masonry*). A random-tooled *ashlar* (q.v.) finished with a narrow chisel. Also called BOASTED ASHLAR.

chitin, ki'tin (*Zool.*). A skeletal material found in the majority of groups of *Invertebrata* but especially in *Arthropoda*. Its empirical formula is $C_{15}H_{26}O_{10}N_2$. On boiling with concentrated hydrochloric acid, it decomposes to glucosamine and acetic acid.

chitting (*Malting*). The appearance, during germination, of the white root sheath at the lower (germ) end of the barley corn, shortly before the rootlets become visible.

chlamyd'eous (*Bot.*) Having a perianth.

chlam'ydospore (*Bot.*). A thick-walled fungal spore, capable of a resting period, and often formed inside a hypha.—(*Zool.*) A protozoan spore which is enclosed in a spore-case. Cf. *gymnospore.*

chloan'thite, cloanthite (*Min.*). Arsenide of nickel occurring in the cubic system. This is a valuable nickel ore, often associated with smaltite.

chloas'ma (*Med*). The appearance of yellowish patches on the face and on the neck of pregnant women.

chlor'agen (or **chlorago'gen**) **cells** (*Zool.*). In *Chaetopoda*, yellowish flattened cells occurring on the outside of the alimentary canal, and concerned with nitrogenous excretion.

chloral (*Chem.*). Trichlor-acetaldehyde, $CCl_3 \cdot CHO$, b.p. 97° C., a viscous liquid, of characteristic odour, obtained by the action of chlorine upon alcohol and subsequent distillation over sulphuric acid. A powerful hypnotic.

chloral hydrate (*Chem*). $CCl_3 \cdot CH(OH)_2$, m.p. 57° C., b.p. (with decomposition) 97° C., large colourless crystals, soluble in water, a soporific and antiseptic. Obtained from *chloral* (q.v.) and water. One of the few compounds having two hydroxyl groups attached to the same carbon atom.

chlo'ramines (*Chem.*). Compounds obtained by the action of hypochlorite solutions on compounds containing the NH or NH_2 groups. Important as disinfectants. Chloramine T

$$CH_3 \cdot C_6H_4 \cdot SO_2 \cdot NClNa$$

is the active constituent of an ointment employed as an antidote against vesicant war gases.

chlo'ranil (*Chem.*) Tetrachloro-quinone, $C_6Cl_4O_2$.

chloran'thy (*Bot.*). An abnormal condition of a flower, in which all parts have been changed into leafy structures.

chlorar'gyrite (*Min.*). Cerargyrite.

chloras'trolite (*Min.*). A green mineral of fibrous habit resembling prehnite; it occurs in rounded geodes in basic igneous rocks near Lake Superior. When cut *en cabochon* it exhibits chatoyancy and is used as a semi-precious gemstone.

chlorates (*Chem.*). Salts of chloric acid. Powerful oxidising agents. Explosive when ground or detonated in contact with organic matter.

chlorenchy'ma (*Bot.*). Tissue containing chloroplasts.

chloric acid (*Chem.*). $HClO_3$. A monobasic acid forming a series of salts, chlorates—where ClO_3 acts as a univalent radical.

chlorides (*Chem.*). Salts of hydrochloric acid, obtained by the action of the acid on many metals. Many metals combine direct with chlorine to form chlorides.

chloride of lime (*Chem.*). See **bleaching powder.**

chloride of silver cell (*Elec. Eng.*). A primary cell having electrodes of zinc and silver and a depolariser of silver chloride.

chloridising roasting (*Met.*). The roasting of sulphide ores and concentrates, mixed with sodium chloride, to convert the sulphides to chlorides.

chlorination (*Chem.*). (1) The substitution or addition of chlorine in organic compounds.—(2) The sterilisation of water with chlorine, sodium hypochlorite, or bleaching powder.—(*Sewage*) The addition of chlorine to sewage in order to assist the processes of purification in the land treatment method.

chlorine (*Chem.*). Symbol, Cl. At. wt. 35·457, at. no. 17, valencies 1, 3, 5, 7, m.p. −101·6° C., b.p. −34·6° C., density 3·214 gms. per cc. at N.T.P. Chlorine is a greenish-yellow gas, Cl_2, usually obtained by the action of oxidising agents upon hydrochloric acid. In commercial conditions chlorine is now obtained by electrolytic processes using chlorides. It is a powerful oxidising agent and forms an essential constituent of bleaching powder. Used as a non-persistent cloud gas in warfare, it has a destructive effect on the respiratory tract, and is highly lethal.

chlorine monoxide (*Chem.*). Cl_2O. Like chlorine in colour and smell. Dissolves in water to form hypochlorous acid.

chlorites (*Min.*). A group of allied minerals which may be regarded as hydrated silicates of aluminium, iron, and magnesium. They crystallise in the monoclinic system, and are of green colour. They occur as alteration products of such minerals as biotite and hornblende, and also in schistose rocks.

chlorite schist (*Geol.*). A schist composed largely of the mineral chlorite, in association with quartz, epidote, etc. Formed from basic igneous rock by dynamothermal metamorphism.

chlorite-slate (*Geol.*). A slate containing large quantities of chlorite.

Chloritic Marl (*Geol.*). A thin bed of fossiliferous green marl, at the base of the English Chalk. The pigment is glauconitic, not chloritic.

chloritisation (*Geol.*). The replacement, by alteration, of ferro-magnesian minerals by chlorite.

chloro-acetic acids (*Chem.*). Monochlor-acetic acid, $CH_2Cl{\cdot}COOH$, m.p. 62° C., b.p. 186° C.; formed by chlorination of acetic acid in the presence of acetic anhydride, sulphur or phosphorus.—Dichlor-acetic acid, $CHCl_2{\cdot}COOH$, b.p. 191° C.; formed by heating chloral hydrate with potassium cyanide.—Trichlor-acetic acid, $CCl_3{\cdot}COOH$, m.p. 52° C., b.p. 195° C.; formed by oxidising chloral hydrate with nitric acid.

chloroaur'ic acid (*Chem.*). $HAuCl_4$. A complex acid formed when auric oxide (Au_2O_3) dissolves in hydrochloric acid. Forms a series of complex salts called chloroaurates.

chlorocru'orin (*Zool.*). A green respiratory pigment of certain *Polychaetes*. *

chlor'oform (*Chem.*). $CHCl_3$, b.p. 62° C., sp. gr. 1·5; a colourless liquid of a peculiar ethereal odour, an important anaesthetic, solvent for fats and oils, resins, rubber, and numerous other substances. It is prepared technically from alcohol and calcium hypochlorite.

chlorohy'drins (*Chem.*). A group of hydrochloric acid esters of glycols; e.g. *ethylene chlorohydrin* or *glycol chlorohydrin*, $CH_2Cl{\cdot}CH_2OH$.

chloro'ma (*Med.*). A greenish tumour in the bones, composed of cells resembling white blood cells; occurs in acute leukaemia.

Chlor'omonadi'na (*Zool.*). An order of *Phytomastigina*; forms generally passing much of the life-history in the palmella stage; green or colourless; sometimes of amoeboid form; with a gullet but without a transverse groove; having food reserves of oil; with a contractile vacuole.

chlor'ophae'ite (*Min.*). A mineral closely related to chlorite, dark-green when fresh, but rapidly changing to brown, hence the name (Greek *chloros*, yellowish-green, *phaios*, dun). Described from basic igneous rocks.

Chlorophy'ceae (*Bot.*). A large group of algae, inhabiting fresh water, salt water, and less often occurring on soil or objects out of the water. They are green, having a chlorophyll mixture of approximately the same character as that present in higher plants; they form starch as a storage product, and contain cellulose in their walls. The *Chlorophyceae* are often referred to as the *green algae*.

chlor'ophyll (*Bot.*). The mixture of two green and two yellow pigments, present in the chloroplasts of all plants which are able to synthesise carbohydrates from carbon dioxide and water, in some fashion enabling the plants to utilise energy derived from light in the synthesis of material. The two green pigments, which predominate in the mixture, are: *chlorophyll a* ($C_{55}H_{72}O_5N_4Mg$); and *chlorophyll b* ($C_{55}H_{70}O_6N_4Mg$); the yellow pigments are carotin ($C_{40}H_{56}$) and xanthophyll ($C_{40}H_{56}O_2$).

chlorophyll corpuscle (*Bot.*). See **chloroplast.**

chlorophyl'lase (*Bot.*) An enzyme occurring in association with chlorophyll in plants, and able to decompose it.

chlorophyl'logen (*Bot.*). A hypothetical forerunner of chlorophyll, formed independently of light, and giving rise to chlorophyll when exposed to light.

chlorophyl'lous, chlorophyl'lose (*Bot.*). Containing chlorophyll.

chlor'oplast (*Bot.*). A plastid containing chlorophyll, with or without other pigments, embedded singly or in considerable numbers in the cytoplasm of a plant cell.

chloroplat'inate, potassium (*Chem.*). See **potassium chloroplatinate.**

chloroplatin'ic acid (*Chem.*). $H_2PtCl_6{\cdot}6H_2O$. Formed when platinum is crystallised from a solution acidified with hydrochloric acid. Referred to commercially as *platinum chloride.*

chloro'sis (*Bot.*). An unhealthy condition due to deficiency in chlorophyll; shown by yellowing of the plant.

chlorosis (*Med.*). Green sickness. An anaemia in young girls readily cured by iron; formerly common, now rare.

chlorostat'olith (*Bot.*). A chloroplast containing starch which acts as a statolith.

chlorot'ic. *Adj.* from *chlorosis.*

choana, kō-ā'na (*Zool.*). A funnel-shaped aperture.—*pl.* **choanae,** the internal nares of Vertebrates.

choa'nocyte (*Zool.*). A flagellate cell, in which a collar surrounds the base of the flagellum.

choa'nosome (*Zool.*). In eurypylous *Porifera*, that part of the Sponge containing the flagellated chambers, as opposed to the *ectosome* (q.v.).

chocking (*Mining*). The supporting of undercut coal with short wedges or *chocks.*

chocolate (*Foods*). A food preparation made from cacao, sugar, and milk.

choice (*Textiles*). A term used by woolsorters to denote wool of third quality.

choke (*I.C. Engs.*). (1) The venturi or throat in the air-passage of a *carburettor* (q.v.).—(2) A butterfly valve in a carburettor intake, which reduces the air supply and so gives a rich mixture for starting purposes. Also called STRANGLER.

choke (*Radio*). An inductance coil designed to prevent the passage of high-frequency currents.

choke bore (*Artillery*). The gradual diminution in the calibre of a gun, due to various causes (e.g. the deposition of copper from the driving band). Also, the slight constriction made in the bore of the barrel of a sporting gun, near the muzzle end, in order to limit the spread of the shot.

choke control (*Radio*). A system of anode modulation in which the modulating and modulated valves are coupled by means of a high-inductance choke included in the common anode-voltage supply lead. Also called CHOKE MODULATION, CONSTANT CURRENT MODULATION.

choke coupling (*Radio*). A method of coupling the successive stages of a multi-stage amplifier in which the coupling impedance is a choke.

choke damp (*Mining*). A term sometimes used for *black damp* (carbon dioxide). More correctly, any mixture of gases which causes choking or suffocation.

choke feed (*Radio*). The provision of a high inductance path for the d.c. component of the anode current of a valve, the circuit for the a.c. components being completed through a condenser.

choke modulation (*Radio*). See **choke control.**

choked disc (*Med.*). See **papilloedema.**

choking coil (*Elec. Eng.*). See **inductor.**

chol-, chole-, cholo- (Greek *cholē*, bile). A prefix used (especially in Medicine) in the construction of compound terms; e.g. *cholangitis* (q.v.).

cholae'mia, chole'mia (*Med.*). Presence of bile pigments in the blood.

chol'agogue (*Med.*). Increasing evacuation of bile: a drug which does this.

cholangi'tis, cholangei'tis (*Med.*). Inflammation of the bile passages.

cholecystec'tomy (*Surg.*). Excision of the gall-bladder.

cholecystenteros'tomy (*Surg.*). An artificial opening made between the gall-bladder and the upper part of the small intestine.

cholecysti'tis (*Med.*). Inflammation of the gall-bladder.

cholecystog'raphy (*Radiol.*). The X-ray investigation of the gall-bladder previously filled with a substance opaque to X-rays.—CHOLECYS'TOGRAM, the X-ray photograph so obtained.

cholecystos'tomy (*Surg.*). The surgical formation of an opening in the wall of the gall-bladder.

choledo'chal (*Zool.*). Containing bile.

choledochi'tis (*Med.*). Inflammation of the common bile duct.

choledochot'omy (*Surg.*). Incision into one of the main bile ducts.

cholelithi'asis (*Med.*). The presence of stones in the gall-bladder and bile passages.

chol'era (*Med.*). An acute bacterial infection in Eastern countries; characterised by severe vomiting and diarrhoea, drying of the tissues, and painful cramps; spread by infected food and water.

cholera, fowl, duck (*Vet.*). A contagious septicaemia of birds due to *Pasteurella aviseptica.* Also called BIRD FEVER.

cholera, hog (*Vet.*). See **swine fever.**

cholesteatoma, —es'tē-a-tō'ma (*Med.*). A tumour in the brain, or in the middle ear, composed of cells and of crystals of cholesterol.

cholesterae'mia, cholestere'mia (*Med.*). See **cholesterolaemia.**

choles'terol (*Chem.*). $C_{27}H_{45}OH$, an alcohol of the alicyclic series, found in nerve tissues, gall stones, and in other tissues of the body. It is a white crystalline solid, m.p. 148·5° C., soluble in organic solvents and in fats. There are numerous stereoisomers known.

cholesterolae'mia, cholesterole'mia (*Med.*). Excess of cholesterol in the blood.

cholestero'sis (*Med.*). Diffuse deposits of cholesterol in the lining membrane of the gall-bladder.

cholet'elin (*Chem.*). A yellow oxidation product of bilirubin.

cho'lic acid (*Chem.*). $C_{23}H_{39}O_3{\cdot}COOH$, the product of hydrolysis of certain bile acids, is conjugated in the body forming glycocholic acid with glycine, and taurocholic acid with taurine.

choline (*Chem.*). Ethylol-trimethylammonium hydroxide, $OH{\cdot}CH_2{\cdot}CH_2{\cdot}NMe_3{\cdot}OH$, a strong base, present in the bile, brain, yolk of egg, etc., combined with fatty acids or with glyceryl-phosphoric acid (*lecithin*, q.v.). See **neurine.**

cholu'ria (*Med.*). The presence of bile pigments in the urine.

cho'mophyte (*Bot.*). A plant growing on rock ledges littered with detritus, or in fissures and crevices where root hold is obtainable.

chondr-, chondro- (Greek *chondros*, cartilage). A prefix used in the construction of compound terms; e.g. *chondrocranium* (q.v.).

chon'dral (*Histol.*). Pertaining to cartilage.

chondren'chyma (*Zool.*). A form of parenchyma, occurring in Sponges, which closely resembles hyaline cartilage, having the cells embedded in a stiff gelatinous matrix.

chondrification (*Histol.*). Strictly, the formation of chondrin; hence, the development of cartilage.

chon'drin (*Histol.*). A firm, elastic, translucent, bluish-white substance of a gelatinous nature, which forms the ground-substance of cartilage.

chon'drio- (Greek *chondros*, grain). A prefix used in the construction of compound terms.

chon'driocont, chondriokont (*Cyt.*). A chondriosome which has the form of a rod or thread.

chondriol'ysis (*Cyt.*). The dissolution of mitochondria.

chon'driome (*Cyt.*). The mitochondria of a cell, collectively.

chon'driomite (*Cyt.*). A chondriosome having the form of a chain of granules.

chondrioso'mal mantle (*Cyt.*). An accumulation of chondriosomes surrounding a dividing nucleus.

chon'driosomes (*Cyt.*). See **mitochondria.**

chon'drite (*Geol.*). A type of stony meteorite containing *chondrules*—nodule-like aggregates of minerals.

chondro-. Prefix. See **chondr-.**

chon'droblast (*Histol.*). A cartilage cell which builds up the chondrin matrix.

chon'droclast (*Histol.*). A cartilage cell which destroys the chondrin matrix.

chondrocra'nium (*Zool.*). The cartilaginous brain-case of lower Vertebrates and the embryos of higher Vertebrates, which usually also partly envelops the principal sense-organs.

chondrodystro'phia (*Med.*). See **achondroplasia.**

chondrogen'esis (*Histol.*). See **chondrification.**

chon'droid (*Bot.*). Said of the medulla of a lichen when it is hard and tough, consisting of thick-walled hyphae in very firm association.

chondroids (*Vet.*). Compact lumps of dried pus commonly found in the exudate of inflamed guttural pouches of the horse.

chondro'ma (*Med.*). A tumour composed of cartilage cells.

chondropro'teins (*Chem.*). A group of *glucoproteins* (q.v.). They are insoluble in water but soluble in dilute alkalis.

chondrosarco'ma (*Med.*). A malignant tumour composed of sarcoma cells and of cartilage.

chondroskel'eton (*Zool.*). The cartilaginous part of the Vertebrate skeleton.

chondros'teo'sis (*Histol.*). The transformation of cartilage into bone.

chon'drule (*Geol.*). See under **chondrite.**

Chonotrich'a (*Zool.*). An order of *Ciliata* the members of which are of permanently sessile habit; there is a spiral funnel, ciliated internally, leading to the mouth; other cilia are absent.

chop (*Carp.*). The movable wooden jaw of a carpenter's bench vice.

chops (*Horol.*). A clamp. The two flat pieces of metal, usually of brass, between which the end of a pendulum suspension spring is screwed or riveted.

chopped continuous waves (*Radio*). See **interrupted continuous waves.**

chopped wave (*Elec. Eng*). A travelling voltage wave which rises to a maximum and then rapidly falls to zero. Such a wave occurs on transmission lines when an ordinary voltage wave has caused an insulator flashover, thereby losing its tail

chopper (*Radio*). (1) An interrupter, generally in the form of a rotating commutator, used to break up the continuous oscillations generated by a valve oscillator into trains for transmission in interrupted continuous wave telegraphy. Also called TONE WHEEL.—(2) A similar interrupter used at the receiver, to render audible the rectified signals from a continuous wave telegraph transmitter without heterodyning. Also called a TICKER.

chord. A straight line drawn between two points on a curve.

chord or **chord length** (*Aero.*). The length of that part of the chord line intercepted by the extremities of the leading and trailing edges of an aerofoil section.

chord (*Struct.*). A flange of a large girder. Also called a BOOM.

chord line (*Aero.*). A straight line joining the centres of curvature of the leading and trailing edges of any aerofoil section. Historically, it was the common tangent to the curvatures on the lower surfaces, i.e. the line of a straight edge held against the underside of the plane, but with the development of planes with convex lower surfaces, this definition lacks precision.

chords, colour (*Photog.*). See **colour chords.**

chorda (*Zool*). Any string-like structure; as the *chordae tendinae*, tendinous cords attaching the valves of the heart: also, the notochord.

chordacen'tra (*Zool*). Vertebral centra formed mainly from the notochordal sheaths; cf. *archecentra.*—*adj.* **chordacen'trous.**

chorded winding (*Elec. Eng.*). An armature winding in which the span of the coils is less than a pole-pitch.

chordee (*Med.*). Painful distortion of the erect penis as a result of injury or disease, especially gonorrhoea.

chordo'ma (*Med.*). An invasive tumour arising from remains of the notochord in the skull and the spinal column.

chordot'omy (*Surg.*). The cutting of the nerve fibres in the spinal cord conveying the sensation of pain; done for the relief of severe and intractable pain.

chordoto'nal organs (*Zool.*). In Insects, auditory organs consisting of bundles of scolophores.

chore'a (*Med.*). Sydenham's chorea; St. Vitus dance. An infection of the brain manifested by uncontrollable, irregular, purposeless movements, closely related to rheumatism. See also **Huntington's chorea.**

chore'iform (*Med.*). Similar to chorea.

chor'ion (*Zool.*). In higher Vertebrates, one of the foetal membranes, being the outer layer of the amniotic fold: in Insects, the hardened eggshell lying outside the vitelline membrane.—*adj.* **chorion'ic.**

chorion-epithelioma (*Med.*). A malignant tumour of the uterus composed of cells derived from the foetal chorion; it appears during or after pregnancy.

chorioretini'tis (*Med.*). Inflammation of the choroid and retina.

choripet'alous (*Bot.*). Polypetalous.

chori'sis (*Bot.*). Fission into two or more lobes; often applied to abnormalities.

chor'oid (*Zool.*). The vascular tunic of the Vertebrate eye, lying between the retina and the sclera.—*adj.* **choroid'al.**

choroid plexus (*Anat.*). A vascular tuft, covered with epithelium, projecting into the cavities of the brain.

choroidi'tis (*Med.*). Inflammation of the choroid of the eye.

chre'sard (*Bot.*). The total amount of water in the soil which can be drawn upon by plants.

chrom-, chromo-, chromat-, chromato- (Greek *chrōma, chrōmatos*, colour). Prefixes used in the construction of compound terms; e.g. *chromogenic*, colour-forming.

chro'maffine, —fēn (*Zool.*). Having an infinity for chromic acid salts; as certain cells in Vertebrates which originate in the sympathetic nervous system, and migrate thence to various parts of the body, especially to the ductless glands.

chromaffino'ma (*Med*). See **paraganglioma.**

chro'masie (*Cyt*). Increase of chromatin.

chromat-, chromato-. Prefix. See under **chrom-.**

chromates (*Chem*). The salts corresponding to chromium trioxide. The normal chromates, M_2CrO_4, are isomorphous with sulphates and are generally yellow, while the dichromates, $M_2Cr_2O_7$, are isomorphous with pyrosulphates and are generally orange-red. Many chromates are used as pigments.

chromatics (*Optics*). The science of colours as affected by phenomena determined by their differing wavelengths.

chromatic aberration (*Light*). Non-coincidence of the component colour images formed by a lens owing to *dispersion* (q.v.) of the lens. See **achromatic lens.**

chromatic adaptation (*Bot.*). A variation in coloration in relation to the amount of light reaching a plant.

chromaticity (*Photog.*). The quality of a colour, comprising brilliance, hue, and saturation.

chro'matid (*Cyt.*). One of the four constituent parts of a *tetrad* (q.v.).

chro'matin (*Cyt.*). The deeply staining portion of the nucleoplasm.

chromatograph'ic analysis (*Chem.*). The analysis of a dye solution by selective adsorption on gelatin, alumina, etc.

chromatol'ysis (*Cyt*). The dissolution of chromatin in injured cells.

chromat'ophore, chro'moplast (*Bot.*). A plastid containing one or more pigments, not necessarily chlorophyll.

chromatophore (*Zool.*). A pigment cell; usually a connective-tissue corpuscle containing pigment granules, and capable of changing its shape under the influence of the sympathetic nervous system or of hormones.

chromatophores (*Zool.*). Cup- or plate-shaped masses of protoplasm, occurring in *Phytomastigina.*

chro'matoplasm (*Bot.*). The peripheral region of the protoplast in *Myxophyceae*, containing the pigments of the cell.

chromatosphe'rite (*Cyt.*). See **nucleolus.**

chrome alum (*Chem.*). Potassium chromium sulphate, $K_2SO_4{\cdot}Cr_2(SO_4)_3{\cdot}24H_2O$, purple octahedral crystals obtained by the reduction of potassium dichromate solution acidified with sulphuric acid. It is used in dyeing, calico-printing, and tanning.

chrome green (*Dec.*). See **Guignet's green.**

chrome iron ore (*Met.*). See **chromite.**

chrome leather (*Leather*). Leather that has been tanned with salts of chromium; boot uppers and belting leather are tanned by this method.

chrome red (*Chem.*). See **basic lead chromate.**

chrome spinel (*Min.*). Another name for the mineral *picotite*, a member of the spinel group. Cf. *chromite.*

chrome yellow (*Chem.*). See **lead chromate.**

chromic acid (*Chem.*). H_2CrO_4. An aqueous solution of chromic anhydride. See **chromium trioxide.**

chromic anhydride (*Chem.*). See **chromium trioxide.**

chromic oxide (*Chem.*). Chromium sesquioxide, Cr_2O_3, an amphoteric oxide corresponding to chromic salts, CrX_3, and to chromites, $M_2Cr_2O_4$.

chromic salts (*Chem.*). Salts in which chromium is trivalent. They are either green or violet, and are quite stable.

chromid'ia (*Cyt.*). Fragments of chromatin which lie free in the cytoplasm, and are not massed together to form a nucleus.

chromidium (*Bot.*). An algal cell in the thallus of a lichen.

chro'miole (*Cyt.*). One of the deeply staining granules of which chromatin is composed.

chromite (*Min.*). A double oxide of chromium and iron, used as a source of chromium and also as a refractory for resisting high temperatures. It has neutral chemical properties, and is resistant to attack by both acid and basic slags. Chromite occurs as an accessory in some basic and ultrabasic rocks, and crystallises in the cubic system as lustrous grey-black octahedra; also massive. Also called CHROME IRON ORE.

chromium (*Met.*). A metallic element. Chem. symbol, Cr. At. wt. 52·01, at. no. 24, sp. gr. at 20° C. 7·138, m.p. 1830° C., specific electrical resistivity at 20° C. 13·1 microhms per cub. cm. Obtained from chromite. Alloyed with nickel in heat-resisting alloys and with iron or iron and nickel in stainless and heat-resisting steels. Also used as a corrosion-resisting plating.

chromium plating (*Met.*). The production of a thin layer of chromium on the surface of another metal by electrodeposition, to protect it against corrosion. Thicker coatings are used to resist wear and abrasion. See **hard plating.**

chromium trioxide (*Chem.*). CrO_3. Produced by the action of concentrated sulphuric acid on a concentrated aqueous solution of potassium dichromate. It is deliquescent and a powerful oxidising agent.

chromo-. Prefix. See **chrom-.**

chromo paper (*Paper*). Paper which is more heavily coated than art paper; used for chromolithography.

chro'moblast (*Zool.*). An embryonic cell which will develop into a chromatophore.

chro'mocentre (*Cyt.*). Any accumulation of chromatin in the nuclear reticulum.

chromochon'dria (*Cyt.*). Mitochondria concerned in pigment formation.

chro'mogen (*Chem.*). A coloured compound containing a *chromophore* (q.v.).

chro'mogramme (*Photog.*). See **kromogram.**

chromoisom'erism (*Chem.*). The existence of substances having the same chemical composition but different colours.

chromolithog'raphy (*Print.*). The process of reproducing a coloured original by means of lithography. Drawings corresponding to the different colours of the original are executed in accurate register on separate stones or plates, printing being done as in ordinary lithography.

chro'momeres (*Cyt.*). The small granules of which chromatin is built up.

chromone'ma (*Cyt.*). The whole of the threads which make up the nuclear reticulum: one of the threads.

chromones (*Chem.*). Compounds having a condensed benzene and pyrone ring.

chro'mophil, chromophil'ic (*Biol.*). Staining heavily in certain microscopical techniques.

chro'mophobe, chromopho'bic (*Biol.*). Resisting stains, or staining with difficulty, in certain microscopical techniques.

chro'mophores (*Chem.*). Characteristic groups which, attached to hydrocarbon radicals in sufficient number, are responsible for the colour of dyestuffs. Such groups are: C·C, C:O, C·N, N:N, NO_2, N:O, and others.

chro'moplast (*Bot.*). See **chromatophore.**

chro'moscope (*Photog.*). A device for synthesising colour or coloured images.

chromoso'mal chimaera (*Bot.*). A chimaera in which the nuclei do not all contain the same number of chromosomes.

chro'mosome (*Cyt.*). One of the deeply staining rod-like bodies, constant in number for any given species, into which the chromatin of the nucleus becomes condensed during meiosis or mitosis.

chromosome arm (*Cyt.*). One of the two parts of a chromosome to which the spindle fibre is attached along the side.

chromosome complement (*Bot., Zool.*). The set of chromosomes characteristic of the nuclei of any one species of plant or animal.

chromosome cycle (*Cyt.*). The whole of the changes in the chromosomes during the complete life-cycle of an organism.

chromosome map (*Cyt.*). A diagram which purports to show the position of the genes in a chromosome.

chromosome matrix (*Cyt.*). A sheath of weakly staining material surrounding the more stainable substance of a chromosome.

chromosome set (*Cyt.*). The whole of the chromosomes present in the nucleus of an unfertilised female gamete, usually consisting of one each of the several kinds that may be present.

chromosphere (*Astron.*). The layer of the sun's atmosphere, just outside the photosphere, which is observed visually during total solar eclipses, and spectroscopically at other times.

chromot'ropy (*Chem.*). See **chromoisomerism.**

chromous salts (*Chem.*). Salts of divalent chromium; they yield blue solutions with water and are strong reducing agents.

chro'mule (*Bot.*). A general term for plant pigments.

chromyl (*Chem.*). The divalent radical CrO_2''.

chro'naxie (*Physiol.*). A time-constant in nervous excitation, equal to the smallest time required for excitation of a nerve when the stimulus is an electrical current of twice the threshold intensity required for excitation when the stimulus is indefinitely prolonged.

chronic (*Med.*). Said of a disease which is deep-seated or long-continued. Cf. *acute*.

chron'ispore (*Bot.*). A resting spore.

chron'ograph (*Horol.*). (1) A watch with a centre seconds hand which can be caused to start, stop, and fly back to zero by pressing the button or a push-piece on the side of the case. The chronograph mechanism is independent of the going train, so that the balance is not stopped when the centre seconds hand is stopped. See **stop watch.**—(2) Any type of mechanism which gives a record of time intervals; e.g. a *tape chronograph* in which a long paper tape is used, the time intervals being marked on the tape by pens actuated electromagnetically by a chronometer or other suitable time standard.

chronom'eter (*Horol.*). A precision timekeeper. In Great Britain and U.S.A. the term denotes the very accurate timekeeper kept on board ships for navigational purposes, and fitted with the spring detent escapement. On the Continent the term is also applied to any very accurate clock or watch which may be fitted with the spring detent or lever escapement.

chronometer clock (*Horol.*). A clock fitted with a chronometer escapement.

chronometer escapement (*Horol.*). The spring detent escapement. A highly detached escapement, capable of giving the most exacting performance. Impulse is given to the balance every alternate vibration. Locking is performed by a pallet on a spring detent, and unlocking by a discharging pallet carried on a roller on the balance staff.

chron'opher (*Teleg.*). The arrangement for automatically switching standard time signals from an observatory to telegraph lines.

chrys'alis (*Zool*). The pupa of some Insects, especially *Lepidoptera*: the pupa-case of *Lepidoptera*.

chrysan'iline (*Chem*). See **phosphine** (2).

chrys'oberyl (*Min*). Aluminate of beryllium, crystallising in the orthorhombic system. The crystals often have a stellate habit and are green to yellow in colour. In the gemstone trade yellow chrysoberyl is known as *chrysolite*.

chrysoberyl cat's eye (*Min.*). See **cymophane.**

chrysocol'la (*Min.*). A hydrated silicate of copper, often containing free silica and other impurities. It occurs in encrustations or thin seams, usually blue and amorphous.

chrysogonid'ium (*Bot.*). A yellow algal cell in a lichen.

chrysoi'dine (*Chem*). 2,4-Diamino-azobenzene hydrochloride, C_6H_5 N N $C_6H_3(NH_2)_2 \cdot HCl$, an orange-red azo-dyestuff for dyeing direct silk and wool.

chrys'olite (*Min.*). The mineralogical name for common *olivine* (q.v.), sometimes restricted to the pale-yellowish crystals of gemstone quality. The term is incorrectly applied to chrysoberyl of golden-yellow colour.—CEYLONESE CHRYSOLITE, the trade name for the fine golden-yellow chrysoberyl obtained in Ceylon and used as a gemstone.

Chrysomonadi'na (*Zool.*). An order of *Phytomastigina*, comprising forms with one or two flagella; yellow, brown, or colourless; often of amoeboid form; without a gullet or a transverse groove; having food-reserves of leucosin and oil, but not of starch; without a contractile vacuole.

chrys'oprase (*Min.*). An apple-green variety of chalcedony; the pigmentation is probably due to the oxide of nickel.

chrys'otile (*Min*). A fibrous variety of serpentine, occurring in small veins. It forms part of the asbestos of commerce. Also called CANADIAN ASBESTOS.

C.H.U. (*Eng.*). Abbrev. for *Centigrade heat unit*, the same as the *pound-calorie* (q.v.).

chuck (*Eng.*). A device attached to the spindle of a machine tool, for gripping the revolving work, cutting tool, or drill.

See **bell—**
combination—
cup—
independent—
magnetic—
scroll—
self-centring—
universal—

chucking machine (*Eng.*). A machine tool in which the work is held and driven by a chuck, not supported on centres.

chuffs (*Build.*). Bricks which have been rendered useless owing to the presence in them of cracks caused by rain falling on them while they were hot. Also called SHUFFS.

chumship (*Typog.*). The Scottish equivalent of *companionship* (q.v.).

churning loss (*Automobiles, etc.*). In a gear-box, the power wasted in fluid friction through the pumping action of the revolving gears in the oil.

chute (*Hyd.*). An inclined channel for conducting water to a water-wheel.

chute (*Mining*). (1) An inclined trough for the transference of broken coal or ore.—(2) An area of rich ore in an inclined vein or lode, generally of much greater vertical than lateral extent.

chute (*San. Eng.*). A special tapered outlet pipe from a deep inspection chamber, employed to make rodding easier.

Chvostek's sign (*Med.*). Twitching of the muscles of the face on tapping the facial nerve; a sign of tetany.

chyle, kil (*Zool.*). In Vertebrates, lymph containing the results of the digestive processes, and having a milky appearance due to the presence of emulsified fats.—*adjs.* **chyla'ceous, chylif'erous, chylif'ic.**

chylification, chylifaction (*Zool.*). Formation of *chyle* (q.v.).

chylocaul'ous (*Bot.*). Having a succulent stem.

chyloperitone'um (*Med.*). The presence of chyle in the peritoneal cavity as a result of obstruction of the abdominal lymphatics.

chylophyl'lous (*Bot.*). Having succulent leaves.

chylopoesis, —pō-ē'sis (*Zool*). See **chylification.**

chylotho'rax (*Med.*). The presence of chyle in the pleural cavity, due to injury to, or pressure on, the thoracic duct.

chylu'ria (*Med.*). The presence of chyle in the urine.

chyme, kīm (*Zool.*). In Vertebrates, the semi-fluid mass of partially digested food, entering the small intestine from the stomach.

chymification (*Zool.*). The formation of *chyme* (q.v.).

C.I. engine. See **compression-ignition engine.**

cicatricial. *Adj.* from *cicatrix.*

cic'atricle, cicatric'ula (*Zool.*). In heavily yolked eggs, the germinating area of blastoderm.

cicatrisation (*Bot., etc*). The formation of scar tissue.

cic'atrix (*Bot.*). A scar left on a plant where a member has been shed.—(*Med., Zool*) The scar left after the healing of a wound: one which marks the previous point of attachment of an organ or structure.

Cico'niifor'mes (*Zool*). An order of *Pelargomorphae* having a desmognathous palate and usually webbed feet; all are of aquatic habit, but some are wading Birds (e.g. Pelicans, Herons, Ibises, Spoonbills, and Flamingoes), some are powerful swimmers and divers (e.g. Gannets and Cormorants), while others are powerful fliers (Frigate Birds).

cil'ia (*Zool.*). In Mammals, the eyelashes: in Birds, the barbicels of a feather: in general, small lash-like processes of a cell which beat rhythmically and cause locomotion, or create a current of fluid.—*sing.* **cilium.**—*adjs.* **ciliated, ciliate.**

cil'iary (*Zool.*). In general, pertaining to or resembling cilia: in Vertebrates, used of certain structures in connexion with the eye, as the *ciliary ganglion, ciliary muscles, ciliary process.*

Cilia'ta (*Zool.*). A subclass of *Ciliophora*, the members of which possess cilia throughout life.

cil'iate, cil'iated (*Bot.*). (1) Having a fringe of long hairs on the margin.—(2) Having flagella.

cil'iograde (*Zool.*). Moving by the agency of cilia.

cil'iolate (*Bot.*). Fringed with very short, fine hairs.

Cilioph'ora (*Zool.*). A class of *Protozoa*, comprising forms which always possess cilia at some stage of the life-cycle, and usually have a meganucleus.

cil'iospore (*Zool.*). In *Protozoa*, a ciliated swarm-sphore.

cil'ium (*Bot.*). (1) A hair-like appendage to a spore.—(2) See **flagellum.**—*pl.* **cilia.**

cilium (*Zool.*). *Sing.* of *cilia* (q.v.).

Cimarron Series, sim-ar-ŏn' (*Geol.*). Red beds occurring above the salt deposits in the Permian of Kansas.

Ciment Fondu, se-mahn^g' fon^{g}dü' (*Civ. Eng.*). A rapid-hardening cement made by heating lime and alumina in an electric furnace to incipient fusion, and afterwards grinding to powder. Also known as ELECTRIC CEMENT.

cinching (*Cinema.*). Tightening a roll of film by holding the centre and pulling the edge.

cinchona bases, sin-kō'na (*Chem.*). Alkaloids present in cinchona bark, derivatives of quinoline.

cin'chonine (*Chem.*). $C_{19}H_{22}ON_2$, an alkaloid of the quinoline group, found in cinchona and cuprea barks; crystallises in rhombic prisms from alcohol, m.p. 264° C. It behaves as a diacidic base and gives two series of salts.

Cincinnat'ian (*Geol.*). Strata in N. America equivalent in age to the Upper Ordovician of N.W. Europe and including, among other formations, the *Utica Shales* and *Trenton Limestone* (qq.v.).

cincin'nus (*Bot.*). A cymose inflorescence in which the lateral axes arise on alternate sides of the relatively main axis.

cinclides, sin'kli-dēz (*Zool.*). In *Anthozoa*, perforations of the body-wall for the extrusion of acontia.—*sing.* **cinclis.**

cincture (*Arch.*). A plain ring or fillet round a column, generally placed at the top and bottom to separate the shaft from its capital and its base.

Cinder Bed (*Geol.*). A marine band in the freshwater Purbeck Series of Dorset, composed largely of fossil oyster shells.

cinder pig (*Met.*). Pig-iron made from a charge containing a considerable proportion of slag from puddling or reheating furnaces.

ciné camera, sin'ā (*Cinema.*). A motion-picture camera using film smaller in width than standard stock, usually 16 and 9·5 mm.; used mainly for amateur and scientific cinematography.

ciné film (*Cinema.*). The same as *sub-standard film.*

Cinecolor (*Photog.*). American two- and three-colour subtractive processes for colour cinematography.

cinemagazine (*Cinema.*). A film consisting of short sequences of matters of pictorial interest, other than sequences used in news-reels.

Cineop'tichrome (*Photog.*). A French additive colour cinematographic process.

cineaste, sin'e-ast (*Cinema.*). One who takes an advanced view of the artistic possibilities of motion pictures.

cinema (*Cinema.*). A location, usually indoors, where motion films are projected to audiences; arranged to afford optimum visual and aural reception to the maximum economic number of seats, with ambient comfort.

cinema organ. The same as *theatre organ.*

cinematic (*Cinema.*). Said of a literary work, of natural scenery, or of human occupations, when these are considered suitable subjects for effective presentation by motion pictures.

cinematograph camera (*Photog.*). A camera, with intermittent motion, in which frames are exposed successively, for subsequent projection after processing.

cinematograph film (*Cinema.*). A motion picture in which the appearance of motion is effected by the flashing, on a screen, of successive pictures, each slightly different, in sequence; e.g. at 24 per second. See **sound-film.**

cin'eole (*Chem.*). Eucalyptole, $C_{10}H_{18}O$, b.p. 176° C.; optically inactive; considered to be the internal anhydride or ether of terpin. It has no alcoholic or ketonic properties, but forms hydrochlorides, phosphates, arsenates, and additive compounds with phenols.

cine'reous (*Bot.*). Grey, like wood ashes.

cin'gulum (*Zool.*). Any girdle-shaped structure. In *Annelida*, the clitellum: in *Rotifera*, the outer post-oral circlet of cilia: in Mammals, a tract of fibres connecting the hippocampal and callosal convolutions of the brain: in Mammals, a ridge surrounding the base of the crown of a tooth and serving to protect the gums from the hard parts of food.

cin'nabar (*Min.*). Sulphide of mercury, HgS, occurring as red acicular crystals, or massive; the ore of mercury, worked extensively at Almadén, Spain, and elsewhere.

cin'nabarine (*Bot.*). Bright orange-red.

cinnam'ic acid (*Chem.*). $C_6H_5{\cdot}CH\,CH{\cdot}COOH$, m.p. 133° C., b.p. 300° C.; an unsaturated monobasic aromatic acid, technically prepared from benzal chloride by heating with sodium acetate. It exhibits a peculiar isomerism inasmuch as there are known a trans-form and three cis-forms—Liebermann's iso-cinnamic acid, m.p. 57° C.; Erlenmeyer's (sen.) iso-cinnamic acid, m.p. 38°-46° C.; Liebermann's allo-cinnamic acid, m.p. 68° C.—which, however, are not chemically isomeric, but represent a case of trimorphism.

cinnamic aldehyde (*Chem.*). $C_6H_5{\cdot}CH\,CH{\cdot}CHO$, b.p. 246° C.; an oil of aromatic odour; the chief constituent of cinnamon oil and of cassia oil.

cinnamon stone (*Min.*). See **hessonite.**

Cinophot (*Photog.*). A visual estimating device for determining stops or exposures; it is based on the threshold of visual sensitivity of the eye.

cinquefoil, sink'foil (*Arch.*). A five-leaved ornament used in panellings, etc.

cipher (*Acous.*). See under **ventil.**

cipher tunnel (*Build.*). A false chimney built on to a house for symmetrical effect.

cip'olin (*Build.*). A white marble with green streaks; used for decorative purposes.

Cipolletti weir, chē-pol-et'i (*Hyd.*). A weir in which the notch plate has a trapezoidal opening tapering down to the sill with side slopes of 1 (horizontal) in 4 (vertical).

C.I.P.W. (*Geol.*). A quantitative scheme of rock classification based on the comparison of norms; devised by four American petrologists, Cross, Iddings, Pirsson, and Washington.

cir'cinate (*Bot.*). Rolled inwards from the apex towards the base, resembling a crozier in form.—(*Med.*) Rounded, circular.

circle (*Geom.*). A plane curve which is the locus of a point which moves so that it is at a constant distance (the *radius*) from a fixed point (the *centre*). The length of the circumference of a circle is $2\pi r$, and its area πr^2, where r is the radius and π is equal to 3·141593 (to 6 places).

circle (*Lace*). The arc formed by the combs on which the carriages ride.

circle coefficient (*Elec. Eng.*). A term often used to denote the leakage factor of an induction motor.

circle diagram (*Elec. Eng.*). A vector diagram representing conditions in certain types of electric circuit; in the diagram the locus of the end of a current or voltage vector moves round a circle. Commonly used in connexion with induction motors, in which case the locus of the end of the stator current vector lies on a circle.

circle of confusion (or **diffusion**) (*Photog.*). The minimum area of a focused bright point of light, the size of which determines the maximum definition possible with a given lens arrangement and stop.

circle of curvature (*Geom.*). A circle which touches a curve at a given point and has its centre at the centre of curvature of the curve at that point.

circle of least confusion (*Photog.*). The image of a point source of light cannot be perfect, and the diameter of this image is a measure of the limit of definition. The maximum permissible diameter for sharp definition is taken to be 0·01 in.

circle on circle (*Carp., Join.*). Work which is shaped so as to present a curved outline both in plan and elevation.

circuit (*Cinema.*). A number of cinemas associated under a common control, to ensure exhibition of cinematograph films.

circuit (*Elec. Comm.*). The whole or part of the path of transmitted electrical energy in a communication channel.

See **buffer—**
closed—
composite—
copper—
cord—
direct—
divided—
double-phantom—
earth-return—
forked—
four-wire—
ghost—
grounded—
junction—
loaded—
metallic—
monitoring—
octuple-phantom—
open—
open-wire—
order wire—
phantom—
phonogram—
physical—
quadruple-phantom—
side—
superposed—
tank—
toll—
track—
transfer—
trunk—
trunk-record—
two-wire—

circuit (*Elec. Eng.*). A number of conductors connected together for the purpose of carrying an electric current.

circuit-breaker (*Elec. Eng*). A switch for making and breaking an electric circuit under normal conditions, and also under abnormal conditions such as a short-circuit.

See **air-blast—**
air-break—
cross blast—
expansion—
oil—
oil-poor—
oil-less—

circuital magnetisation (*Elec. Eng.*). See **solenoidal magnetisation.**

circular error (*Horol*). The variation in the isochronism of a pendulum due to the path of the bob being that of a circular arc instead of a cycloid. For small amplitudes the error is small, and for precision clocks the amplitude is kept to about two degrees on either side of the line of suspension.

circular level (*Surv.*). A form of level employed on various surveying instruments; in it the liquid is contained in a box covered with a glass shaped to present to the liquid a concave surface which is a portion of a sphere, so that when the circular bubble is central the level is on a truly horizontal plane.

circular magnetisation (*Elec. Eng.*). Magnetisation of a cylindrical piece of magnetic material in such a way that the lines of force are circumferential.

circular measure (*Geom.*). The expression of an angle in *radians*, one radian being the angle subtended at the centre of a circle by an arc of length equal to the radius. There are thus 2π, or approximately 6·283, radians in one complete revolution. Generally, the angle between two lines meeting at the centre of a circle is equal to the ratio of the length of arc between the two lines to the radius of the circle.

circular mil (*Elec. Eng.*). A unit of area commonly used in America for denoting wire sizes; it is equal to the area of a wire one mil (0·001 in.) in diameter.

circular mitre (*Carp., Join.*). A mitre formed between a curved and a straight piece.

circular pitch (*Eng.*). The distance between corresponding points on adjacent teeth of a gear-wheel, measured along the *pitch circle* (q.v.).

circular plane (*Carp.*). A plane adapted (through the use of special irons) for producing curved surfaces, either convex or concave.

circular polarisation (*Light*). A type of polarisation produced when one of two equal, mutually perpendicular, plane-polarised components is retarded by a quarter of a period relative to the other. It may be produced by allowing plane-polarised light to pass through a quarter-wave plate, with its principal plane at 45° with the plane of polarisation.

circular polarisation (*Radio*). The state of polarisation of an electromagnetic wave when its electric and magnetic fields each contain two equal components, at right-angles in space and in phase quadrature.

circular saw (*Eng.*). A steel disc carrying teeth on its periphery, used for sawing wood, metal, or other materials; usually power-driven. See **cold saw, hot saw.**

circular scanning (*Television*). A system of scanning in which the spot follows a nearly circular (strictly, spiral) path.

circular stairs (*Build.*). Stairs in which all the steps are winders and which are enclosed within a staircase circular in plan.

circular time base (*Cathode Ray Tubes*). A device for causing the spot on the screen of a cathode ray tube to traverse a circular path at a constant angular velocity.

circulating current (*Elec. Comm.*). The current which flows round the loop of a complete circuit, as contrasted with *longitudinal current*, which flows along the two sides or legs of the same circuit, in parallel.—(*Elec. Eng.*) A current flowing round a closed circuit forming part of a larger electrical network.

circulating-current protective system (*Elec. Eng.*). A form of Merz-Price protective system in which the current transformers at the two ends of the circuit to be protected are arranged to circulate a current round the pilots, any difference in the currents from the two transformers passing through a relay.

circulating pump (*Eng.*). A pump, usually of centrifugal type, used to circulate cooling water through the condenser of a steam plant. See **centrifugal pump.**

circulation (*Bot.*). A rotatory movement of the protoplasm inside a cell.

circulation (*Elec. Eng.*). The line integral of a vector, representing, for example, an electric or magnetic field intensity, round a closed contour.

circulation (*Physiol*). The continuous movement of the blood through the heart, arteries, capillaries, and veins.

circulation (*Teleg.*). The section of a large telegraph centre in which there are sorting arrangements for routing the transmission of telegrams.

circulation of electrolyte (*Elec. Eng.*). Movement of the electrolyte in an electroplating bath in order to ensure an even deposit.

circulatory system (*Zool.*). A system of organs through which is maintained a constant flow of fluid, which facilitates the transport of materials between the different organs and parts of the body.

cir'culus (*Zool.*). An annular arrangement of blood-vessels, as the *circulus cephalicus* of Fish.

circum- (Latin *circum*, around). A prefix used in the construction of compound terms; e.g. *circumoesophageal*, surrounding the oesophagus.

circumcision (*Surg.*). Surgical removal of the prepuce or foreskin in the male or of the labia minora in the female.

circum'ferentor (*Surv., etc.*). (1) A compass provided with a graduated card and adjustable sighting-vanes to establish a line of sight. Much used in mine surveying.—(2) A graduated wheel, turning on an axle fixed in a handle, used to measure the circumference of a wheel. Also called a TYRE-MEASURER.

circumfil'i (*Zool.*). Conspicuous whorls of hair occurring on the antennae of certain Insects, as Gall Midges (*Cecidomyidae*).

circumflex accent (*Typog.*). An accent occurring mostly in words of French origin, as in *depôt*.

circumfluence (*Zool.*). See **circumvallation.**

circumnuta'tion (*Bot.*). The rotation of the tip of an elongating stem, so that it traces a helical curve in space.

circumpolar stars (*Astron.*). Those stars which, for a given locality on the earth, do not rise and set but revolve about the elevated celestial pole, always above the horizon. To be a circumpolar, a star's declination must exceed the co-latitude of the place in question.

circumscis'sile (*Bot.*). Splitting open by a circular tear.

circumscribe (*Drawing*). To draw one plane figure so as to enclose another.

circumvalla'tion (*Zool.*). The action of a phagocytic cell, or of a Sarcodine, in engulfing foreign bodies or food particles by the extrusion of pseudopodia.

cirque or **corrie** (*Geol.*). A semi-amphitheatre, or 'armchair-shaped' hollow, of large size, excavated in mountain country by, or under the influence of, ice.

cirrals, sir'alz (*Zool*). In *Crinoidea*, the hollow ossicles supporting the cirri.

cir'rate, cirrif'erous (*Bot., Zool.*). Bearing cirri.

cirrh-. Erroneously derived prefix sometimes used in terms relating to *cirrus*.

cirrho'sis (*Med.*). (1) A disease of the liver in which there are increase of fibrous tissue and destruction of liver cells.—(2) Diffuse increase of fibrous tissue in any organ. (Greek *kirros*, orange-tawny.)

Cirripe'dia (*Zool.*). A subclass of marine *Crustacea*, generally of sessile habit when adult; the young are always free-swimming; the adult possesses an indistinctly segmented body which is partially hidden by a mantle containing calcareous shell plates; there are six pairs of biramous thoracic legs; attachment is by the antennules; many species are parasitic. Barnacles.

cirro-cumulus (*Meteor.*). Small rounded masses or white flakes of cloud without shadows, arranged in groups and often in lines. They are composed of ice crystals and occur at heights above 25,000 ft. Also called MACKEREL SKY.

cirro-stratus (*Meteor.*). A thin sheet of whitish cloud; sometimes covering the sky completely and giving it a milky appearance (it is then called *cirro-nebula* or *cirrus haze*); at other times presenting more or less distinctly a fibrous structure like a tangled web. This type of cloud, being composed of ice crystals, often produces haloes of radius 22° around the sun and moon.

cir'rose (*Bot., Zool.*). Curly: like a waved hair.

cir'rus (*Bot.*). A *tendril* (q.v.).—(*Zool.*) In *Protozoa*, a stout conical vibratile process, formed by the union of cilia: in some *Platyhelminthes*, a copulatory organ formed by the protrusible terminal part of the vas deferens: in *Annelida*, a filamentous tactile and respiratory appendage: in *Cirripedia*, a ramus of a thoracic appendage: in *Insecta*, a hair-like structure on an appendage: in *Crinoidea*, a slender jointed filament arising from the stalk or from the centro-dorsal ossicle and used for temporary attachment: in Fish, a barbel.

cirrus (*Meteor.*). Detached clouds of delicate appearance, fibrous structure, and feather-like form; white in colour; composed of ice crystals; occur at heights between 25,000 and 35,000 ft.

cirsoid aneurysm (*Med.*). A mass of newly formed, tortuous, and dilated arteries.

***cis*-** (*Chem.*). A prefix indicating that geometrical isomer in which the two radicals are situated on the same side of the plane of a double bond or alicyclic ring.

cissing (*Paint.*). A defect in paint, enamel, or varnish work due to poor adhesion; characterised by the rising of blobs on the surface of the work.

cissoid (*Maths.*). The inverse of a parabola with respect to its vertex. It may be represented by the equation: $x(x^2+y^2)=by^2$.

cistern (*Build.*). A tank for storing up a supply of water which may later be drawn upon as required.

citral (*Chem.*). Geranial, $C_{10}H_{16}O$, an olefinic terpene of the formula CH_2:CMe·CH_2·CH_2·CH_2 CMe.CH·CHO; b.p. 110°-112° C. (12 mm.); it occurs in the oil of lemons and oranges and in lemon-grass oil.

citrates (*Chem.*). The salts of citric acid.

citrene (*Chem.*). See ***d*-limonene.**

citric acid (*Chem.*). HOOC CH_2·C(OH)(COOH)·CH_2·COOH, hydroxy-tricarballylic acid; large rhombic prisms, m.p. 153° C.; obtained from lemon juice, which contains 6-7% of the acid; it can be synthesised from *sym.* dichloracetone.

citriform (*Bot.*). Lemon-shaped.

citrine, citron-colour (*Bot.*). Lemon-coloured.

citrine or **quartz topaz** or **false topaz** (*Min.*) Not the true *topaz* (q.v.) of mineralogists, but a yellow variety of quartz, which closely resembles it in colour though not in other physical characters; it is of much less value than true topaz. It figures under a variety of geographical names; e.g. *Bohemian topaz*, *Indian topaz*, *Madagascar topaz*, *Madeira topaz*, and *Spanish topaz* (q.v.). See also **Scotch topaz, smoky quartz**; and cf. *Brazilian topaz*, which is the true mineral.

citron yellow (*Paint.*). See **zinc yellow.**

citronel'lal (*Chem.*). CH_2·CMe·CH_2·CH_2·CH_2·CHMe·CH_2·CHO, an olefinic terpene aldehyde, b.p. 205°-208° C.; present in citronella oil and in lemon-grass oil.

City solder (*Plumb.*). Solder which has been stamped by the Livery Guild of Plumbers of the City of London.

civery (*Arch.*). One bay of a vaulted ceiling. Also spelt SEVERY.

civil engineering. 'The art of directing the great sources of power in nature for the use and convenience of man.' It includes the design and construction of roads, railways, bridges, aqueducts, canals, docks, ports, harbours, moles, breakwaters, lighthouses, and drainage works. The term originated in the distinction of such engineering activities from those associated with military operations, e.g. fortifications, ordnance, etc.

Cl (*Chem.*). The symbol for *chlorine*.

clack or **clack valve** (*Eng.*). A check valve admitting water from a feed pump to the boiler of a locomotive. A ball valve is used, the name *clack* being derived from the characteristic sound of the ball striking its seat. See **feed check valve.**

clad-, clado- (Greek *klados*, a slip or shoot). A prefix used in the construction of compound terms; e.g. *cladocarpous* (q.v.).

cladautoi'cous (*Bot.*). Said of a moss which bears the antheridia on a separate branch.

cladocar'pous (*Bot.*). Having the fruit at the end of a lateral shoot.

Cladocera, —os'era (*Zool.*). An order of freshwater *Branchiopoda* having a bivalve carapace enclosing the body but not the head; the eyes are sessile and coalescent; the second antennae are biramous and natatory; the trunk limbs are few in number; the caudal furca are claw-like. Water Fleas.

Cladoco'pa (*Zool.*). An order of *Ostracoda*, in which the shell lacks an antennal notch; there are three pairs of postoral limbs and the caudal furca have lamellar rami armed with spines.

cladode (*Bot.*). A flattened branch, which looks like, and functions as, a leaf.

cladogen'ous (*Bot.*). Producing the inflorescences at the ends of branches.

cla'dophyll (*Bot.*). A cladode.

cladopto'sis (*Bot.*). The shedding of branches.

cladosiphon'ic (*Bot.*). A term applied to a siphonostele which has branch gaps, but not leaf gaps.

clagging (*Foundry*). The adhesion of blacking to a trowel or sleeker during smoothing of the surface of a mould.

clairecolle (*Dec.*). See **clearcole.**

Claisen condensation, klā′zen (*Chem.*). An important synthetic reaction involving condensation between esters, or between esters and ketones, in the presence of sodium ethoxide.

Claisen flask (*Chem.*). A distillation flask used for vacuum distillations; it consists of a glass bulb with a neck for a thermometer, to which another neck with outlet tube is attached.

Claisen reaction (*Chem.*). The elimination of water from an aliphatic and an aromatic aldehyde in the presence of caustic soda, an unsaturated aldehyde being formed; e g. cinnamic aldehyde is thus formed from acetaldehyde and benzaldehyde.

clam-forceps (*Vet.*). An instrument for closing wooden clams.

clams (*Vet*). Instruments, usually made of wood, for effecting compression; used commonly for castrating stallions and bulls.

clamp (*Build*). A stack of dried raw bricks built up for burning, together with cinders and coal, over a system of flues roughly formed with burnt bricks.

clamp (*Join*). A wooden frame consisting of two parallel bars connected by two tightening screws; used to hold parts together while a glued joint dries, or to secure work in process of being formed.

clamp bricks (*Build.*). Stock bricks burnt in a clamp.

clamp connexion (*Bot*). A short, backwardly directed hypha, present across the septa of hyphae of some *Basidiomycetes*, formed as the nuclei divide, and making possible the distribution of the daughter nuclei in the two segments formed from the terminal segment of the hypha.

clamping screw (*Elec. Eng.*). A screw for holding a conductor to a piece of apparatus used in electrical installation work (e.g. a ceiling rose or switch). Also called a TERMINAL SCREW.

clan (*Bot.*). A small clump formed of individuals of a single species, and developed either as a result of vegetative multiplication or from seed scattered over a small area.

clan (*Geol.*). A suite of igneous rock-types closely related in chemical composition but differing in mode of occurrence, texture, and possibly in mineral contents.

clap (*Acous.*). See **thunder.**

clap (*Med.*). *Gonorrhoea* (q.v.).

clap-board (*Carp.*). A form of weather-board which is tongued and rebated and frequently moulded, rather than being feather-edged.

clap-board gauge (*Carp.*). A gauge used in fixing clap-boarding, to ensure that each board is so set as to expose a parallel width.

clap post (*Join.*). The upright post against which the door of a cupboard ' claps ' in closing.

clap-sill (*Hyd. Eng.*). See **mitre-sill.**

clapper box (*Eng.*). A slotted tool head carried on the saddle of a planing machine. It carries a pivoted block to which the tool is clamped, thus allowing the tool to swing clear of the work on the return stroke of the table.

clappers (*Cinema.*). A device, usually consisting of two hinged pieces of board, which is closed sharply in front of a camera in sound-film production, thus providing synchronisation indication on the picture-track and the sound-track, the noise of the clappers resulting in a characteristic record on the latter.

clarain (*Coals*). A separable constituent of bright coal.

clarendon (*Typog.*). A heavy type-face: **Clarendon.**

Claret-Vuilleumier surface-contact system, klar-ā vwē-ėm′yā (*Elec. Eng.*). A system of surface-contact traction in which the supply to the studs is controlled by electromagnetic distributor switches at intervals along the track. Formerly used in Paris.

Clark cell (*Chem.*). A standard cell consisting of a zinc anode and a mercury cathode covered with mercurous sulphate paste, both dipping into a saturated solution of zinc sulphate.

Clark process (*Chem.*). A process for effecting the partial softening of water by the addition of sufficient limewater to convert all the acid carbonates of lime and magnesium into the normal carbonates.

clasmat′ocyte (*Zool.*). A large actively phagocytic cell occurring in areolar tissue and having a marked tendency to take up vital stains.

clasp nail (*Build.*). A square-section cut nail whose head has two pointed projections that sink into the wood.

clasp nut (*Eng.*). A nut split diametrally into halves, which may be closed so as to engage with a threaded shaft; used as a clutch between a lathe lead screw and the saddle.

claspers (*Zool.*). In Insects, an outer pair of gonapophyses: in male Selachian Fish, the inner narrow lobe of the pelvic fin, used in copulation: more generally, any organ used by the sexes for clasping one another during copulation.

class (*Bot., Zool.*). In biometry, a group of organisms all falling within the same range as indicated by the unit of measurement employed: in the plant kingdom, one of the larger subdivisions: in the animal kingdom, one of the groups into which a phylum is divided, ranking next above an *order* (q.v.).

class-A amplifier (*Elec. Comm.*). A thermionic amplifier in which the polarising voltages are adjusted for complete operation on the linear portion of the characteristic curves of the valve, without grid current.*

class-A oils (*Diel.*). See **oils.**

class-AB amplifier (*Elec. Comm.*). A thermionic amplifier in which the valve has its grid-bias so adjusted that the operation is intermediate between classes A and B, i.e., the anode current is shut off during part of the excitation cycle, but the quiescent anode current is not reduced to a small value.*

class-A, -B, -C, or -O insulating materials (*Elec. Eng.*). A classification of insulating materials according to the temperature which they will withstand; laid down in British Standard Specifications.

class-B amplifier (*Elec. Comm.*). A thermionic amplifier in which the grid-bias is adjusted to give the lower cut-off in anode current. Applied, colloquially, also to the combination of two such valves in one envelope, the two valves being designed to operate with grid current and substantially zero grid-bias, and in anti-phase.*

class-B oils (*Diel.*). See **oils.**

class-C amplifier (*Elec. Comm.*). A thermionic amplifier in which the grid-bias is greatly in excess of that in class B, and in which the anode output power becomes proportional to the anode voltage for a given grid excitation.*

class-room film (*Cinema.*). A documentary motion picture, usually without sound, for educational purposes (especially for exhibition in the class-room to children).

classification of the elements (*Chem.*). See **periodic system.**

classifier (*Met.*). A machine for separating the product of ore-crushing plant into two portions consisting of particles of different sizes. In general, the finer particles are carried off by a stream of water, while the larger settle. The fine portion is known as the *overflow* or *slime*, the coarse as the *underflow* or *sand*.

clastic rocks (*Geol.*). Rocks formed of fragments of pre-existing rocks. The term is broadly synonymous with *sedimentary*.

clathrate (*Bot.*). Like lattice-work.

Claude process (*Chem.*). A method of liquefying air in stages, the expanding gas being cooled by external work on pistons.

claudication (*Med.*). The action of limping. See **intermittent claudication.**

Claudius' cells (*Zool.*). In Mammals, cuboidal epithelium cells lying on the basilar membrane of the cochlea.

Claus' blue (*Chem.*). A name sometimes applied to the blue solution of rhodium trioxide in alkali hydroxide, considered to be an alkali rhodate.

Claus'ius - Clapeyron equation, klap-ā-ron$^{g'}$ (*Chem.*). This shows the influence of pressure on the temperature at which a change of state occurs, and the variation of vapour pressure with temperature.

$$q=T\cdot\Delta v\cdot\frac{dp}{dT},$$

where q is the heat absorbed (latent heat); T is the absolute temperature; Δv is the change of volume.

claustropho'bia (*Med.*). Abnormal fear of being in a confined space.

claustrum (*Zool.*) In *Ostariophysi*, one of the Weberian ossicles, but not forming part of the Weberian chain: in higher Vertebrates, a thin layer of grey matter in the cerebral hemispheres.

clav'a (*Bot.*). A club-shaped stroma formed by a fungus.—(*Zool.*) A gradual swelling at the distal end of a structure, resembling a club.

clavate. *Adj.* from *clava*: shaped like a club (e.g. *clavate* antennae).

clav'icle (*Zool.*). In Vertebrates, the collar-bone, an anterior membrane bone of the pectoral girdle.—*adj.* **clavic'ular.**

clav'icorn (*Zool.*). Having clavate antennae.

clavicula'rium (*Zool.*). See **epiplastron.**

clavo'la (*Zool.*). In Insects, the remainder of the antenna, excluding the scape and the pedicel.

clav'ula (*Zool.*). In *Spatangoidea*, a small ciliated spine occurring in a fasciole: in *Porifera*, a rod-shaped spicule bearing a discoidal expansion at one end.

clav'ulate (*Bot.*). Somewhat club-shaped, but not so distinctly as to be *clavate.*

cla'vus (*Zool.*). The narrow area of the hardened basal part of the hemelytron of *Hemiptera*, adjacent to the scutellum. Cf. *corium.*

clavus hyster'icus (*Med.*). Pain in and tenderness of the scalp, with the sensation as if a nail were being driven into the head; occurs in hysteria.

claw (*Bot.*). The narrow, elongated lower portion of a petal in some plants.

claw (*Carp.*). A small tool with a bent and split end, used for extracting tacks.

claw (*Zool.*). A curved, sharp-pointed process at the distal extremity of a limb: in *Vertebrata*, a nail which tapers to a sharp point.

claws (*Cinema.*). The means whereby the motion-picture film is intermittently fed forward through the picture gate, the claws operating on the sprocket holes.

claw bolt (*Carp.*). A wrought-iron bolt with a long head flattened in a direction parallel to the length of the bolt, and bent over at right-angles near the end.

claw chisel (*Build.*). A chisel, having a 2-in.-long serrated cutting edge, used for rough-dressing building stone.

claw coupling or **claw clutch** (*Eng.*). A shaft coupling in which flanges carried by each shaft engage through teeth cut in their opposing faces, one flange being slidable axially for disengaging the drive.

claw foot (*Med.*). See **pes cavus.**

claw-hammer (*Carp.*). A hammer having a bent and split peen which may be used for extracting a nail by giving leverage under its head.

claw hand (*Med.*). The claw-like position adopted by the hand when the muscles supplied by the ulnar nerve are paralysed.

clay (*Geol., etc.*). A fine-textured, sedimentary, or residual deposit. It consists of hydrated silicates of aluminium mixed with various impurities. The true clay substance is in part colloidal. Clay for use in the manufacture of pottery and bricks must be fine-grained and sufficiently plastic to be moulded when wet; it must retain its shape when dried, and sinter together, forming a hard coherent mass without losing its original shape, when heated to a sufficiently high temperature. *

clay ironstone (*Geol.*). Nodular beds of clay and iron compounds, often associated with the Coal Measure rocks.

clay press (*Pot.*). A press used to squeeze water out of slip, which is then dried and ground.

clay puddle (*Civ. Eng.*). A plastic material produced by thoroughly mixing clay with about one-fifth of its weight of water. It is used in engineering construction to prevent the passage of water; e.g. for cores for earthen reservoir dams.

clay slate (*Geol.*). A hard fissile metamorphic rock, derived from argillaceous material.

clay with flints (*Geol.*). A stiff clay, containing unworn flints, which occurs as a residual deposit in Chalk areas, but which is extensively mixed with other superficial deposits.

claying (*Civ. Eng.*). The operation of lining a blast-hole with clay to prevent the charge from getting damp.

cleading (*Eng.*). *Lagging* (q.v.).

cleading (*Hyd. Eng.*). The boarding of a coffer-dam or timber lock-gate.

clean (*Typog.*). Said of a proof sheet containing no corrections.

clean-up (*Elec. Eng.*). The improvement in the vacuum which occurs in an electric discharge tube or vacuum lamp consequent upon absorption of the residual gases by the glass.

cleaner (*Foundry*). A small brass tool used by a moulder to improve the finish of the surface of a mould. See **sleekers.**

cleaning eye (*San. Eng.*). See **access eye.**

cleaning-up (*Join.*). The operation of preparing the finished surface of joinery work.

clear (*Elec. Comm.*). A message is *in clear* when it is not coded.

clear (*Teleph.*). To take down all temporary connexions, in the form of plugs inserted into jacks, on the termination of a call.

clear lamp (*Illum.*). An electric filament lamp in which the bulb is made of clear glass.

clear span (*Build.*). The horizontal distance between the inner extremities of the two bearings at the ends of a beam.

clear-stuff (*Timber*). Timber which is free from knots, wane, shakes, doat, sapwood, and other blemishes.

clear water reservoir (*Hyd. Eng.*). See **service reservoir.**

clearance (*Eng.*). (1) The distance between two objects, or between a moving and stationary part of a machine.—(2) The angular backing-off given to a cutting tool in order that the heel shall clear the work.

clearance volume (*Eng.*). In a reciprocating engine or compressor, the volume enclosed by the piston and the adjacent end of the cylinder, when the crank is on the dead centre. See **compression ratio, cushion steam.**

clearcole (*Paint.*). A priming coat composed of size or glue with whiting and sometimes a little alum, used before applying limewashes or distemper, also as a foundation for gold-leaf. Also called CLERECOLE, CLAIRECOLLE.

clearing agent (*Biol.*). In microscopical technique, a liquid reagent which has the property of rendering objects immersed in it transparent and so capable of being examined by transmitted light.

clearing bath (*Photog.*). A bath specially used for clearing development or fixing stains from emulsions, before drying. The basis is generally chrome alum.

clearing foot (*Zool.*). In some *Phyllocarida*, a filamentous process of the second maxilla.

clearing hole (*Eng.*). A hole drilled slightly larger than the diameter of the bolt or screw which passes through it.

clearing signal (*Teleph.*). An indication, by means of a lamp, to a distant operator to disengage a circuit.

cleat (*Carp.*). A strip of wood fixed to another for strengthening purposes, or as a locating piece to ensure that another piece shall be in its correct position.

cleat wiring (*Elec. Eng.*). A system of wiring in which the wires are attached to the wall or other surface by cleats.

cleats (*Mining*). The main cleavage planes or joint planes in a seam of coal.

cleavage (*Bot., Zool.*). The series of mitotic divisions by which the fertilised ovum is transformed into a multicellular embryo.

cleavage (*Chem.*). (1) The splitting of a crystal along certain planes parallel to certain actual or possible crystal faces, when subjected to tension.—(2) The splitting up of a complex protein molecule into simpler molecules.

cleavage (*Geol.*). A property of rocks, such as slates, whereby they can be split into thin sheets. Cleavage is produced by intense pressures due to earth movement, and the cleavage planes are commonly highly inclined to the direction of the pressure which produced them.

cleavage-nucleus (*Zool.*). The nucleus of the fertilised ovum produced by the fusion of the male and female pronuclei: in parthenogenetic forms, the nucleus of the ovum.

cleaving-saw (*Tools*). See **pit-saw.**

cleft (*Bot.*). Deeply cut, but with the incisions not reaching to the midrib of the leaf.

cleft chestnut fencing (*Build.*). Fencing formed from cleft poles 2 in. to 6 in. apart, bound together with twisted wire, the fence being supported by posts about 7 ft. apart.

cleft palate (*Med.*). A gap in the roof of the mouth as a result of congenital maldevelopment, with or without hare-lip.

cleft timber (*Carp.*). Timber riven along the grain with an axe.

cleidot'omy (*Obstet.*). The cutting of the clavicles when the shoulders of the foetus prevent delivery in difficult labour.

cleis'tocarp (*Bot.*). An ascocarp in which the asci and ascospores form and ripen inside a completely closed outer wall, which breaks down, permitting the ultimate escape of the spores.

cleistocar'pous (*Bot.*). Said of a capsule which does not open by means of a lid.

cleis'togam'y (*Bot.*). The production of small flowers, often simplified and inconspicuous, which do not open, and in which self-pollination occurs. —*adjs.* **cleistogamic, cleistogamous.**

cleith'rum (*Zool.*). In some Fish, a bone of the pectoral girdle, situated lateral to each clavicle.

clench nailing (*Carp.*). A method of nailing pieces together in which the end of the nail, after passing right through the last piece, is bent back and driven into this piece, so that it may not be drawn out.

clep'sydra (*Horol.*). A water clock; the earliest known mechanism for indicating intervals of time. In its simplest form, water under a constant head flowed through an orifice into a cylinder, in which a float indicated the rise of the water level in the cylinder.

clerecole (*Paint.*). See **clearcole.**

clerk of works (*Build., Civ. Eng.*). The official appointed by the employer to watch over the progress of any given building works, and to see that contractors comply with requirements in connexion with materials and labour.

Cleveland Iron Ore (*Min.*). An ironstone consisting of iron carbonate, which occurs in the Middle Lias rocks of North Yorkshire near Middlesborough. The ironstone is oölitic and yields on the average 30% iron.

cliché, klē-shā (*Typog.*). A stereotype or electrotype plate. (French *clicher*, to stereotype.)

click (*Horol.*). A pawl or detainer used, in conjunction with a ratchet wheel, to permit rotation in one direction only.

clicks (*Radio*). Atmospheric disturbances of very short duration.

click method (*Radio*). A method of determining the resonant frequency of an oscillatory circuit, depending upon the click produced in the telephones of a heterodyne wavemeter when an oscillatory circuit coupled thereto is brought into resonance.

click spring (*Horol.*). The spring which holds the click in the teeth of the ratchet wheel.

clicker (*Typog.*). A compositor who receives copy and instructions from the overseer and distributes the work among his companions.

clicking department (*Boots and Shoes*). The department in which the uppers, linings, and various small fitments are cut out.

climate (*Meteor.*). The average weather conditions of a place. These comprise the mean daily temperature and the mean daily maximum and minimum temperature, the average humidity, amounts of cloud and sunshine and rainfall, direction and velocity of winds, all taken for each month and for the year. Climate depends on latitude, position with respect to oceans and continents, and upon local geographical conditions.

climatic climax (*Bot.*). A stable plant community maintained in any given area by the prevailing climatic conditions.

climatic community (*Bot.*). A plant community determined by the climate of the region in which it exists.

climatic factor (*Bot.*). A condition such as average rainfall, temperature, and so on, which plays a controlling part in determining the features of a plant community.

climatic zones (*Meteor.*). The earth may be divided into zones, approximating to zones of latitude, such that each zone possesses a distinct type of climate. Eight principal zones may be distinguished: a zone of tropical wet climate near the equator; two sub-tropical zones of steppe and desert climate; two zones of temperate rain climate; one incomplete zone of boreal climate with a great range of temperature in the northern hemisphere; and two polar caps of arctic snow climate.

climatology (*Meteor.*). The study of climate and its causes in relation to a particular region.

climax association (*Bot.*). The plant association which is stable under the influence of any given set of ecological factors.

climax community (*Bot.*). The stable type of vegetation which finally becomes established in any given habitat.

climax dominant (*Bot.*). A species which dominates a climax community.

climax species (*Bot.*). Any species of plant which is a characteristic member of a climax community.

climber (*Rail.*). The driving wheel of a rack-railway locomotive, meshing with the rack.

climbing form (*Civ. Eng.*). A type of form sometimes used in the construction of reinforced concrete walls for buildings. The wall is built in horizontal sections, the climbing form being raised, after the pouring of each section, into a position convenient for the pouring of the next higher section.

clinan'drium (*Bot.*). The part of the column in the flower of an orchid which bears or contains the anther.

clinch nailing (*Carp.*). See **clench nailing.**

clink (*Civ. Eng.*). A short pointed steel wedge used for excavation in hard gravel or road surfaces, for which purpose it is struck with a sledge hammer.

clink (*Plumb.*). A Scottish term for a welt joint in lead.

clinks (*Met.*). Internal cracks formed in steel by differential expansion of surface and interior during heating. The tendency for these to occur increases with the hardness and mass of the metal, and with the rate of heating.

clink-stone (*Geol.*). See **phonolite.**

clinker (*Eng.*). Incombustible residue, consisting of fused ash, raked out from coal- or coke-fired furnaces; used for road-making and as aggregate for concrete. See **breeze.**

clinkers (*Build.*). See **klinker brick.**

cli'nochlore (*Min.*). A variety of chlorite, occurring as tabular monoclinic crystals.

cli'nograph (*Drawing*). A form of adjustable set-square, the two sides forming the right-angle being fixed, while the third side is adjustable; it differs from the adjustable set-square in that no scale is provided to show the angular position of the third side in relation to the other two.

clinom'eter (*Surv.*). A hand instrument for the measurement of angles of slope.

clino-rhomboidal crystals (*Crystal.*). See **triclinic system.**

Clinton Limestones, Clinton Shales (*Geol.*). The Middle Niagara Series, well exposed in the Niagara Gorge section and locally including a bedded iron ore at the base, which supplies the iron works at Birmingham, Alabama.

clip screws (*Surv.*). The screws by which the two verniers of the vertical circle of a theodolite may be adjusted so as to eliminate index error. Also called ANTAGONISING SCREWS.

clipper (*Mining*). A man who attaches and detaches tubs to and from the rope of an endless rope haulage system.

clipping (*Acous.*). The loss of the initial or final speech-sounds in telephone transmission, due to the operation of voice-switching apparatus, which is required to prevent the circuit from singing. Obviated by the use of delay networks, so that the switching has time to operate the transmission circuits before the speech-currents pass their contacts.

Clipsham stone (*Build.*). An oölitic limestone, deep-cream or buff in colour, used as a building-stone; quarried from the Inferior Oölite at Clipsham, Oxfordshire.

clitel'lum (*Zool.*). A special glandular region of the epidermis of *Oligochaeta* which secretes the cocoon and the albuminoid material which nourishes the embryo.

clitoridec'tomy (*Surg.*). Surgical removal of the clitoris.

clitoridot'omy (*Surg.*). Circumcision of the female.

clit'oris (*Zool.*). In female Mammals, a small mass of erectile tissue, homologous with the glans penis of the male, situated just anterior to the vaginal aperture.

cloaca, klō-ā'ka (*San. Eng.*). A term for a sewer, arising from the names of those in ancient Rome.

cloaca (*Zool.*). Generally, a posterior invagination or chamber into which open the anus, the genital ducts, and the urinary ducts: in *Urochorda*, the median dorsal part of the atrium: in *Holothuroidea*, the wide posterior terminal part of the alimentary canal into which the respiratory trees open.

cloaci'tis (*Vet.*). Inflammation of the cloaca.

cloan'thite (*Min.*). See **chloanthite.**

clobbering (*Pot.*). A term applied to the decoration of Chinese blue and white china with flowers, etc., painted in enamel and fired.

clock (*Elec. Eng.*). See **counter.**

clock (*Horol.*). A timekeeper, other than a chronometer or watch. See **chiming clock, striking clock.**

clock meter (*Elec. Eng.*). An energy meter in which the current that passes causes a change in the rate of a clock. See **Aron meter.**

clock stars (*Astron.*). Those stars whose positions are taken as known, in determinations of time, longitude, and latitude by astronomical observations, and whose co-ordinates are tabulated in astronomical ephemerides such as the *Nautical Almanac*.

clock-watch (*Horol.*). A watch which strikes the hours.

clod (*Mining*). A hard earthy clay on the roof of a working place in a coal-seam, often a fireclay.

cloisonné, kloi-zon'ā (*Dec., etc.*). Enamel formed with vitreous powders placed in compartments made of wires, or thin strips of metal, soldered to the metal base.

clone (*Bot.*). The entire stock of plants obtained by budding, grafting, cuttings, or other means of vegetative multiplication from one original seedling: by extension, any stock of plants raised vegetatively from one original parent. In rubber cultivation, a tree which has been developed by grafting a bud from a high yielding rubber tree on to a seedling.

clone (*Zool.*). (1) The descendants of a single individual; a pure line.—(2) An asexually produced individual. a form of Sponge spicule.

clonus (*Zool.*). A series of muscular contractions in which the individual contractions are visible.

close annealing (*Met.*). The operation of annealing metal products (e.g. sheets, strip, and rod) in closed containers to avoid oxidation. Also called POT (or BOX) ANNEALING.

close-boarded fencing (*Build.*). Fencing formed of lapped feather-edged boarding posts bound together by two or three rails, the fence being supported by posts about 9 ft. apart, and having a gravel board along the bottom.

close-packed hexagonal structure (*Met.*). An arrangement of atoms in crystals which may be imitated by packing spheres; characteristic of a number of metals. The disposition of the atomic centres in space can be related to a system of hexagonal cells.

close plating (*Elec. Eng.*). The application of a thin sheet of metal by a process of soldering.

close shot (*Cinema.*). In motion-picture production, a shot that is not so close as a *close-up*; it may comprise, for example, two persons at a table. See **close-up.**

close string (*Carp.*). See **housed string.**

close-up (*Cinema.*). A shot in which one object, such as a face or hands, mainly fills the field of view.

close wall (*Build.*). A wall enclosing an area.

closed circuit (*Elec. Eng.*). An electrical circuit in which there is a complete path for the current to flow.

closed circuit (*Radio*). A circuit composed entirely of condensers, resistances, inductances, etc., of relatively small physical dimensions, as distinguished from an antenna circuit.

closed circuit (*Teleg.*). A circuit which is closed during both marking and spacing signals; if a spacing current is used, continuity is always indicated.

closed-coil winding (*Elec. Eng*). An armature winding in which the complete winding forms a closed circuit.

closed community (*Bot.*). A plant community which occupies the ground without leaving any spaces bare of vegetation.

closed-core transformer (*Elec. Eng.*). A transformer in which the magnetic circuit is entirely of iron, i.e. with no air gaps.

closed diaphragm (*Acous.*). A diaphragm which is not directly open to the air, but communicates with the latter through a horn, which serves to match the high mechanical-impedance of the diaphragm with the low radiation-impedance of the outer air.

closed magnetic circuit (*Elec. Eng.*). A magnetic circuit composed entirely of magnetic material; e g an iron ring.

closed pipe (*Acous*). A *stopped pipe* (q v.).

closed shed (*Textiles*). A term indicating that all warp threads in a loom are level or in the same plane.

closed slots (*Elec. Eng.*). In the rotor or stator of an electric machine, slots for receiving the armature winding which are completely closed at the surface and therefore in the form of a tunnel. Often called TUNNEL SLOTS.

closed stokehold (*Eng.*). A ship's boiler room closed in order that fans may maintain in it an air pressure slightly higher than atmospheric, so that forced draught may be provided to the furnaces. See **forced draught.**

closed traverse (*Surv*). A traverse in which the final line links up with the first line.

closed vascular bundle (*Bot.*). A vascular bundle which does not include any cambium, and cannot therefore increase in diameter.

closer (*Build.*). Any portion of a brick used, in constructing a wall, to close up the bond next to the end brick of a course. Also called a BAT.

closet (*Build.*). (1) A small chamber or side room; a recess, generally enclosed, for storing articles.—(2) A water-closet or privy.

closing department (*Boots and Shoes*). The department in which the sections forming the uppers are stitched together, the edges folded over, and the linings shaped to fit them.

closing error (*Surv.*). The distance, as computed from the field observations, between the final and the starting points in a closed traverse, these points being in fact coincident. Also called ERROR OF CLOSURE.

closing layer (*Bot.*). A sheet of closely packed cells lying across a lenticel, and preventing, more or less completely, the diffusion of gases and vapours through the lenticel.

closing membrane (*Bot.*). A thin portion of wall between the pits in adjacent cells, tracheides, or vessels.

closing-up (*Eng.*). In riveting, the process of forming the head on the projecting rivet shank.

clot (*Med.*). The semi-solid state of blood or of lymph when they coagulate.

cloth (*Textiles*). A fabric woven, felted, or knit from cotton, wool, silk, flax, ramie, jute, hemp, or hair, adapted for manufacture into wearing apparel or for other use.

cloth, focusing (*Photog.*). See **focusing cloth.**

clothing (*Struct.*). The covering (walls, roofing, etc.) applied to the structural framework of a steel-framed building.

clothing leather. Usually sheepskin, tanned, dyed, and treated with a cellulose finish to render it waterproof; used for sports clothing, etc.

clothing wool (*Textiles*). A wool of short fibre and good quality, suitable for the manufacture of woollen fabrics.

cloud (*Meteor.*). A mass of water droplets remaining more or less at a constant altitude. Cloud is usually formed by condensation brought about by warm moist air which has risen by convection into cooler regions and has been cooled thereby, and by expansion, below its dew point.

cloud (*Textiles*). Yarn made by twisting together two threads of different colours. The rate of delivery of the threads being twisted is not constant but is varied so that each colour in turn predominates.

cloud-burst (*Meteor.*). A popular but erroneous expression for an extremely heavy downpour of rain, leading to flooding if occurring in restricted land areas. It arises chiefly from the rapid cessation of rising air, as when a cloud is driven up over a mountain ridge.

cloud negative (*Photog.*). A negative taken of clouds, for subsequent use in adding skyscape to otherwise cloudless landscapes while printing.

cloud point (*Chem*). The temperature at which paraffin wax or other solid substances begin to crystallise out or separate from solution, when a petroleum oil is chilled under definite prescribed conditions.

clouded ware (*Pot.*). Pottery coloured with, usually, manganese, copper, cobalt, or antimony, the colour being put on with a sponge.

clouding (*Paint.*). *Blooming* (q.v.).

cloudy (*Textiles*). The term used to indicate uneven shade, due to faulty dyeing or finish.

cloudy swelling (*Med*). A mild degenerative change in cells in which the swollen cloudy appearance is due to the presence of small granules of protein.

cloudy web (*Cotton Spinning*). A web of fibres from the doffer of a carding engine uneven in density throughout.

clout nail (*Build.*). A nail having a large, thin, flat head.

clover disease (*Vet.*). A type of fagopyrism.

cloves oil (*Chem*). An oil obtained from the flowers of *Eugenia aromatica*. It is a pale-yellow, volatile liquid, of strong aromatic odour; b.p. 250°-260° C., sp. gr. 1·048-1·070.

club (*Zool.*). In Insects, the distal joints of the antenna, when they are enlarged.

club foot (*Med.*). Deformity of the foot. See **talipes.**

club line (*Typog.*). A term used for the last (short) line of a paragraph. In common practice in the upmaking of a book, the occurrence of a club line at the top of a page is to be avoided. Also called BREAK LINE.

club-tooth escapement (*Horol.*). The most widely used escapement for watches and platform escapements. See **escapement.**

clubbing (*Med.*). Thickening of the ends of the fingers which occurs in chronic disease of the lungs.

clump or clunch (*Mining*). (1) A bend in a roadway or passage in a coal-seam.—(2) A large fall of roof.—(3) A tough fireclay.

clumps (*Typog.*). Metal spacing material thicker than 6-pt. or nonpareil.

clunch (*Mining*). See **clump.**

cluster (*Bot.*). A general term for an inflorescence of small flowers closely crowded together.

cluster cup (*Bot.*). The popular name for an *aecidium.*

clustered column (*Build.*). A column formed of several shafts bunched together.

clutch (*Build., Civ. Eng.*). A connecting bar used between adjacent flanges of I-section steel sheet piles to retain them in position. In section it consists of a web part running between a pair of adjacent piles, with curved 'flanges' which slide over and secure the flanges of the piles.

clutch (*Eng.*). A device by which two shafts or rotating members may be connected or disconnected, either while at rest or in relative motion.

See **centrifugal—**
cone—
disc (or **plate**)**—**
dog—
friction—
magnetic—

clutch arc lamp (*Illum.*). A type of automatic arc lamp in which the carbons are fed forward by the electromagnetic release of a clutch, as a result of the current falling below a certain predetermined value.

clutch stop (*Automobiles*). A small brake arranged to act on the driven member of a clutch when it is fully withdrawn to facilitate an upward gear change.

clypeal. *Adj.* from *clypeus.*

Clypeastro'ida, klip-ĕ-as— (*Zool.*). An order of *Echinoidea* in which the periproct and anus are eccentric, and the dorsal parts of the ambulacra are petaloid; the body is usually flattened; sand-living forms. Cake Urchins.

clyp'eate (*Bot.*). Shield-shaped.

clyp'eus (*Bot.*). A stroma formed in the leaf of the host plant by some parasitic *Ascomycetes.*

clypeus (*Zool.*). A sclerite of the head in Insects, lying immediately anterior to the frons.

clyster (*Med.*). An *enema* (q v.).

C.N. (*Chem.*). Abbrev. for *co-ordination number.*

cnemid'ium, kn— (*Zool.*). In Birds, the lower part of the leg, bearing usually scales instead of feathers.

cne'mis (*Zool.*). The shin or tibia.

cni'da (*Zool.*). See **cnidoblast.**

Cnida'ria (*Zool.*). A sub-phylum of *Coelenterata* the members of which are distinguished by the possession of stinging-cells or *cnidoblasts* (q.v.), and usually show radial symmetry; locomotion is by muscular action.

cni'doblast (*Zool.*). A thread-cell or stinging-cell, containing a nematocyst; characteristic of the *Cnidaria.*

cni'docil (*Zool*). A short sensory process or trigger-hair developed from the external part of a cnidoblast, stimulation of which causes the discharge of the nematocyst.

cni'dosac (*Zool.*). In *Siphonophora,* a battery of cnidoblasts borne on a tentacle, where it gives rise to a coloured swelling.

Cnidosporid'ia (*Zool.*). An order of *Neosporidia,* in which the spores possess polar capsules.

C.N.S. (*Zool*). A common abbrev. for *central nervous system.*

CO_2 recorder (*Eng.*). An instrument which analyses automatically the flue gas leaving a furnace, and records the percentage of carbon dioxide (CO_2) on a chart. See **exhaust gas analyser.**

CO_2 refrigerator (*Eng.*). A refrigerator in which the working agent is carbon dioxide (CO_2); used where leakage of a more noxious or toxic agent, as ammonia, would be objectionable. See **refrigerator.**

Co (*Chem.*). The symbol for *cobalt.*

co- (Latin *cum,* with). Prefix, often signifying *together.*

coacervate, kō-as'— (*Bot.*). Massed in a small heap.

coacervation (*Chem.*). The reversible aggregation of particles of an emulsoid into liquid droplets preceding flocculation.

coach screw (*Eng.*). A large wood screw with a square head which is turned by a spanner; used in heavy timber work.

coaction (*Ecol.*). The mutual relations existing between plant and plant, and between plant and animal.

coadaptation (*Biol.*). Correlated adaptation or change in two mutually dependent organs or organisms.

coagel, kŏ'a-jel (*Chem.*). A gel formed by coagulation.

coagulation, kō-ag— (*Biol.*). The irreversible setting of protoplasm on exposure to heat or to poisons.

coagulation (*Chem.*). The precipitation of colloids from solutions, particularly of proteins.

coagulation (*Med.*). The process of clotting of blood as a result of the interaction of enzymes, calcium, and a protein in the blood, in the presence of tissue injury.

coag'ulum (*Med.*). A clot.

coak (*Carp.*). A projection on one of the mating surfaces of a scarfed joint, fitting into a corresponding recess in the other surface. Also called TABLE.

coal (*Geol.*). A general name for firm brittle carbonaceous rocks; derived from vegetable debris, but altered, particularly in respect of volatile constituents, by pressure, earth movements, and a variety of other chemical processes.

coal ball (*Bot.*). A calcareous nodule crowded with petrified plant remains; found in some seams of coal.

coal-cutting machinery (*Mining*). Machinery for removing, by means of chain, disc, or bar cutters, a thin slice from the bottom of a coal-seam to facilitate the extraction of coal.

coal-gas (*Fuels, etc.*). Gas made by the carbonisation of fusible bituminous coal in town gas-works, in coke ovens (high-temperature process), and by low-temperature carbonisation. Calorific value of the first, per cubic foot, at 60° F. ranges from 475 to 550 B.Th.U.; that of low-temperature gas is about 890. The approximate percentage composition by volume of purified coal-gas is: hydrogen 48, methane 35, carbon monoxide 6, nitrogen 6, olefines 2-4, carbon dioxide 1, with traces of benzene hydrocarbons and acetylene.

coal pusher (*Eng.*). A steam-operated ram used in the tenders of some express locomotives to deliver the coal to within easy reach of the fireman.

coal-tar (*Chem.*). The distillation products of the high- or low-temperature carbonisation of coal. Coal-tar consists of hydrocarbon oils (benzene, toluene, xylene and higher homologues), phenols (carbolic acid, cresols, xylenols, and higher homologues), and bases, such as pyridine, quinoline, pyrrole, and their derivatives.

coales'cent (*Bot., Zool.*). Grown together, especially by union of the walls.

coalite or **semi-coke** (*Fuels*). Trade name for a smokeless fuel produced by carbonising coal at a temperature of about 600° C.; used for domestic purposes, calorific value per pound about 13,000 B.Th.U.

coarc'tate (*Zool.*). Said of pupae in which the last larval skin is retained as a covering; pressed together: having thorax and abdomen connected by a constricted portion.

coarctation (*Med.*). A narrowing or constriction, especially of the aorta near its origin from the heart.

coarse aggregate (*Civ. Eng.*). Gravel or crushed stone (forming a constituent part of concrete) which when dry will be retained on a sieve having ¼-in. diameter holes. See **aggregate.**

coarse-grained (*Geol.*). See **grain-size classification,** and *Table of Igneous Rocks* in Appendix.

coarse screen (*Typog.*). A term applied to half-tones for use on rough paper. The *screen* (q.v.) may be up to 85 lines to the inch.

coarse silt (*Geol.*). See **silt grade.**

coarse stuff (*Plast.*). A mixture of lime mortar and hair used as a first coat for plastering internal walls.

coastal refraction (*Radio*). The refraction, towards the normal, of waves arriving from sea to land at their incidence with the shore-line. The result is an appreciable error in radio direction-finding when bearings making a small angle with the shore-line are being measured.

coasting (*Elec. Eng.*). A term used in connexion with electric traction to denote running with the supply to the motors cut off and the brakes not applied.

coat (*Bot.*). (1) See **integument** (ovule).—(2) See **testa** (seed-coat).

coat (*Paint., Plast.*). A layer of paint or plaster.

coating (*Elec. Eng*). The metallic sheets or films forming the plates of a condenser.

coating (*Paint, Plast*). See **coat.**

coating machine (*Paper*). A machine which deposits a layer of mineral on paper. Brushes distribute the coating evenly, and the paper is then dried and calendered.

co-axial cable (*Television*). A type of cable in which a central conductor is surrounded by an outer tubular conductor, the dielectric being mainly air, with a minimum of solid insulating material. Its low attenuation makes it suitable for the transmission of video-frequency currents in television.

co-axial carbons (*Illum.*). Carbons in an arc lamp so arranged as to be in the same straight line with each other.

co-axial tube feeder (*Radio*). See **concentric tube feeder.**

coazervation (*Chem*). The separation of a lyophilic colloidal sol into two liquid phases.

cob (*Build.*). An unburnt brick.

cob wall (*Build.*). A wall built of puddled clay and straw, or of a mixture of straw, lime, and earth, laid without shuttering.

co'balt (*Met*). A metallic element in the eighth group of the periodic system. Symbol, Co. It is magnetic below 1075° C., and can take a high polish. At. no. 27, at. wt. 58·94, valency 2 or 3, m.p. 1480° C., elec. resist. at 20° C. $6{\cdot}35 \times 10^{-6}$ ohms/cm^3. Tensile strength (commercial, containing carbon) 29 tons/sq. in. Similar in properties to iron, but harder; used extensively in alloys.

cobalt bloom (*Min.*). See **erythrite.**

cobalt glance (*Min.*). See **cobaltite.**

cobalt oxide (*Chem.*). CoO. Used to produce a deep-blue colour in glass, and in small quantity to counteract the green tinge in glass caused by the presence of iron.

Cobalt Series (*Geol.*). The upper of the two main divisions of the Huronian in the Canadian Shield. It comprises the Gowganda Boulder Bed, probably a fossil boulder clay, striped jaspers, and quartzites.

cobaltif'erous wad (*Min.*). An impure hydrated oxide of manganese containing up to 30% of cobalt.

co'baltite or **cobalt glance** (*Min.*). Sulphide and arsenide of cobalt, crystallising in the cubic system; usually found massive and compact with smaltite.

cobble (*Geol.*). See **boulder.**

cobblestone (*Civ. Eng.*). A smallish roughly squared stone used for paving purposes; largely superseded nowadays by setts.

cobbling (*Textiles*). Re-dyeing a fabric in order to perfect the shade.

cobwebby (*Bot.*). Covered with delicate, long, interlaced hairs.

cocaine (*Chem.*). A coca-base alkaloid, the methyl ester of benzoyl-*l*-ecgonine; m.p. 98° C. Used as a local anaesthetic.

Coccidiomor'pha, kok-sid'i-o— (*Zool.*). An order of *Telosporidia*, in which the adult trophozoite is an intracellular parasite, and in which schizogony alternates with sporogony.

coccidio'sis (*Vet.*). A contagious infection of animals and birds due to protozoa of the genera *Eimeria* and *Isospora.*

coccin (*Photog.*). A red dye for reducing or removing transparent parts of negatives.

coccin'eous (*Bot.*). Bright-red.

coccoid (*Bot.*). Unicellular, motionless in the vegetative condition, but liberating motile zoospores or gametes.

coc'colith (*Zool.*). In some *Mastigophora*, a small calcareous exoskeletal plate.

coccus (*Bot.*). (1) A one-seeded portion formed by the break-up of a dry fruit.—(2) A minute spherical bacterium.

coccydyn'ia, kok-si— (*Med.*). Severe pain in the coccyx.

coccygec'tomy (*Surg.*). Excision of the coccyx.

coccyge'omesenter'ic (*Zool.*). (In Birds) said of a vein which receives blood from the caudal vein and passes it into the hepatic portal vein; it lies in the mesentery supporting the intestine.

coccygodynia (*Med.*). See **coccydynia.**

coccyx, kok'siks (*Zool.*). A bony structure in *Primates* and *Amphibia*, formed by the fusion of the caudal vertebrae: urostyle.—*pl.* **coccy'ges.**—*adj.* **coccyg'eal.**

cochineal' (*Chem.*). The dried bodies of female insects of *Coccus cacti.* The colouring matter is carminic acid, $C_{17}H_{18}O_{10}$, soluble in water and alcohol.

cochlea, kok-lē'a *or* kok'-lēa (*Acous., Zool.*). In Mammals, the complex spirally coiled part of the inner ear which translates mechanical vibrations into nerve impulses.—(*Bot.*) A tightly coiled pod.

coch'lear. *Adj.* from *cochlea*: spoon-shaped.

cochlear'iform (*Bot., Zool.*). Rounded and concave, like a spoon.

cochleate (*Bot., Zool.*). Spirally twisted, like the shell of a snail: cochleariform.

cock (*Eng.*). See **plug cock.**

cock (*Horol.*). A carrier or bracket for a pivot.

cock (*Plumb.*). A type of water-valve in which flow passes through a hole in a plug which is located transversely across the direction of the pipe.

cock-bead or **cocked bead** (*Join.*). A bead projecting from the surface which it is decorating.

cockpit (*Aero.*). The opening in the fuselage or hull of an aircraft for the accommodation of the occupants of the machine, where a closed cabin is not provided.

cockspur fastener (*Build.*). A bronze or iron fastener for casement windows, used in conjunction with a stay bar and pin.

cock-up (*Typog.*). A large initial that extends above the first line and ranges at the foot.

cocket centring (*Civ. Eng.*). Arch centring which leaves some head-room above the springing line.

cocking (*Carp.*). See **cogging.**

cockle-stairs (*Carp*). Winding stairs.

cockled hair (*Furs*). Twisted hair, standing up.

cockling (*Textiles*). A defect in the surface of a fabric due to variable counts of yarn, variable yarn tension, or irregular shrinkage during finishing.

cockscomb (*Min.*). Aggregates of pyrite, formerly thought to be marcasite crystals, found in the Chalk.

coconut oil (*Chem.*). The oil obtained from the fruit of the coconut palm; a white waxy mass, m.p. 20°-28° C., sp. gr. 0·912, saponification value 250-258, iodine value 8·9, acid value 5-50.

cocoon (*Zool.*). In Insects, a special envelope constructed by the larva for protection during the pupal stage; it consists either of silk or of extraneous material bound together with silk.—Specifically (*Silk*), the envelope spun by the fully grown silkworm round itself as a protective covering when entering the chrysalid state. If intended for silk manufacture, the cocoon is submitted to a heat of 60 to 90 degrees for about three hours to destroy the pupa, and the thread is subsequently reeled.

cod liver oil (*Chem.*). Oil obtained from fresh livers of cod fish; a yellow or brown liquid, of characteristic odour, very rich in vitamins, sp. gr. 0 992-0·930, saponification value 182-189, iodine value 141-159, acid value 204-207.

Codd cell (*Elec. Eng.*). A single fluid cell with zinc and carbon as electrodes and picric chloride as a depolariser. The carbon electrode lies horizontally at the bottom of the cell and is covered with an inert powder.

codding (*Build.*). The Scottish equivalent for *template* (q.v.).

code (*Civ. Eng*). A collection of rules prepared as a basis for securing uniformity of practice and an adequate standard of workmanship in a particular type of work.

code (*Teleg.*). The list of impulse combinations corresponding to letters or figures, or other significant combinations, required to be transmitted telegraphically.

See **Baudot—**
cable—
five-unit—
Morse—

code selector (*Auto. Teleph.*). A selector which is operated by impulses corresponding to an exchange code, i.e. the first three trains of impulses in a director area, either for finding first numerical selectors, or routes to the required exchange.

coded call indicator (*Teleph.*). A *call indicator* (q.v.) system in which the dialled impulses are translated into a more rapid system of transmission than with normal trains; e.g. by marginal currents.

coded call indicator working (*Auto. Teleph.*). The use, in a call indicator system, of marginal currents instead of impulse trains, in order to transmit the required numerals for display more speedily.

co'deine (*Chem.*). $C_{18}H_{21}O_3N$, an alkaloid of the morphine group, the methyl derivative of *morphine* (q v.).

coder (*Auto. Teleph.*). The arrangement for translating digit-trains of impulses into marginal currents, for their more rapid transmission and subsequent operation of display panels.

co-dominant (*Bot.*). One of two or more species, which together dominate a plant community.

coefficient (*Phys., etc.*). A numerical constant prefixed as a multiplier to a variable quantity, in calculating the magnitude of a physical property. Thus, if the *coefficient of expansion* of brass is ·000018, the expansion of a brass rod of length l heated through t° would be $\cdot000018lt$.—(*Maths.*) See **binomial—*, differential—*, partial differential—*.**

coefficient of absorption. See **absorption coefficient, absorption factor.**

coefficient of amplification (*Thermionics*). *Amplification factor* (q.v.).

coefficient of apparent expansion (*Phys.*). See **apparent expansion (coefficient of).**

coefficient of compressibility (*Chem.*). A measure of deviation of a gas from Boyle's law.

coefficient of contraction (*Hyd.*). (Of an orifice from which fluid is discharged under pressure) the ratio of the area of the smallest section of the jet to the area of the orifice. See **vena contracta.**

coefficient of coupling (*Radio*). See **coupling coefficient.**

coefficient of detection (*Radio*). See **detector coefficient.**

coefficient of discharge (*Hyd.*). (Of an orifice from which fluid is discharged under pressure) the ratio of the actual discharge to the theoretical discharge; the product of the coefficient of velocity and contraction.

coefficient of dispersion (*Elec. Eng.*). See **dispersion coefficient.**

coefficient of elasticity (*Mech.*). See **elasticity.**

coefficient of equivalence (*Met.*). See **equivalence (coefficient of).**

coefficient of expansion (*Heat*). See **expansion (coefficient of).**

coefficient of fineness of water-plane (*Ship Constr.*). The area of a ship's load water-plane divided by the product of breadth (mld) and length (B.P.).

coefficient of friction (*Mech.*). See **friction.**

coefficient of mutual induction (*Elec. Eng.*). See **mutual inductance.**

coefficient of perception (*Illum.*). A term used in connexion with the effect of glare; equal to the reciprocal of Fechner's constant.

coefficient of performance (*Eng.*). A measure of the efficiency of a refrigerator. It is the ratio of the heat removed from the cold body to the heat equivalent of the work done by the machine.

coefficient of reflection (*Illum.*). See **reflection factor.**

coefficient of restitution (*Mech.*). See **impact.**

coefficient of rigidity (*Mech.*). See **rigidity (modulus of).**

coefficient of self-induction (*Elec. Eng.*). See **self-inductance.**

coefficient of utilisation (*Illum.*). A term used in lighting calculations to denote the ratio of the useful light to the total output of the installation.

coefficient of velocity (*Hyd.*). (Of an orifice discharging a fluid under pressure) the ratio of the actual velocity of discharge to the theoretical velocity.

coefficient of viscosity (*Phys.*). See **viscosity.**

-coele (*Zool.*). A suffix derived from the Greek *koilia*, large cavity (of the belly).

Coelentera'ta, sēl— (*Zool.*). A phylum of *Metazoa* comprising forms which are of aquatic habit; they show radial or biradial symmetry; possess a single cavity in the body, the enteron, which has a mouth but no anus; and generally have only two germinal layers, the ectoderm and the endoderm, from one of which the germ cells are always developed. Polyps, Corals, Sea-anemones, and Jelly-fish.

coelen'teron (*Zool.*). The digestive body cavity of *Coelenterata.*

coel'iac (*Zool.*). In Vertebrates, pertaining to the belly or abdomen.

coeliac disease (*Med.*). A wasting disease of childhood in which failure to absorb fat from the intestines is associated with an excess of this substance in the faeces.

coelocon'ic (*Zool.*). Said of papillae which lie in pits, from which the apex does not project; as the *coeloconic sensillae* of Insects.

coelom, sē'lom (*Zool.*). The secondary body cavity of animals, which is from its inception surrounded and separated from the primary body cavity by mesoderm.—*adjs.* **coelo'mic, coel'omate.**

Coeloma'ta (*Zool.*). A group of *Metazoa*, including all those animals which possess a *coelom* (q.v.) at some stage of their life-history.

coel'omere (*Zool.*). In metameric animals, the portion of coelom contained within one somite.

coelo'moduct (*Zool.*). A duct of mesodermal origin, opening at one end into the coelom, at the other end to the exterior.

coelo'mopores (*Zool.*). In living *Tetrabranchiata*, openings by which the pericardium communicates with the exterior.

coelo'mostome (*Zool.*). In Vertebrates, the ciliated funnel by which the nephrocoel opens into the splanchnocoel.

Coelomyce'tes (*Bot.*). A large group of *Fungi imperfecti*, which form their spores within a cavity in the matrix whereupon they grow.

coelosper'mous (*Bot.*). Having boat-shaped seeds.

coel'ostat (*Astron.*). An instrument consisting of a mirror (driven by clock-work) rotating about an axis in its own plane, and pointing to the pole of the heavens. It serves to reflect, continuously, the same region of the sky into the field of view of a fixed telescope.

coelozo'ic (*Zool.*). Extra-cellular: living within one of the cavities of the body.

coene'cium (*Zool.*). In colonial *Polyzoa*, the common body bearing the zooids.

coenen'chyma (*Zool.*). The hard matter filling up the spaces between adjacent polyps of a compound coral.

coeno'bium (*Bot.*). A group of algal cells, having a definite form and organisation, behaving as an individual, and giving rise to daughter coenobia of the same kind.

coenocen'trum or **central body** (*Bot.*). A globular mass of deeply staining material lying round or near the nucleus in the oögonia of some *Oömycetes*.

coenocy'tia (*Zool.*). Multinucleate syncytial tissues formed by the division of the nucleus without the division of the cell, as striated muscle fibres and the trophoblast of the placenta.

coenocyt'ic (*Bot.*). Containing a number of nuclei, but not divided into separate cells by walls.

coenogametan'gium (*Bot.*). A gametangium in which a coenogamete is formed.

coenogam'ete (*Bot.*). A multinucleate body which functions as a gamete.

coe'nosarc (*Zool.*). The tubular common stem uniting the individual polyps of a hydroid colony.

coenos'teum (*Zool.*). In *Corals* and *Hydrocorallinae*, the common calcareous skeleton of the whole colony.

coenozy'gote (*Bot.*). The body resulting from the fusion of two coenogametes.

coenuro'sis (*Vet.*). Infection of the brain of sheep by the 'bladderworm' or intermediate stage, *Multiceps multiceps* (syn. *Coenurus cerebralis*), of the tapeworm *Taenia multiceps* of Carnivora.

coenu'rus (*Zool.*). A bladderworm, possessing a well-developed bladder with many scolices.

co-enzyme (*Chem.*). An enzyme which can effect a chemical reaction, e.g. fermentation, only in conjunction with another enzyme.

coercive force (*Elec. Eng.*). The magnetising force which has to be applied to annul the residual magnetism of a substance. Also called COERCIVITY or COERCIVE INTENSITY.

coffer (*Build.*). A sunk panel in a ceiling or soffit.

coffer (*Furn.*). A plain form of chest or long-box.

coffer (*Hyd. Eng.*). A canal lock-chamber.

coffer-dam (*Civ. Eng.*). A temporary wall serving to exclude water from any site normally under water, so as to facilitate the laying of foundations or other similar work.

coffer work (*Masonry*). Rubble-work with stone facings.

coffering (*Civ. Eng.*, *Mining*). The operation involved in the construction of dams (see **coffer-dam**) for impounding water.

cog (*Build.*). See **nib.**

cog (*Carp.*). The solid middle part left between the two notches cut in the lower timber in a cogging joint.

cogs (*Eng.*). Separate wooden teeth, formerly used in gear-wheels.

cog-wheel ore (*Min.*). A miners' name for bournonite.

cogging (*Carp.*). A form of jointing used to connect one beam to another across which it is bearing. Notches as long as the top beam is wide are cut in the top surface of the lower beam opposite one another, so as to leave a solid middle part, and the upper beam has a small transverse groove cut in it, to fit over this solid middle part. Also called CAULKING, COCKING, CORKING.

cogging (*Met.*). The operation of rolling or forging an ingot to reduce it to a bloom or billet.

cognition (*Psychol.*). Intellectual perception, e.g. ideas and reasons. See **conation.**

coherent (*Bot.*). United, but so slightly that the coherent organs can be separated without very much tearing.

coherer (*Radio*). An early form of detector of electromagnetic waves, in which the resistance of an imperfect contact is abruptly reduced by the passage of high-frequency currents.

See **Branley—**
Lodge-Muirhead—
Marconi—

cohesion (*Bot.*). The union of plant members of the same kind, as when petals are joined in a sympetalous corolla.

cohesion (*Phys.*). The attraction between the molecules of a liquid which enables drops and thin films to be formed. In gases the molecules are too far apart for cohesion to be appreciable (but see **Joule-Thomson effect**).

cohesion mechanism (*Bot.*). Any mechanism in a plant, in particular one concerned with the dehiscence of a sporangium, which depends on the cohesive powers of water (i.e. that a mass of water resists disruption).

Cohnheim's areas (*Histol.*). In a transverse section of striated muscle, the small angular fields into which each fibre appears to be divided.

cohobation (*Chem.*). Successive re-distillation.

cohort (*Bot.*). A group of related families.

Coignet pile, kwon'yā (*Civ. Eng.*). A type of reinforced concrete pile, similar to the *Hennebique pile* (q.v.).

coil (*Elec. Comm.*). Any winding of conducting wire, with a core of air or of magnetic material, for providing inductance.

See **drainage—**
heat—
induction—
loading—
Pupin—
repeating—
retardation—
Ruhmkorff—
trip—

coil (*Elec. Eng.*). An arrangement of one or more convolutions of bare or insulated wire.

See **armature—**
blow-out—
choking—
compensating—

coil antenna (*Radio*). See **frame antenna.**

coil-drive (*Acous.*). The electrodynamic electromechanical transducer represented by a coil carrying an alternating current (e.g. speech current) moving in the air-gap of a magnet, the air-gap being generally circular.

coil heating (*Build.*). A form of *panel heating* (q.v.).

coil ignition (*Automobiles, etc.*). See **battery-coil ignition.**

coil-loaded cable (*Teleph.*). A cable containing conductors that are loaded with coil inductances at uniform intervals along the routes.

coil loading (*Elec. Comm.*). The added inductance, in the form of coils, inserted at intervals along an extended line. Cf. *continuous loading.*

coil-side (*Elec. Eng.*). That part of an armature coil lying in a single slot.

coil span (*Elec. Eng.*). A term used to denote the distance, measured round the armature periphery, between one side of an armature coil and the other; it is usually measured in electrical degrees or slots.

coil-span factor (*Elec. Eng.*). A factor introduced into the equation giving the e.m.f. of an electric machine, to allow for the fact that the coils have a fractional pitch and therefore do not embrace the whole flux.

coiled-coil filament (*Illum.*). A spiral filament for an electric lamp which is coiled into a further helix in order to reduce radiation losses and enable it to be run at a higher temperature.

coiled-coil lamp (*Illum.*). An electric filament lamp having a coiled-coil filament.

coiler (*Cotton Spinning*). The mechanism used with the carding engine and the draw frame to deliver the sliver in coils into the coiler cans.

coiler can (*Cotton Spinning*). A slowly rotating upright cylinder into which sliver from the carding engine and from the draw frame is delivered in coils.

coin box (*Teleph.*). A telephone station arranged for the collection of the charges for its use. The user places coins in slots in a box, and automatic indication of the money inserted is given to the operator.

coin box line (*Teleph.*). A line from a coin-box telephone station to an exchange, so arranged that by remote operation the operator can accept or reject the inserted fee and otherwise control the connexion.

coin-collector (*Elec. Eng.*). A mechanical device attached to energy meters, in order that the consumer may close a switch after the insertion of a given number of coins.

co'ition or **co'itus** (*Zool*). See **copulation.**

coke (*Fuels*). The solid residue from the carbonisation of coal after the volatile matter of the coal has been distilled off. Coke is used as a fuel, and in metallurgy as a reducing agent for metal oxides.—GAS COKE, solid fuel produced by the carbonisation of bituminous coal in a closed chamber known as a retort; the temperature of the charge ranging up to 1100° C.; the calorific value per pound is about 12,000 B.Th.U.—LOW TEMPERATURE COKE, this has a much higher percentage of volatile matter than gas and metallurgical cokes (10%) and a lower percentage of fixed carbon, about 83%.—METALLURGICAL COKE, a dense coke made from hard-caking bituminous coals, suitable for furnace and foundry use. It has a smaller percentage of volatile matter than gas coke (0·6% : 0·9-1·6%) and practically the same amount of fixed carbon.—SEMI-COKE, see **coalite.**

coke breeze (*Build.*). The smaller grades of coke from coke ovens or gasworks, used in the manufacture of breeze concrete.

coke mill (*Foundry*). A small mill for pulverising coke, used in the preparation of *blacking* (q.v.).

coke oven gas (*Fuels*). Gas produced in the manufacture of hard cokes from hard-caking bituminous coals; calorific value per cubic foot, at 60° F., about 520 B.Th.U.

coke ovens (*Fuels*). Large ovens in which hard-caking bituminous coal is subjected to a long process of carbonisation at high temperatures. See **coke (metallurgical).**

cokes (*Tinplates*). Originally, tin plates made from wrought-iron produced in a coke furnace. The term is now applied to plates with a thinner tin coating. See **charcoal.**

col (*Meteor.*). The region between two centres of high pressure, or anticyclones, so called by analogy with the *col* between neighbouring mountain peaks.

co-latitude (*Astron.*). The complement of the latitude, terrestrial or celestial, namely the angular distance (90°−latitude). On the celestial sphere it is, therefore, the angular distance between the celestial pole and the observer's zenith, and also the meridian altitude of the celestial equator above the observer's horizon.

Colby's bars (*Surv.*). Compensated bimetallic bars 10 ft. long, arranged to show an unvarying length despite temperature change; used for base-line measurement in the Ordnance Survey of the United Kingdom.

col'chicine (*Chem.*). $C_{22}H_{25}O_6N$, an alkaloid of unknown constitution, obtained from autumn crocus, *Colchicum autumnale*; pale yellow needles, m.p. 155°-157° C.

cold (*Med.*). Common cold. An acute infectious catarrh of the nasal mucous membrane thought to be due to a filter-passing organism.

cold bend (*Eng.*). A test of the ductility of a metal; it consists of bending a bar when cold through a certain specified angle.

cold-blooded (*Zool.*). (Of animals) having a bodily temperature which is dependent on the environmental temperature. Cf. *warm-blooded.*

cold cathode (*Thermionics*). An electrode from which electronic emission takes place by virtue of a high potential-gradient at the surface at normal temperatures.

cold-cathode discharge lamp (*Illum.*). An electric discharge lamp in which the cathode is not heated, the electron emission being produced by a high voltage gradient at the cathode surface.

cold-cathode rectifier (*Thermionics*). A rectifier for low-frequency alternating currents, comprising a convex cathode and a concave anode placed close together in a gas at low pressure.

cold chisel (*Eng*). A chisel for chipping or cutting away surplus metal; it is used with a hand hammer. Different forms of cutting edges (e.g. flat, cross-cut, half-round) are used for various purposes. See **cross-cut chisel, flat chisel.**

cold-drawing (*Eng.*). The process of producing bar or wire by drawing through a steel die without heating the material. See **wire-drawing.**

cold emission (*Thermionics*). See **auto-emission.**

cold front (*Meteor.*). The leading edge of an advancing mass of cold air, usually attended by line-squalls and heavy showers.

cold-heading (*Eng.*). The process of forming the heads of bolts or rivets by upsetting the end of the bar without heating the material.

cold moulding (*Plastics*). A bituminous moulding powder containing a drying oil or varnish and a large percentage of filler is pressed together cold. The moulded article is then baked in an oven to dry, shrink, and harden, after which it may be only slightly thermoplastic.

cold pressing (*Acous.*). A defect in gramophone-record pressing, due to the material not having reached a sufficiently high temperature for adequate flow and consequent definition of track. The indication is a lack of lustre on the black surface.

cold, production of (*Phys.*). See **refrigeration.**

cold riveting (*Eng.*). The process of closing a rivet without previous heating; confined to small rivets.

cold-rolled (*Met.*). Said of metal that has been rolled at a temperature close to atmospheric. The cold-rolling of metal sheets results in a smooth surface-finish.

cold-saw (*Eng.*). A metal-cutting circular saw for cutting steel bars to length. The teeth may be either integral with the disc or inserted.

cold sett (set or sate) (*Eng.*). A smith's tool similar to a short, stiff cold chisel; used for cutting bars, etc. without heating. It is supported by a metal handle and struck with a sledge-hammer.

cold short (*Met.*). Brittle at atmospheric temperature.

cold shut (*Foundry*). A casting imperfection due to metal entering the mould by different gates or sprues, cooling and failing to unite on meeting.

cold storage. See **refrigeration.**

cold-water test. See **hydraulic test.**

cold wave (*Meteor.*). The fall of temperature following the passage of a depression.

cold-working (*Met.*). The operation of shaping metals at or near atmospheric temperature by rolling, pressing, drawing, stamping, or spinning. See also **work-hardening.**

colec'tomy (*Surg.*). Excision of the colon.

colemanite (*Min.*). Hydrated calcium borate, crystallising in the monoclinic system; occurs as nodules in clay found in California and elsewhere.

co'leogen (*Bot.*). The layer of meristematic cells from which the endodermis is formed.

Coleop'tera (*Zool*). An order of *Endopterygota*, having the fore-wings or elytra thickened and chitinised, meeting in a straight line; the hind-wings, if present, are membranous; the mouth-parts are adapted for biting and the second maxillae are fused; the larvae are either sluggish and grub-like, or active and carnivorous. Beetles.

coleop'teroid (*Bot.*). Said of a seed or fruit which looks like a beetle.

coleop'tile (*Bot*). The first leaf to appear above ground in a seedling of a grass; it forms a sheath around the younger leaves within it, and contains little or no chlorophyll.

coleorhi'za or **coleorrhiza** (*Bot.*). A layer of protective cells on the tip of the radicle of the embryos of some flowering plants.

Coley's fluid (*Med.*). A mixture of cultures of streptococci and *B. prodigiosus*; used in the treatment of malignant tumours.

colibacillae'mia or **colibacillemia** (*Med.*). The presence of *B. coli* in the blood.

colibacillo'sis (*Vet*). Infection by *B. coli*. See also **pyosepticaemia.**

colibacillu'ria (*Med*). The presence of *B. coli* in the urine.

colic (*Med., Vet.*). Severe spasmodic pain in the belly due to affections of abdominal organs; e.g. kidney, gall-bladder, intestines.

coli'tis (*Med.*). Inflammation of the colon.

col'labent (*Bot.*). Collapsing, falling in, sunken in the middle.

col'lagen or **col'logen** (*Chem., Zool.*). A scleroprotein, occurring in the connective tissue, bone, and cartilage of animals, which is converted into gelatine on boiling with water: ossein.

collapse (*Med.*). Extreme prostration and depression of vital functions.

collapse of lung (*Med.*). An airless state of the lung, caused by obstruction of a bronchus, or occurring reflexly after abdominal operation.

collapse therapy (*Med.*). The treatment of lung disease by compression of the affected area; e.g. by injecting air between the layers of the pleura.

collapsing (*Bot.*). Falling together into a brush-like form.

collar (*Arch., Furn.*). A band, either flat or slightly concave, plain or decorated, around a column or around the leg of a chair or table.

collar or **collet** (*Bot.*). The junction between the stem and root of a plant, usually situated at soil level.

collar (*Eng.*). A ring of rectangular section secured to a shaft to provide axial location with respect to a bearing: a similar ring formed integral with the shaft.

collar (*Zool.*). The rim of a choanocyte: in *Hemichorda*, a collar-like ridge posterior to the proboscis: in *Gastropoda* with a spiral shell, the collar-like fleshy mantle edge protruding beyond the lip of the shell: more generally, any collar-like structure.

collars (*Met.*). In rolling mills, the sections of larger diameter separating the grooves in rolls used for the production of rectangular sections.

collar and clamp (*Civ. Eng.*). A form of dock-gate hinge, otherwise known as *anchor and collar* (q.v.).

collar beam (*Carp.*). The horizontal connecting beam of a collar-beam roof.

collar-beam roof (*Build.*). A roof composed of two rafters tied together by a horizontal beam connecting points about half-way up the rafters.

collar cell (*Zool.*). See **choanocyte.**

collar cloth (*Textiles*). A cotton fabric, generally formed from a face cloth and a back cloth bound together by a stitching warp, used for collars.

collar-headed screw (*Eng.*). A screw in which the head is provided with an integral collar; used where fluid leakage may occur past the threads.

collaring (*Met.*). The term used to indicate that metal passing through a rolling mill follows one of the rolls so as to encircle it.

collate (*Bind.*). To put the sections of a book into the right order, ready for binding. In modern practice, to check the sections after *gathering* (q.v.).

collateral (*Zool.*). (1) Running parallel or side by side.—(2) Having a common ancestor several generations back.

collateral bud (*Bot.*). A bud inserted by the side of an axillary bud.

collateral bundle (*Bot.*). A vascular bundle with a strand of xylem and a strand of phloem lying externally to it and on the same radius.

collateral siphon (*Zool.*). In *Echiuroidea*, a tube of unknown function which runs parallel to the intestine and opens into it at both ends.

collecting cell (*Bot.*). A thin-walled cell of the mesophyll of a leaf, lying below, and in intimate contact with, one or more cells of the palisade layer, from which it takes elaborated food material.

collecting electrode (*Elec. Eng.*). See **passive electrode.**

collecting lens (*Cinema.*). In a multiple condensing lens, the component lens which is nearest the light source.

collective drive (*Elec. Eng.*). A term used in connexion with electric locomotives to denote a drive in which all the driving wheels are coupled and driven by a single motor. Cf. *individual drive.*

collective fruit (*Bot*). A fruit derived from several flowers, as a mulberry.

collective unconscious (*Analytical Psychol.*). A term used by Jung to denote that part of the unconscious mind which is inherited, and which contains, therefore, the instinct and primitive patterns of thought, which are collective rather than personal.

collector (*Elec. Eng.*). (1) A set of slip rings on an electrical machine and their supporting structure.—(2) That part of an influence machine which collects the charge.

See **comb—** **current—**

collector rings (*Elec. Eng.*). See **slip rings.**

collector shoe (*Elec. Eng.*). A metal shoe used on the vehicles of an electric traction system to maintain contact with the conductor-rail.

collector strip (*Elec. Eng.*). See **contact strip.**

Collem'bola (*Zool.*). An order of *Apterygota* having not more than six abdominal somites; the antennae have few joints; anal cerci and abdominal appendages are lacking; there is a ventral adhesive apparatus associated with the first abdominal somite and a saltatorial appendage posteriorly; Malpighian tubules and a tracheal system are absent; usually found under stones and leaves. Spring Tails.

collen'chyma, *or* **—len-ki'ma** (*Bot.*). A mechanical tissue characteristic of petioles and of young stems. It usually lies close to the periphery, and consists of elongated cells with their walls strengthened by longitudinal strips of cellulose thickening material, so that the cell walls are not of uniform thickness.

collenchyma (*Zool.*). A form of parenchyma occurring in Sponges, having scattered stellate cells embedded in a gelatinous matrix.

col'lencyte (*Zool.*). In Sponges, one of the cells composing a collenchyma.

Colles's fracture (*Surg*). Fracture of the lower part of the forearm above the wrist.

collet (*Bot.*). See **collar**.

collet or **collet chuck** (*Eng.*). An externally coned sleeve, slotted along one side and arranged to be drawn into the internally coned nose of a lathe mandrel, for the purpose of gripping small circular work.

collet (*Horol.*). A circular flange or collar: the collar held friction-tight on a balance staff, to which the inner end of the balance spring is pinned.

col'leter (*Bot.*). A plant hair which secretes mucus, often present on the outside of bud scales, and on the petals of some flowers.

collete'rial (*Zool.*). Glue-producing; as the *colleterial glands* of some female Insects which produce an adhesive substance that later forms the oötheca.

collic'ulose (*Bot.*). Said of a surface covered with small rounded upgrowths.

collic'ulus (*Zool.*). A small prominence; as a small prominence of the surface of the optic lobe of the brain, a rounded process of the arytaenoid cartilage.

col'ligative properties (*Chem.*). Those properties of solutions which depend only on the concentration of dissolved particles, ions, and molecules, and not on their nature.

collimation. The process of aligning the various parts of an optical system. (The word is falsely derived from the Latin *collineare, -atum,* to bring together in a straight line.)

collimation error (*Surv.*). An error produced in levelling or in theodolite work when the line of collimation is out of its correct position; the latter, for the level, is parallel to the bubble line and perpendicular to the vertical axis of rotation of the instrument, and for the theodolite it is in addition perpendicular to the trunnion axis.

collimation, line of (*Surv.*). In a surveying telescope, the imaginary line passing through the optical centre of the object glass and the intersection of the cross-hairs in the diaphragm.

collimation, plane of (*Surv.*). The imaginary surface swept out by the *line of collimation* (see above) of a levelling instrument, when its telescope is rotated about its vertical axis.

collimation system (*Surv.*). A system of reduction of levels in which the staff reading at any point is subtracted from the corresponding height of the plane of collimation of the instrument to give the reduced level of the point. See **rise-and-fall system.**

col'limator (*Optics*). A device for obtaining a beam of parallel light. In a spectroscope, the collimator consists of a fine slit at the principal focus of a convex lens. Light from the illuminated slit is rendered parallel by the lens before falling on the prism or grating.

collineation. See **collimation.**

colliq'uative softening (*Med.*). The absorption of water by diseased tissue, which then disintegrates.

collision, ionisation by (*Phys.*). The removal of one or more electrons from an atom by its collision with another particle such as another electron or an α-particle. This process is very prominent in the electrical discharge through a rarefied gas.

col'loblast (*Zool.*). See **lasso-cell.**

collo'dio-chloride paper (*Photog.*). An early printing paper in which the medium, collodion, carried silver nitrate and lithium and strontium chlorides. Gold and platinum toning was usual with this type of emulsion.

collodion (*Chem.*). A cellulose tetranitrate, soluble in a mixture of alcohol and ether (1:7); the solution is used for coating materials and in medicine for treating wounds and burns.—(*Photog.*) In wet-plate processes, collodion is the medium in which the silver salts are held, after the alcohol and ether solution has been evaporated from the pyroxilin.

colloid (*Chem.*). A substance which readily assumes the colloidal state.

colloid equivalent (*Chem.*). The number of atoms sharing unit charge.

colloid goitre (*Med.*). Abnormal enlargement of the thyroid gland due to accumulation in it of the viscid iodine-containing colloid.

colloid rectifier (*Elec. Eng.*). A rectifier with a cathode of colloidal particles in suspension in a liquid which is not electrolysable.

colloid'al dye (*Photog*). A dye with particles of multimolecular dimensions.

colloidal electrolyte (*Chem.*). An electrolyte, such as a soap solution, in which the ions are of colloidal size.

colloidal filament (*Illum.*). A metal filament for electric filament lamps which is prepared by the use of colloidal substances.

colloidal fuel (*Eng.*). A mixture of fuel oil and finely pulverised coal, which remains homogeneous in storage; its calorific value is high, and it is used in oil-fired boilers as an efficient substitute for fuel oil alone.

colloidal movement (*Chem.*). See **Brownian movement.**

colloidal state (*Chem.*). A state of subdivision of matter in which the particle size varies from that of true 'molecular' solutions to that of coarse suspensions, the diameter of the particles lying between 10^{-7} and 10^{-5} cm.

col'lophore (*Zool.*). The ventral tube of *Collembola*, so called because it is believed by some to represent an adhesive organ.

collotype (*Print.*). A printing process in which a glass plate carries a bichromated gelatine surface on which the desired image is printed from a continuous-tone negative. The surface is developed with water and treated with glycerine, the hardened parts taking up the greasy printing ink, as in lithography. The hardened surface breaks into a very fine grain structure, proportionally to the amount of light action. Suitable for reproductions which require fine detail.

collum (*Zool*). Any collar-like structure.

colluvia'rium (*Civ. Eng.*). An access opening in an aqueduct for maintenance and ventilation.

Collyweston Slate (*Geol.*). A thin stratum of very fissile calcareous sandstone, occurring at the top of the Northampton Sands; used locally for roof-tiling purposes.

colo- (Greek *kolon*, colon). A prefix used, especially in Medicine, in the construction of compound terms; e.g. *colo-enteritis* (q.v.).

colobo'ma (*Med.*). Congenital defect of development, especially of the lens, the iris, or of the retina.

colo-enteritis (*Med.*). Inflammation of the colon and small intestine.

Cologne earth (*Paint.*). Lignite yielding a deep-brown transparent pigment.

Cologne yellow (*Paint.*). A compound of chromate and sulphate of lead with sulphate of lime.

colombier (*Paper*). A standard size of writing and drawing paper, 23½ × 34½ in. (U.S. 23 × 34 in.)

co'lon (*Typog.*). A mark of punctuation (:) now used mainly to introduce quotations or phrases grouped together. The em rule, or dash, after the colon is now usually omitted.

colon (*Zool.*). In Insects, the wide posterior part of the hind-gut: the large intestine of *Vertebrata*. —*adj.* **colic.**

colonisation (*Bot.*). The occupation of bare ground by seedlings and sporelings.

colonist (*Bot.*). A plant which occurs only on ground which is periodically disturbed by human agency.

colonnade (*Arch.*). A row of columns supporting an entablature.

colony (*Bot.*). (1) A group of individuals of one species which are invading new ground.—(2) A fungal mycelium grown from one spore.

colony (*Zool.*). A collection of individuals living together and in some degree interdependent, as a *colony* of polyps, a *colony* of social insects: strictly, the members of a colony are in organic connexion with one another.

col'opexy or **colopex'ia** (*Surg.*). The anchoring of part of the colon by sewing it to the abdominal wall.

col'ophon (*Typog.*). Originally, a device of the writer or printer, placed at the end of a book before title pages became customary. Replaced to-day by title page and imprint, although some publishers often append a colophon. In modern practice, a decorative device on the title-page or spine of a book.

coloph'ony, colopho'nium. See **rosin.**

colopto'sis (*Med.*). An abnormally low position of the colon in the abdominal cavity.

Colorado beetle. A black-and-yellow striped beetle (*Leptinotarsa decemlineata*), which feeds upon potato leaves, causing great destruction.

Colorado ruby (*Min.*). An incorrect name for the fiery-red garnet (pyrope) crystals obtained from Colorado and certain other parts of U.S.A.

Colorado topaz (*Min.*). True topaz of a brownish-yellow colour is obtained in Colorado, but quartz similarly coloured is sometimes sold under the same name.

Colora'doan Stage (*Geol.*). Synonymous with 'Lower Cretaceous' (Cenomanian to Senonian) in the American sense, comprising the basal Dakota Sandstone Group, the Benton Group, and the Niobrara Group.

colora'doite (*Min.*). Mercuric telluride, crystallising in the cubic system. It usually occurs in the massive state.

colorim'eter (*Light*). An instrument used for the precise measurement of the hue, purity, and brightness of a colour.

colorimet'ric analysis (*Chem.*). Analysis of a solution by comparison of the colour produced by a reagent with that produced in a standard solution.

colorimetric purity (*Photog.*). The ratio of the luminosity of a dominant hue to the total luminosity of a colour. See **saturation.**

colorim'etry (*Photog.*). The science of measuring the chromaticity of colours for photographic purposes.

colos'tomy (*Surg.*). A hole surgically made into the colon for the escape of faeces when the bowel below is obstructed.

colot'omy (*Surg.*). An incision into the colon: (loosely) colostomy.

colour (*Light*). Colour depends on the wavelength of the light. In viewing a continuous spectrum the normal eye perceives a graduation of colour from red at the long-wavelength end, through orange, yellow, green, blue, to violet at the short-wavelength limit. Any of these, or other colours, can be matched by suitably adjusting the stimulations from three primary colours, red, green, and blue-violet, the wavelengths of these (additive) primaries being selected so that a minimum amount of negative primary is required in matching.

See **common—** **secondary—**
complementary— **tertiary—**
primary—

colour analyser (*Photog.*). A colorimeter for separating the components of a complex colour into their respective wavelengths.

colour and weave effect (*Textiles*). A small pattern produced from two or more coloured yarns by a special combination of colours and weave.

colour atlas (*Photog.*). A series of charts giving the aesthetic combinations of colours in order.

colour balance (*Photog.*). See **balancing.**

colour bleeding (*Photog.*). See **bleeding of colour.**

colour blindness (*Med.*). The lack of one or more of the spectral colour sensations of the eye. The commonest form, Daltonism, consists in an inability to distinguish between red and green. Even persons of normal sight may be colour blind to the indigo of the spectrum. The Edridge-Green lamp, beads, and cards provide the standard means of testing. The advent of traffic-light signals has made colour blindness a question of considerable social importance.

colour camera (*Photog.*). A camera for dividing the light from an object into two or three colours for registration on negatives in order to obtain black-and-white images.

colour chords (*Photog.*). Combinations of colours in juxtaposition, according to rules of colour harmony.

colour contrast (*Photog.*). The ratio, or the logarithm, of the intensities of two colours.

colour developer (*Photog.*). A developer which colours a silver image, the reduction causing a coloured oxidation product.

colour disc (*Photog.*). An opaque or transparent disc having sectors coloured with primary or other specified colours.

colour distortion (*Photog.*). The departure from a correct exhibition of colours as they appear in the object photographed.

colour fatigue (*Optics*). Changes in the sensation produced by a given colour, when the eye is fatigued by another or by the same colour.

colour film (*Photog.*). A cinematographic film in which the retention of colour from the object is obtained by chemical means alone.

colour filter (*Photog.*). A partially transparent film or glass which alters the relative intensity of the component wavelengths of light passing through it.

colour fringes (*Photog.*). Alien colours introduced at the demarcation of colours because of non-coincidence of the images in the separate colours of the colour process. They may be due to space or time parallax or to shrinkage of the film.

colour guides (*Print.*). A term sometimes applied to *progressive proofs* (q.v.).

colour harmony (*Photog.*). The selection of colours in patterns, according to rules of aesthetics.

colour index (*Astron.*). The difference between the photographic and the visual magnitudes of a star, and hence an approximate measure of the ratio of blue to yellow light received.

colour index (*Geol.*). A number which represents the percentage of dark-coloured heavy silicates in an igneous rock, and is thus a measure of its leucocratic, mesocratic, or melanocratic character.

colour index (*Photog.*). The colours of all dyes available commercially, arranged in order.

colour index (*Physiol.*). An index of the amount of haemoglobin in the red cells of the blood; obtained by dividing the number of red cells per cent. of the normal into the percentage of haemoglobin.

colour-light signals (*Civ. Eng., etc.*). A method of signalling adapted to both railway and highway purposes, whereby traffic is controlled by light signals of different colours.

colour match (*Photog.*). The condition when two colours are adjusted so that they are indistinguishable by eye.

colour photographic sensitivity (*Photog.*). Sensitivity of an emulsion to a specified wavelength.

colour printing (*Print.*). The reproduction of an original subject comprising two or more colours. Colour printing is achieved by any of the normal printing processes; each colour is printed separately, in a predetermined order, the superimposed impressions, if accurately registered, building up an image corresponding in colour to the original subject. See **line colour, three-colour process, two-colour process, chromolithography.**

colour pyramid (*Photog.*). The arrangement of colours with the primaries at the corners, so that the location of a colour within automatically indicates its hue, saturation, and brightness.

colour saturation (*Photog.*). See **saturation.**

colour screen (*Photog*). Either a filter or a mosaic of the primary colours, used for colour photography.

colour sensitometer (*Photog.*). See **Abney colour sensitometer.**

colour separation (*Photog.*). In photo-engraving, the work carried out on the plates of line-colour blocks, to ensure the correct reproduction of the different colours. Also, in half-tone colour work, the operation involved in the use of *colour filters* (q.v.).

colour specification (*Photog.*). The description of a colour in a standard manner, so that it can be duplicated without comparison.

colour standards (*Photog.*). A standard range of colours for reference purposes in making dyes or filters, or for composing colour patterns for colour photography.

colour temperature (*Photog.*). The temperature of an incandescent black body which is a match for the given colour.

colour transparency (*Photog.*). A colour photograph to be viewed or projected with transmitted light.

colour triangle (*Photog.*). The arrangement of colours with the primaries at the corners, the location of a given colour indicating its hue and saturation.

colours of thin films (*Light*). When white light is reflected from a thin film, such as a soap bubble or a layer of oil on water, coloured effects are seen which are due to optical interference between light reflected from the upper surface and that from the lower. The colours are not bright unless the film is less than about 10^{-3} mm. thick.

colouring pigment (*Paint.*). See **stainer.**

colp-, colpo- (Greek *kolpos*, womb). A prefix used in the construction of compound terms; e.g. *colpospasm* (q.v.).

colpi'tis (*Med.*). Inflammation of the vagina.

Colpitts circuit (*Radio*). A thermionic-valve oscillator circuit formed essentially of negative reactance (capacitative) paths between the grid and cathode, and between the anode and cathode, and a positive reactance (inductive) path between the grid and anode of a triode.

col'pocele (*Med.*). A hernia into the vagina.

colpocysti'tis (*Med.*). Inflammation of the vagina and of the bladder.

colpocys'tocele (*Med.*). A hernia formed by protrusion of the bladder into the vagina.

colpocystot'omy (*Surg.*). Incision of the bladder through the wall of the vagina.

colpoperine'oplasty (*Surg.*). Repair of the vagina and perineum by plastic surgery.

colpoperineor'rhaphy (*Surg.*). Sewing up of the torn vagina and perineum.

colpopto'sis (*Surg.*). Prolapse of the vagina.

colpor'rhaphy (*Surg.*). The narrowing of the vagina by operation.

col'poscope (*Surg.*). An instrument for inspecting the vagina.

col'pospasm (*Med.*). Spasm of the vagina.

col'ulus (*Zool.*). A small pointed appendage just anterior to the spinnerets in some Spiders; of unknown function.

columba'rium (*Build.*). A recess left in the face of a wall to support the end of a timber.

colum'bite (*Min.*). The niobate and tantalate of iron and manganese, crystallising in the orthorhombic system. It occurs in granitoid rocks, and is the chief source of the tantalum used for the metallic filaments of electric lamps

columbium or **niobium** (*Met.*). A light-grey metallic element in the fifth group of the periodic system, occurring between arsenic and antimony. Chem. symbol Cb or Nb, at. wt. 92·91, at. no. 41, sp. gr. at 20° C. 8·57, m.p. 1950° C., specific electrical resistivity 20 microhms per cub. cm. Occurs in a number of rare minerals. Used in austenitic stainless steel to diminish susceptibility to inter-crystalline corrosion.

columel'la (*Bot.*). (1) A central column of sterile tissue in the sporangium of a moss or a liverwort.—(2) A dome-shaped wall in the middle of the sporangium of some moulds.—(3) A mass of sterile tissue at the base of the fruit bodies of some *Gasteromycetes*.—(4) The central part of a root cap, containing statoliths.

columella (*Zool*). In Mammals, the central pillar of the cochlea: in lower Vertebrates, the auditory ossicle connecting the tympanum with the inner ear: in some lower Tetrapods, the epipterygoid: in spirally coiled gastropod shells, the central pillar: in the skeleton of some Corals, the central pillar.—*adj.* **columellar.**

column (*Bot.*). The central portion of the flower of an orchid (probably an outgrowth of the receptacle of the flower), bearing the anther, or anthers, and the stigmas.

column (*Civ. Eng.*). A vertical shaft supporting an axial load.—(*Eng.*) A vertical pillar of cast-iron, forged steel, or steel plate in box section, used to support a compressive load. See also **strut.**

column (*Zool.*). In *Crinoidea*, the stalk: in Vertebrates, a bundle of nerve fibres running longitudinally in the spinal cord: the edge of the nasal septum: more generally, any columnar structure, as the spinal cord.

columnals (*Zool.*). In *Crinoidea*, the ossicles forming the stalk.

columnar crystals (*Met.*). Elongated crystals formed by growth taking place at right-angles to the surface of the mould. The extent to which they grow before solidification is completed, by the formation of equi-axed crystals in the interior, is important.

columnar epithelium (*Zool*). A variety of epithelium consisting of prismatic columnar cells set closely side by side on a basement membrane, generally in a single layer.

columnar structure (*Geol.*). A form of regular jointing, produced by contraction following crystallisation and cooling in igneous rocks, especially those of basic composition. The columns are generally roughly perpendicular to the cooling surface.

columnated window stairs (*Build.*). A staircase whose steps are supported on columns to allow of natural lighting on all sides.

colures, kō-lūrz' (*Astron.*). The great circles passing through (1) the poles of the celestial equator and ecliptic and through both solstitial points, and (2) the poles of the celestial equator and both equinoctial points, these two great circles being the solstitial and equinoctial colures respectively.

colustrum-corpuscles (*Zool.*). Large cells containing fat-particles, which appear in the secretion of the mammary glands at the commencement of lactation.

Colymbifor'mes (*Zool.*). An order of *Colymbomorphae*, possessing webbed feet and a flattened metatarsus; the tail feathers are short and the body is carried upright, the feet being situated far back; the palate is schizognathous; the young are born with a complete covering of down; the adults are of aquatic habit. Grebes and Divers.

Colymbomor'phae (*Zool.*). A legion of *Aves*, of aquatic habit, which includes the Divers and Grebes, the Penguins and the Petrels and Albatrosses. See **Colymbiformes, Sphenisciformes, Procellariformes.**

colza oil (*Oils*). An oil obtained from the seeds of *Brassica campestris*; pale-yellow after refinement by sulphuric acid treatment. Used extensively as an illuminant, also, when blown, as a lubricant, and for quenching steel.

coma (*Bot.*). (1) A tuft of hairs attached to the testa of a seed.—(2) A tuft of leaves—the *comal tuft*—at the tip of a moss stem.

coma (*Optics*). A defect in the image formed by a lens which, when present, appears towards the edges of the field, the images of points being drawn out into small pear-shaped blobs, with their narrow ends directed towards the centre of the field. See also **anisotropic coma.**

coma (*Med.*). A state of complete unconsciousness in which the patient is unable to respond to any external stimulation.

comagmat'ic assemblage (*Geol.*). A more correct term for *petrographic province.*

comal tuft (*Bot.*). A bunch of leaves at the end of a twig.

Coman'chean (*Geol.*). The general name for the Cretaceous strata up to the top of the Albian, as developed in N. America. Sometimes termed COMANCHIC. Most completely developed in Mexico. See also **Fredericksburg, Trinity,** and **Washita Series.**

co'mate, co'mose (*Bot.*). Shaggy, bearing a tuft of hairs at the end.

comate disseminule (*Bot.*). A fruit or seed bearing long silky hairs which aid in dispersal by the wind.

co'matose (*Med.*). Being in a state of coma.

comb (*Build.*). The ridge of a roof.

comb (*Paint.*). A flat, flexible, wire-toothed instrument used by the painter for graining surfaces.

comb (*Zool.*). In *Coelenterata*, a ctene: the framework of wax cells produced by social Bees to shelter the young or for storing food.

combs (*Textiles*). Strips of brass, cast in leads, forming an arc on which the carriages move in a lace machine. The back and front combs form a well for the warp.

comb bars (*Textiles*). Steel bars which extend across a lace machine and support the comb leads.

comb collector (*Elec. Eng.*). A conductor with a row of parallel projecting points, used for collecting the charge in an influence machine.

comb, frozen (*Vet.*). Dry gangrene affecting the comb or wattles of birds as a result of frostbite.

comb poles (*Elec. Eng.*). Poles for salient-pole electric machines, constructed of laminations and having the alternate laminations made shorter than the others, to improve the flux distribution.

comb-rib or **comb** (*Zool.*). See **ctene.**

comb, white (*Vet.*). See **favus (avian).**

Combe Martin Beds (*Geol.*). A division of the Middle Devonian rocks of North Devon, comprising shales and sandstones.

combed ware (*Pot.*). Decoration effected by means of a toothed tool drawn across slip, over a body of a different colour.

combed yarns (*Textiles*). Yarns prepared from fibres that have been mechanically straightened and from which neps and short fibres have been removed. See **combing**; and cf. *carded yarns.*

comber board (*Weaving*). A perforated board, or perforated slips of wood arranged in a frame, through which the cords of the jacquard machine pass to the mails.

combination (*Chem.*). The union of two or more elements to form a compound.

combination chuck (*Eng.*). A lathe chuck in which the jaws may be operated all together, as in a universal or self-centring chuck; or each jaw may be operated separately for holding work of irregular shape, as in an independent chuck. See **independent chuck, self-centring chuck.**

combination colours (*Zool.*). Colour effects produced by pigment in combination with *structural colours* (q.v.), as in certain Butterflies.

combination grate (*Build.*). A grate specially designed to supply heat for hot water and cooking, and for heating the room.

combination principle (*Light*). Ritz discovered that the addition or subtraction of the wave-numbers of two spectral lines frequently gave the value of the wave-number of another line in the same spectrum. This rule emerges naturally from the Bohr quantum theory of spectra.

combination printing (*Photog.*). Building up a positive by successive exposures, with masks, through several negatives.

combination tanned leather (*Leather*) Leather which has been tanned by two or more of the usual processes; e.g. vegetable tanning, mineral tanning, treatment with oils.

combination tones (*Acous.*). Additional tones subjectively perceived by the ear when more than one tone is applied, and having frequencies which are sums and differences of the frequencies of the applied tones. Combination tones arise because of amplitude distortion in the ear.

combination turbine (*Eng.*). See **disc-and-drum turbine.**

combine baler (*Agric. Mach.*). A machine which gathers hay from the windrows in a field and forms it into bales.

combined bath (*Photog.*). The use of chemicals for toning and fixing with the same solution.

combined carbon (*Met.*). In cast-iron, the carbon present as iron-carbide as distinct from that present as graphite. See **graphitic carbon.**

combined distribution frame (*Elec. Comm.*). The combination of main and intermediate distribution frames, when the number of circuits is insufficient to warrant the use of separate frames. Abbrev. C.D.F.

combined half-tone and line (*Print.*). A process block on which half-tone and line work are combined and etched.

combined-impulse turbine (*Eng.*). An *impulse turbine* (q.v.) in which the first stage consists of nozzles that direct the steam on to a wheel carrying two rows of moving blades, between which a row of fixed guide blades is interposed.

combined system (*Sewage*). A system of sewerage in which only one set of sewers is provided for the removal of both the sewage proper and also rain water. Cf, *separate system.*

combined twills (*Textiles*). Fabrics in which the regular twill weaves are combined to form a new weave.

combing (*Dec.*). The process of graining done with a flexible toothed metal plate.

combing (*Textiles*). A mechanical process used in preparing sliver for yarns of fine count in cotton spinning, and in the production of worsted top. The process removes short fibres and straightens those to be used.

combining weight (*Chem.*). See **equivalent weight.**

combustion chamber (*Eng.*). (1) In a boiler furnace, the space in which combustion of gaseous products from the fuel takes place.—(2) In an internal-combustion engine, the space, above the piston (when on its inner dead-centre), in which combustion occurs.

combustion control (*Eng.*). The control, either by an attendant or by automatic devices, of the rate of combustion in a boiler furnace, in order to adjust it to the demand on the boiler.

com'edo (*Med.*). A blackhead. A collection of cells, sebum, and bacteria, filling the dilated orifices of the sebaceous glands near hair follicles.

co'mes (*Zool*). A blood-vessel which runs parallel and close to a nerve.—*pl.* **comites** (kom'it-ēz).

comet (*Astron.*). A body of small mass, generally first seen as it approaches the vicinity of the sun, about which it has an orbit, hyperbolic, parabolic, or elliptic. It consists of a comparatively dense nucleus, and may, when close to the sun, develop a tail of exceedingly tenuous matter which points away from the sun.

Comité Consultatif International (*Elec. Comm.*). An international consultative body, comprising representatives from electrical communication administrations, which studies problems of international communication, allocates research work, and makes recommendations for improvement in international connexions, charges, routes, etc. The work is divided into three departments: **C.C.I.T.**, which deals with telegraphy; **C.C.I.R.**, which deals with radio communication; and **C.C.I.F.** (*Fernsprech*) which deals with telephony and land-line broadcasting.

Comley Sandstone (*Geol.*). A sandstone of Lower and Middle Cambrian age in South Shropshire.

comma (*Acous.*). The pitch error, not greater than 80 : 81·1, arising from tuning one note in various ways with natural ratios from a datum note.

comma (*Typog.*). A mark of punctuation (,). It is most often used to separate compound sentences, to divide a sequence of statements or terms, and to enclose parenthetical statements.

commen'salism (*Biol.*). An external, mutually beneficial partnership between two organisms (*commensals*).—*adj.* **commensal.**

commentary (*Elec. Comm.*). The verbal description of an event for instantaneous use, or for subsequent use as material for making up programmes for broadcasting by radio, or in sound-films.

commercial brass (*Met.*). A copper-zinc alloy (brass) containing 10% zinc; used for screws, wire, hardware, etc.

com'minator (*Zool.*). In *Echinoidea*, one of the muscles connecting adjacent jaws of the lantern of Aristotle.

comminuted (*Med.*). Reduced to small fragments; e.g. *comminuted fracture.*

comminution (*Mining*). Size-reduction by breaking, crushing, or grinding; e.g. in ore-dressing.

commissu'ral arch (*Bot.*). A loop of vascular tissue joining the ends of the veins of a leaf.

com'missure (*Bot.*). (1) A cleft or suture.—(2) A surface by which carpels are in union.—(3) The line where the antical and postical lobes of the leaf of a liverwort join.

commissure (*Masonry*). The joint between adjacent courses of stone.

commissure (*Zool.*). A joint: a line of junction between two organs or structures: a bundle of nerve-fibres connecting two nerve-centres.

commode (*Furn.*). An ornamental form of low chest-of-drawers.

commode step (*Build.*). A step having a riser curved to present a convex surface; used sometimes at and near the foot of a stair.

common ashlar (*Masonry*). A block of stone which is pick- or hammer-dressed.

common battery (*Elec. Comm.*). The same as *central battery.*

common bond (*Build., Masonry*). Like a stretching bond, but with a course of headers every fifth, sixth, or seventh course.

common bricks (*Build.*). A class of brick used in ordinary construction (especially in interior work) for filling in, and to make up the requisite thickness of heavy walls and piers. They usually have plain sides, are not neatly finished, and are much more absorbent and also much weaker than *engineering bricks* (q.v.).

common bundle (*Bot.*). A vascular bundle belonging in part to a stem and in part to a leaf.

common colours (*Paint.*). The primary, secondary, and ordinary tertiary colours as opposed to special or art shades.

common dovetail (*Join.*). An angle-joint between two members in which both show end grain.

common-frequency broadcasting (*Radio*). The use of the same carrier frequency by two or more broadcast transmitters, sufficiently separated for their useful service areas not to overlap. Also called SHARED-CHANNEL BROADCASTING.

common grounds (*Join.*). Unconnected strips of wood used as *grounds* (q.v.).

common joist (*Carp.*). See **bridging joist.**

common lead (*Met.*). Lead of lower purity than chemical or corroding lead (about 99·85%); suitable for ordinary uses.

common pointed capped shell (*Ammunition*). See **armour-piercing capped shell.**

common pointed shell (*Ammunition*). These are used for the attack on light armour, concrete, etc. See **armour-piercing shell, armour-piercing capped shell.**

common rafter (*Build., Civ. Eng.*). A subsidiary rafter carried on the purlins and supporting the roof covering. Also called an INTERMEDIATE RAFTER.

common-rail injection (*I.C. Engs.*). A fuel-injection system for multi-cylinder C.I. engines; an untimed pump maintains constant pressure in a pipe line (rail), from which branches deliver the oil to the mechanically operated injection valves.

common return (*Elec. Eng.*). A single conductor which forms the return circuit for two or more otherwise separate circuits.

common trunk (*Auto. Teleph.*). A trunk or outlet which is common to all groups in a grading scheme, and therefore offers a first choice to a group of selectors.

commo'tio cer'ebri (*Med.*). Concussion of the brain, in which there is bruising of brain tissue.

communal habitat (*Bot.*). The habitat of any plant community.

commu'nalism (*Zool.*). Social life, implying division of labour and sometimes physical differentiation, as in social Insects and Mankind.

community (*Bot.*). Any group of plants growing together under natural conditions, and forming a recognisable unit of vegetation; examples are woodland plants, heathland plants.—(*Zool.*) Collectively, the animals found inhabiting a given restricted area, as a field or a pond; such a community is not necessarily stable.

commutating field (*Elec. Eng.*). The magnetic field under the compoles of a d.c. machine; it induces, in the conductors undergoing commutation, an e.m.f. in a direction to assist in the commutation process.

commutating machine (*Elec. Eng.*). An electrical machine provided with a commutator.

commutating pole (*Elec. Eng.*). See **compole.**

commutator (*Elec. Eng.*). A part of an electric machine consisting of an assemblage of copper bars each connected to a coil of the winding but insulated from each other. Brushes slide on the surface of the bars and collect current from the winding. See also **reversing commutator.**

commutator (*Teleg.*). A rotating switch arm and contact, for distributing the line to a number of channels in a multiplex system.

commutator bar (*Elec. Eng.*). One of the copper bars forming part of a commutator. Also called a COMMUTATOR SEGMENT.

commutator bush (*Elec. Eng.*). See **commutator hub.**

commutator face (*Elec. Eng.*). See **commutator surface.**

commutator grinder (*Elec. Eng*). A portable electric grinding equipment which can be mounted on a commutator machine in order to grind the commutator surface without removing the armature from the machine.

commutator hub (*Elec. Eng.*). A metal structure used for supporting a commutator. Also called a COMMUTATOR SLEEVE, COMMUTATOR SHELL, COMMUTATOR BUSH.

commutator losses (*Elec. Eng.*). Losses occurring at the commutator of an electric machine; they include resistance loss in the segments, in the brushes, and at the contact surface, friction loss due to the brushes sliding on the commutator surface, loss due to sparking, and eddy current loss in the segments.

commutator lug (*Elec. Eng.*). A projecting piece of metal, connected to or integral with a commutator bar. Also called COMMUTATOR RISER, COMMUTATOR TAG.

commutator Micanite (*Diel.*). This is made from Muscovite and Phlogopite splittings, about ½ to 1½ mm. thick and area 1 to 3 sq. in.; bonded with less than 3% of high-grade shellac under great pressure.

commutator motor (*Elec. Eng.*). An electric motor which embodies a commutator in its construction.

commutator rectifier (*Elec. Eng.*). A device for rectifying alternating currents; it consists of a commutator which reverses the connexions of the circuit at the end of each half-cycle.

commutator ring (*Elec. Eng.*). A ring, usually of cast-iron, made to fit into a dovetail in the commutator segments in order to clamp them firmly in position. The term is also used to denote the insulating rings which have to be placed between the metal of the above ring and the commutator segments.

commutator ripple (*Elec. Eng.*). Small periodic variations in the voltage of a d.c. generator or rotary converter resulting from the fact that there can only be a finite number of commutator segments on the machine.

commutator riser (*Elec. Eng.*). See **commutator lug.**

commutator segment (*Elec. Eng.*). See **commutator bar.**

commutator shell (*Elec. Eng.*). See **commutator hub.**

commutator shrink-ring (*Elec. Eng.*). A steel ring shrunk round the cylindrical surface of commutators on very high speed commutator machines (e.g. d.c. turbo-generators) in order to hold the segments in position against the action of the centrifugal force. The ring must, of course, be insulated from the segments.

commutator sleeve (*Elec. Eng.*). See **commutator hub.**

commutator spider (*Elec. Eng.*). A spider mounted on the shaft of an electrical machine and used for supporting the commutator.

commutator surface (*Elec. Eng.*). The smooth portion of a commutator upon which the current-collecting brushes slide. Also called the COMMUTATOR FACE.

commutator tag (*Elec. Eng.*). See **commutator lug.**

commutator transformer (*Elec. Eng.*). A device for converting from a low-voltage d.c. to a high-voltage d.c. and vice versa. It consists of a motor-driven commutator which converts from d.c. to a.c., this being then supplied to a transformer and stepped up; another commutator then rectifies the high-voltage a.c. It is used chiefly for obtaining a high-voltage d.c. supply from a small battery.

compandor (*Teleph.*). The combination of the compressor and expandor, for the transmission of telephonic speech with reduced contrast.

companion cell (*Bot.*). A nucleated cell, associated with a segment of a sieve tube, and apparently playing some part in assisting the sieve tube to conduct food material. Companion cells occur only in *Angiospermae.*

companionship (*Typog.*). A number of compositors working together on adjacent portions of the same job. Called in Scotland CHUMSHIP.

compar′ator (*Phys.*). (1) A form of apparatus used for the accurate comparison of standards of length. It has also been used for measuring the coefficients of expansion of metal bars.—(2) A form of colorimeter.

comparison lamp (*Illum.*). A lamp used, when performing photometric tests, for making successive comparisons between the lamp under test and a standard lamp.

comparison prism (*Light*). A small right-angled prism placed in front of a portion of the slit of a spectroscope or spectrograph for the purpose of reflecting light from a second source of light into the collimator, so that two spectra may be viewed simultaneously. See **comparison spectrum.**

comparison spectrum (*Light*). A spectrum formed alongside the spectrum under investigation, for the purpose of measuring the wavelengths of unknown lines. It is desirable that the comparison spectrum should contain many standard lines of known wavelength. The spectrum of the iron arc is often used for this purpose. See **comparison prism.**

comparison surface (*Illum.*). A surface illuminated by a standard lamp or a comparison lamp; used in photometry.

compass (*Surv., etc.*). An instrument which provides a fixed line of reference from which angles can be measured as bearings; it depends on the property of its magnetic needle which constrains it to take up this direction. Specifically, an instrument for indicating the direction of North, South, and other bearings.

See **azimuth—**
earth inductor—
floating card—
gyro—
Kelvin—
magnetic—
marine—
prismatic—
radio—

compass (*Zool.*). One of five radially disposed, curved ossicles, bifid distally, which overlie the rotulae in the lantern of Aristotle.

compass board (*Textiles*). A comber board, the name now generally used.

compass brick (*Build.*). A brick which tapers in at least one direction so as to be specially useful for curved work, as in building arches, parts of furnaces, etc.

compass card (*Ships, etc.*). The pivoted disc carrying the magnetic needle of a magnetic mariners'-compass; the disc is marked with the bearings, i.e. North, South, etc.

compass errors (*Ships*). The various errors which arise in the indication of a compass when used on board ship and against which special precautions have to be taken.

compass plane (*Tools*). A plane with a curved sole, suitable for working convex or concave surfaces.

compass roof (*Build.*). A roof with rafters bent to the shape of an arc.

compass saw (*Carp.*). A handsaw with straight tapering blade, long and narrow; used for cutting in curves. Also called a FRET-SAW, LOCK-SAW, or KEYHOLE SAW.

compass window (*Build.*). A bay or oriel window.

compasses (*Instruments*). An instrument for describing arcs, taking or marking distances, etc ; it consists essentially of two limbs hinged together at one end.

compatibility (*Chem.*). The tolerance of one dissolved substance towards another dissolved substance; e.g. the tolerance of a nitrocellulose solution towards a solution of a resin, mixture of the two solutions not effecting precipitation of the nitrocellulose.

compatible (*Bot.*). Capable of self-fertilisation.

compensated induction motor (*Elec. Eng*). An induction motor with a commutator winding on the rotor, in addition to the ordinary primary and secondary windings; this winding is connected to the circuit in such a way that the motor operates at unity or at a leading power factor.

compensated pendulum (*Phys.*). A pendulum made of two materials which have different coefficients of expansion and are so chosen that the length of the pendulum remains constant when the temperature varies.

compensated pilot-wire (Beard-Hunter) protective system (*Elec. Eng.*). A modification of the Merz-Price opposed-voltage excess-current protective system, designed to avoid false operation due to capacity currents in the pilot-wires. The pilot-wires are each enclosed in a conducting sheath, and are so connected that any capacity current flows in the sheath and does not pass through the relays.

compensated repulsion motor (*Elec. Eng.*). A repulsion motor with an additional pair of brushes connected in series with the supply circuit and placed in quadrature with the short-circuited brushes, the object being to obtain an improved power-factor.

compensated series motor (*Elec. Eng.*). The usual type of a.c. series motor, in which a compensating winding is fitted to neutralise the effect of armature reaction and so give a good power-factor. Also called NEUTRALISED SERIES MOTOR.

compensated shunt box (*Elec. Eng.*). A shunt box for use with a galvanometer, arranged so that on each step a resistance is put in series with the galvanometer, and the total resistance of galvanometer and shunt is not altered.

compensated voltmeter (*Elec. Eng.*). A voltmeter arranged to indicate the voltage at the remote end of a feeder or other circuit, although connected at the sending end. A special winding compensates for the voltage drop in the feeder.

compensated wattmeter (*Elec. Eng.*). A wattmeter in which there is an additional winding, arranged to compensate for the effect of the current flowing in the pressure circuit.

compensating coil (*Elec. Eng.*). A coil used on instruments, meters, etc. to compensate for the effect of friction or some other factor which might cause error.

compensating collar (*Eng.*). A collar fitted on a revolving shaft, for the purpose of compensating for wear at some point that would otherwise cause axial displacement of the shaft.

compensating diaphragm (*Surv.*). A fitment for a tacheometer which, by an adjustment to the stadia interval determined by the vertical angle, enables the horizontal component of a sloping sight to be deduced directly from the staff intercept.

compensating digits (*Auto. Teleph.*). Extra trains sent out over certain junctions to operate relays, so that subsequent marginal currents operate in resistances which do not depart markedly from the average.

compensating errors. See **accidental errors.**

compensating field (*Elec. Eng.*). A term sometimes used to indicate the field produced by a compensating winding or, occasionally, by a compole.

compensating filter (*Photog.*). A filter used to alter the spectral emission of a light source, or the sensitivity of an emulsion, to a specified response to different wavelengths.

compensating jet (*I.C. Engs.*). An auxiliary petrol jet used in some carburettors, in order to supplement the discharge from the main jet at low rates of air flow, and to keep the mixture strength constant. See **carburettor.**

compensating pole (*Elec. Eng.*). See **compole.**

compensating winding (*Elec. Eng.*). A winding used on d.c. or a c. commutator machines to neutralise the effect of armature reaction.

compensation (*Elec. Comm.*).
See **attenuation—** **phase—**

compensation (*Med.*). The condition in which, in spite of the presence of heart disease, there is no heart-failure; the heart is then said to be *compensated.*

compensation balance (*Horol.*). A balance so constructed as to compensate for the changes of dimensions in the balance and the elastic properties of the balance spring, with changes of temperature. Actually, compensation cannot be complete over a range of temperature. A watch or chronometer adjusted for the extremes of the range will not be correct at the middle of the range. This gives rise to what is known as the ' middle temperature ' error.

compensation method (*Chem.*). See **Poggendorff compensation method.**

compensation pendulum (*Horol.*). A pendulum so constructed that the distance between the centre of oscillation and the point of suspension remains constant with changes of temperature. See **pendulum.**

compensation point (*Bot.*). The light intensity at which, at any given temperature, respiration and photosynthesis just balance in a green plant, so that there is neither liberation nor absorption of carbon dioxide and of oxygen.

compensation sac (*Zool.*). In some *Cheilostomata*, a membranous diverticulum of the ectoderm lying below the calcareous front surface of the zooecium, which fills with water when the tentacles are extruded.

compensation strand (*Bot.*). A strand of vascular tissue passing from an inner to an outer vascular ring in some ferns.

compensation theorem (*Elec. Comm.*). This states that the change in current produced in a network by a small change in any impedance Z carrying a current I is the result of an electromotive force equal to $-I\cdot\delta Z$.

compensation water (*Civ. Eng.*). The water which has to be passed downstream from a reservoir in order to supply users who, prior to the construction of the dam, took their water directly from the stream.

compensator (*Cinema.*). In a sound-film recording camera, an arrangement for making the speed of the film correspond with a stated number of sprocket holes per second; used because of slight variations in the length of the stated number of sprocket holes.

compensator (*Elec. Eng.*). See **auto-transformer.**

compensator (*Photog.*). A device for graduating the light passed through a wide-angle lens, such as an axial rotating star or a plano-convex lens of tinted glass, so that the image of an evenly illuminated surface is also evenly illuminated.

compensator, Gerlach (*Acous.*). See **Gerlach compensator.**

compensator starter (*Elec. Eng.*). See **auto-transformer starter.**

competition (*Bot.*). The struggle between plants for the necessities of life (water, light, etc.).

com'planate (*Bot.*). Flattened, compressed.

complement. The *complement* of an angle α is $(90°-\alpha)$.

complement (*Cyt.*). A group of chromosomes derived from one nucleus, and consisting of one, two, or more sets.

complemental males (*Zool.*). In some hermaphrodite species, as the Barnacle *Scalpellum*, certain small individuals, lacking ovaries, found living in close proximity to the normal hermaphrodite forms; believed to have the function of effecting cross-fertilisation.

complementary after-image (*Optics*). The subjective image, in complementary colours, that is experienced after visual fatigue induced by observation of a brightly coloured object.

complementary colours. If a circle shows subtractive primary and secondary colours around its circumference thus: *red, orange, yellow, green, blue, violet,* those colours found opposite each other are *complementary* and give greatest contrast.

complementary factor (*Gen.*). A factor in inheritance which, in conjunction with one or more similar factors, leads to the appearance of some character in the offspring.

complementary function (*Maths.*). If $y=u+v$ is a solution of a differential equation, where u is the particular integral and v contains the full number of arbitrary constants, v is called the *complementary function.*

complementary society (*Bot.*). A community of two or more species of plants occupying the same soil, but not coming into active competition since they vegetate at different times of the year or develop their roots at different levels in the soil.

complementary tissue (*Bot.*). A loose assemblage of thin-walled, unsuberised cells, fitting loosely together, lying in the cavity of a lenticel, and allowing gases and vapours to diffuse through them.

complete cycle (*Elec. Eng.*). See **cycle.**

complete flower (*Bot.*). A flower which has both calyx and corolla.

complete reaction (*Chem.*). A reaction which is irreversible and therefore proceeds until one of the reactants has disappeared.

complex (*Psychol.*). A term introduced by Jung to denote an emotionally toned constellation of mental factors formed by the attachment of instinctive emotions to objects or experiences in the environment, and always containing elements unacceptable to the self. It may be recognised in consciousness, but is usually repressed and unrecognised.

complex hyperbolic functions (*Elec. Comm.*). Hyperbolic functions, with complex quantities as variables, which facilitate calculations of electric waves along transmission lines.

complex ion (*Chem.*). An ion which dissociates to form simpler ions.

complex tissue (*Bot.*). A tissue made up of cells or elements of more than one kind.

complex tone (*Acous.*). Strictly, a musical note in which all the separate tones are exact multiples of a fundamental frequency, recognised as the pitch, even when the actual fundamental is absent, as in the lowest octave of a piano. Loosely applied to a mixed musical chord.

complex'us (*Zool.*). A complicated system of organs; e.g., in Primates, a compound muscle of the back.

compliance (*Acous.*). The reciprocal of stiffness, i.e. the displacement in cm. corresponding to the application of the force of one dyne.

complic'ant (*Zool.*). Folding one over another, as the wings of some Insects.

complicate (*Bot., Zool.*). Folded together.

compo (*Build.*). A cement mortar.

compo board (*Build.*). A building-board consisting of narrow strips of wood glued together into one sheet, both sides being faced with a heavy paper.

compo pipe (*Gas Fittings*). Pipe made from an alloy, as opposed to lead pipe.

compole (*Elec. Eng.*). An auxiliary pole, employed on commutator machines, which is placed between the main poles for the purposes of producing an auxiliary flux to assist commutation. Also called COMMUTATING POLE, COMPENSATING POLE, INTERPOLE.

component (*Elec. Eng.*). A term sometimes used to denote one of the component parts into which a vector representing voltage, current, or volt-amperes may be resolved; the component parts are usually in phase with, or in quadrature with, some reference vector.

See

active voltage	**reactive voltage**
active current	**reactive current**
active volt-amperes	**reactive volt-amperes.**

component (*Mech.*). The resolved part of a force in any particular direction. The component of a force F, along a line making an angle θ with the line of action of F, is $F\cos\theta$. See **forces (resolution of).**

components (*Chem.*). The minimum number of substances required for the establishment of equilibrium, physical or chemical, in a given system.

compose (*Typog.*). To assemble type matter for printing, either by hand or by type-setting machines.

composing frame (*Typog.*). A wooden or steel structure before which the compositor stands. The upper and lower case in use rest on the top, and the under portion is filled with cases containing various type faces and sizes.

composing machines (*Typog.*). The Monotype composes type matter in separate letters, which may be used for hand-setting or correcting; the Linotype composes in solid lines, or slugs, which must be corrected by resetting. Both machines have a keyboard resembling that of a typewriter. See also **Intertype** and **photo-composition.**

composing rule (*Typog.*). A piece of brass rule with a projecting nose piece, moved up as each line in the stick is completed by the compositor.

composing stick (*Typog.*). A wooden or metal three-sided boxlike receptacle in which the compositor sets his type letter by letter. The width or measure can be altered as desired.

composite balance (*Elec. Eng.*). A modification of the Kelvin balance; the moving coils are of high resistance, enabling the instrument to be used as a wattmeter.

composite block (*Typog.*). (1) *Combined half-tone and line* (q.v.) block.—(2) A block made up from two or more originals.

composite circuit (*Teleg.*). A telegraph circuit operating over a telephone circuit, without interfering with the latter.

composite conductor (*Elec. Eng.*). A conductor composed of more than one material; e.g. steel-cored aluminium cable.

composite deposits (*Elec. Eng.*). Deposits, consisting of two or more layers of different metals, formed by electroplating; the object being protection from corrosion or to obtain a smooth deposit of particular properties.

composite portraits (*Photog.*). The over-printing of a number of images (e.g. portraits) in order to obtain an idea of the average appearance.

composite sill (*Geol.*). A sill comprising successive injections of different igneous rocks.

composite truss (*Build.*). A roof truss formed of timber struts and steel or wrought-iron ties (apart from the main tie, which is usually of timber to simplify connexions).

composition (*Chem.*). The nature of the elements present in a substance and the proportions in which they occur.

composition (*Photog.*). The creative work in deciding the disposition of the pictorial elements in a photographic image.

composition nails (*Build.*). Roofing nails made of a cast 60-40 copper-zinc alloy.

composition of forces (*Mech.*). The process of finding the resultant of a number of forces, that is a single force which can replace the other forces and produce the same effect. See **parallelogram of forces.**

compositor (*Typog.*). A craftsman whose work consists of setting up type matter by hand, or correcting that set by machine. Skill and judgment in display work are part of his routine.

compound (*Bot.*). Formed of a number of parts which are nearly separate, and usually separate at maturity.

compound (*Chem.*). See **chemical compound.**

compound arch (*Build.*). An arch having an archivolt receding in steps, so as to give the appearance of a succession of receding arches of varying spans and rises.

compound brush (*Elec. Eng.*). A type of brush used for collecting current from the commutator of an electric machine; the brush has alternate layers of copper and carbon so that the conductivity is greater longitudinally (i.e. in the direction of the main current flow) than laterally.

compound-catenary construction (*Elec. Eng.*). A construction used for supporting the overhead contact wire of an electric traction system; the contact wire is supported from an auxiliary catenary which, in turn, is supported from a main catenary, all three wires lying in the same plane.

compound curve (*Surv.*). A curve composed of two arcs of different radii, having their centres on the same side of the curve, connecting two straights.

compound dredger (*Civ. Eng.*). A type of dredger combining the suction or suction cutter apparatus with a bucket ladder.

compound engine (*Eng.*). A steam-engine in which the expansion of the steam from boiler pressure to exhaust pressure is carried out in two stages, necessitating the use of high- and low-pressure cylinders in series.

compound fault (*Geol.*). A series of closely spaced parallel or sub-parallel faults.

compound-filled apparatus (*Elec. Eng.*). Electrical apparatus (e.g. bus-bars, potential transformers, switchgear) in which all live parts are enclosed in a metal casing filled with insulating compound.

compound fruit (*Bot.*). A fruit formed from several closely associated flowers.

compound generator (or **motor**) (*Elec. Eng.*). A d.c. generator (or motor) on which there are both a shunt and a series field winding. See **cumulatively compound machine, differentially compound-wound machine, flat-compounded, over-compounded generator** (or **motor**).

compound girder (*Struct.*). A rolled-steel joist strengthened by additional plates riveted or welded to the flanges.

compound harness (*Textiles*). An arrangement of cords in a jacquard machine, made in order to increase the figuring capacity of the machine.

compound-interest law (*Bot.*). The doctrine that the rate of growth of a plant at any time is proportional to the amount of plant material present at the time.

compound leaf (*Bot.*). A leaf the lamina of which consists of a number of quite distinct leaflets, being divided down to the midrib; the leaflets may fall independently of one another as the leaf dies.

compound lever (*Eng.*). A series of levers for obtaining a large mechanical advantage, the short arm of one being connected to the long arm of the next; used in large weighing and testing machines.

compound magnet (*Elec. Eng.*). A permanent magnet made up of several laminations.

compound microscope (*Light*). See **microscope.**

compound oil (*Oils*). (1) An oil blended from the products of crudes of different characteristics —(2) A blend of mineral and vegetable oils, used to combine certain desirable properties.

compound oösphere (*Bot.*). A multinucleate body occurring in an oögonium, probably composed of a number of female gametes which have not become individualised.

compound pendulum (*Phys.*). See **pendulum (compound).**

compound pier (*Build.*). A clustered column.

compound pillar (*Struct.*). A pillar formed of a rolled-steel joist or joists or channels strengthened by additional plates riveted or welded to the flanges.

compound pyrenoid (*Bot.*). A pyrenoid made up of two closely associated portions.

compound reflex (*Zool.*). A combination of several reflexes to form a definite co-ordination, either simultaneous or successive.

compound train (*Eng.*). A train of gear-wheels in which intermediate shafts carry both large and small wheels, in order to obtain a large speed ratio in a small space.

compound umbel (*Bot.*). A racemose inflorescence consisting of a number of secondary axes radiating obliquely upwards from the end of a main branch, and bearing in their turn a number of flower stalks similarly arranged. Each flower stalk bears one flower, and, generally, the whole assemblage of flowers forms a flat, circular group.

compounding (*Eng.*). The principle, or the use of the principle, of expanding steam in two or more stages, either in reciprocating engines or steam-turbines.

compressed (*Bot.*). Flattened laterally: pressed together.

compressed-air condenser (*Elec. Eng.*). An electric condenser in which air at several atmospheres' pressure is used as the dielectric, on account of its high dielectric strength at these pressures.

compressed-air disease (*Med.*). See **caisson disease.**

compressed-air lamp (*Illum.*). An electric lamp for use in fiery mines; it is supplied from a small compressed-air-driven generator incorporated in the lamp-holder.

compressed-air squeezer (*Moulding*). See **squeezer.**

compressed-air tools (*Eng.*). See **pneumatic tools.**

compressibility (*Mech.*, *Phys*). The reciprocal of the bulk modulus.

compressibility, coefficient of (*Chem.*). See **coefficient of compressibility.**

compression (*Eng*). In an internal-combustion engine, (1) the stroke during which the working agent is compressed; (2) the gas-tightness of the piston during the compression stroke.

compression flange (*Bot*). A group of turgescent parenchymatous cells on the convex side of a coiled tendril.

compression-ignition engine (*Eng.*). An internal-combustion engine in which ignition of the liquid fuel injected into the cylinder is performed by the heat of compression of the air charge. See **Diesel engine.**

compression moulding (*Plastics*). The material is placed in a hardened, ground, polished steel container and forced down by means of a plunger at a pressure of 3000-5000 lb. per sq. in. The disadvantages of the method are the damage done to the mould by the material travelling under a high pressure and the fact that more material than is necessary must be used.

compression ratio (*Eng.*). In an internal-combustion engine, the ratio of the total volume enclosed in the cylinder at the outer dead-centre to the volume at the end of compression; the ratio of swept volume, plus clearance volume, to clearance volume. See **clearance volume.**

compression rib (*Aero.*). See **rib (compression).**

compression test (*Eng*). A test for ductility and malleability of iron and steel bar, in which a specimen, of length 1·5 diameters, is compressed to half its length. No cracks should result.

compression wood (*Bot*). Wood of dense structure formed at the bases of some tree trunks, and on the undersides of branches.

compressor (*Eng.*). Any kind of reciprocating, rotary, or centrifugal pump for raising the pressure of a gas. See **air compressor, blower, centrifugal compressor.**

compressor (*Teleph.*). A thermionic amplifier designed to reduce the contrast in telephonic speech, for transmission at an average higher level in the presence of interference.

compressor (*Zool.*). A muscle which by its contraction serves to compress some organ or structure.

Compton effect (*Phys.*). When short homogeneous X-rays are scattered by light elements their wavelength is slightly increased, the scattered radiation containing usually both the original and the modified wavelengths. For an angle of scattering of 90°, the increase in wavelength is always 0·024 A.U., whatever the scattering element. The effect is due to the collision of a photon with an electron and the consequent decrease in the energy of the photon.

compulsion neurosis (*Psycho-an.*). See **obsessional neurosis.**

computing scale (*Surv.*). A special scale fitted with a sliding cursor, used for the computation of area on maps, etc.

cona'rium (*Zool.*). In *Vertebrata*, the pineal gland: in *Coelenterata*, the transparent deep-sea larva of *Vellella*.

conation (*Psychol.*). The conscious desire to act as a result of feelings conditioned in the individual by some cognitive process. This cognition leads to affect, which in turn leads to conation.

concat'enate (*Bot.*). Joined together, forming a chain of similar members.

concatenated connexion (*Elec. Eng.*). See **cascade connexion.**

concatenated motor (*Elec. Eng.*). See **cascade motor.**

Concato's disease (*Med.*). A chronic inflammation of serous membranes attended with effusion of fluid into serous sacs (e.g. peritoneal, pericardial, and pleural cavities).

concave brick (*Build.*). A compass brick.

concave grating (*Light*). A diffraction grating ruled on the surface of a concave spherical mirror, made usually of speculum metal or glass. Such a grating needs no lenses for collimating or focusing the light. Largely on this account it is the most useful means of producing spectra for precise measurement. See **Rowland circle.**

concave lens (*Light*). A *divergent lens* (q.v.).

concave mirror (*Light*). A curved surface—usually a portion of a sphere—the inner surface of which is a polished reflector. Such a mirror is capable of forming real and virtual images, their positions being given by the equation $\frac{2}{R}=\frac{1}{v}+\frac{1}{u}$, R being the radius of curvature of the mirror, u the distance of the object, and v the distance of the image from the mirror. See **convention of signs.**

concave plane (*Tools*). A compass plane adapted to work concave surfaces.

concave veins (*Zool.*). In Insects, veins which follow the furrows of the wing corrugations.

concealed heating (*Build*). See **panel heating.**

concen'trate (*Bot.*). Arranged around a common centre, or having a common centre.

con'centrate or **concentrates** (*Met*). The products of concentration operations in which a relatively high content of metal has been obtained and which are ready for treatment by chemical methods.

concentrated load (*Struct.*). A load which is regarded as acting through a point.

concentrated winding (*Elec. Eng.*). A winding in which all the conductors forming one group (e.g. one phase under one pole in an a.c. machine) are placed in one slot instead of being distributed over a number of slots.

concentrating reflector (*Illum.*). A type of reflector which concentrates a strong beam of light on a particular area; used in industrial work.

concentration (*Acous.*). See **acoustic concentration.**

concentration (*Chem.*). (1) Number of molecules or ions of a substance in a given volume, generally expressed as gram-molecules or gram-ions per litre.—(2) A process in which the *concentration* (see above) of a substance is increased; e.g. evaporation of the solvent from a solution.

concentration (*Met.*). Separation of the valuable (i.e. mineral) portion of an ore from the useless portion (i.e. the gangue) by methods which depend on physical differences between these materials.

concentration cell (*Elec. Eng.*). A primary cell containing electrodes of the same metal, immersed in solutions of the same salt but of different degrees of concentration. During the action of the cell the strengths of the two solutions equalise by the solution of one electrode and deposit on the other.

concentration plant, concentrator (*Met.*, *Mining*). Equipment for the recovering of valuable minerals from ores by physical means; e.g. by washing or flotation.

concentration polarisation (*Elec. Eng.*). A form of polarisation occurring in an electrolytic cell; due to changes in the concentration of the electrolyte surrounding the electrode.

concentrator (*Met.*). See **concentration plant,** and cf. *separator*.

concentric arch (*Build.*). An arch laid in several courses whose curves have a common centre.

concentric cable (*Cables*). A cable with two or more concentric conductors.

concentric chuck (*Eng.*). See **self-centring chuck.**

concentric coils (*Elec. Eng.*). Coils of an armature winding designed to have different spans so that, when placed in the slots, the end connexions shall not have to cross each other.

concentric plug-and-socket (*Elec. Eng.*). A type of plug-and-socket connexion in which one contact is a central pin and the other is a ring concentric with it.

concentric tube feeder (*Radio*). A type of transmission line in which the two conductors are concentric tubes. The absence of external fields and freedom from 'pick-up' make it specially suitable for use in conjunction with directional antenna systems. Also called CO-AXIAL TUBE FEEDER, CONCENTRIC TUBE TRANSMISSION LINE.

concentric vascular bundle (*Bot.*). A bundle in which a strand of xylem is completely surrounded by a sheath of phloem, or vice versa.

concentric winding (*Elec. Eng.*). An armature winding, used on a.c. machines, in which groups of concentric coils are employed. Also used to denote the type of winding, used on transformers, in which the high-voltage winding is arranged concentrically with the low-voltage winding.

concentric wiring (*Elec. Eng.*). An interior wiring system in which the conductor consists of an insulated central core surrounded by a flexible metal sheath which forms the return lead.

concep'tacle (*Bot.*). A flask-shaped cavity in a thallus, opening to the outside by a small pore, and containing reproductive structures.

conception (*Physiol.*). The fertilisation of an ovum with a spermatozoon.

concert pitch (*Acous.*). The recognised pitch, i.e. frequency of the generated sound-waves, to which musical instruments, organs, etc. are tuned, so that they can play together. The exact value has varied considerably during musical history, but it has recently been internationally standardised so that *A* (above middle-*C*) becomes 440 cycles per second. Dance-bands are normally a few cycles per second lower. Allowance must be made for the rise in temperature experienced in concert halls, which rise alters the pitch in ways peculiar to the different types of instrument.

concha, kong'ka (*Arch.*). The smooth concave surface of a vault.

concha (*Zool.*). In Vertebrates, the cavity of the outer ear: the outer or external ear: a shelf projecting inwards from the wall of the nasal cavity to increase the surface of the nasal epithelium.

con'chate or **con'chiform** (*Bot.*). Shaped like a sea shell.

conchiolin, —kĭ'ō-lin (*Zool.*). A horny substance forming the outer layer of the shell in *Mollusca*.

conchi'tis (*Med.*). Inflammation of a concha.

Conchos'traca (*Zool.*). An order of *Branchiopoda*, having a carapace, in the form of a bivalve shell, enclosing the head and body; the eyes are sessile and coalescent; the second antennae are biramous and natatory; there are numerous trunk limbs; the caudal furca are claw-like. Clam Shrimps.

con'color or **concol'orous, —kul-ur(-us)** (*Bot., Zool.*). Uniform in colour.

concol'orate (*Zool.*). Having both sides the same colour.

concres'cence (*Bot.*). Growing together to form a single structure.—*adj.* **concrescent.**

concrete (*Bot.*). (1) Grown together to form a solid body.—(2) Adhering closely to anything.

concrete (*Build., Civ. Eng., etc.*). A mixture of cement, sand, and gravel, with water in varying proportions according to the use which is to be made of it.

concrete blocks (*Civ. Eng., etc.*). Solid or hollow pre-cast blocks of concrete used in the construction of buildings.

concrete mixer (*Civ. Eng., etc.*). An appliance in which the constituents of concrete are mixed mechanically.

concretion (*Med.*). Collection of organic matter with or without lime salts, or of lime salts, in bodily organs.

concretionary structures (*Geol.*). Nodular or irregular concentrations of siliceous, calcareous, or other materials, formed by localised deposition from solution in sedimentary rocks.

concussion (*Med.*). A violent shaking or blow (especially of or to the head), or the condition resulting from it. See **commotio cerebri.**

condensance (*Elec. Eng.*). A term occasionally used to denote the reactance of a capacitor.

condensation (*Bot.*). Crowding in a vertical series, due to the absence or suppression of internodes.

condensation (*Chem.*). (1) The linking together of two or more molecules, resulting in the formation of long chain compounds.—(2) The union of two or more molecules with the elimination of a simpler group, such as H_2O, NH_3, etc.

condensation (*Meteor.*). The process of forming a liquid from its vapour. When moist air is cooled below its dew-point, water vapour condenses if there are extended surfaces or nuclei present. These nuclei may be dust particles or ions. Mist, fog, and cloud are formed by nuclear condensation.

condensation gutter (*Build.*). A small gutter provided at the curb of lantern lights to carry away condensed water formed on the interior surface of the glazing.

condensation sinking (*Join.*). A groove cut in the bottom rails of skylights to carry away condensed water formed on the interior surface of the glazing.

condensed (*Bot.*). Said of an inflorescence in which the flowers are crowded together and nearly or quite sessile.

condensed (*Typog.*). See **elongated.**

condensed nucleus (*Chem.*). A ring system in which two rings have one or more (generally two) atoms in common; e.g. naphthalene, phenanthrene, quinoline.

condensed system (*Chem.*). One in which there is no vapour phase. The effect of pressure is then practically negligible, and the Phase Rule may be written $P+F=C+1$.

condenser (*Chem.*). Apparatus used for condensing vapours obtained during distillation; it consists of a condenser tube, either freely exposed to air or contained in a jacket in which water circulates.

condenser (*Cotton Spinning*). A mechanism which, with a roller card, produces rovings from the material delivered by the carding engine.

condenser (*Elec. Eng., etc.*). A term previously used to denote a *capacitor*, the latter name being now preferred.

See **air—**
blocking—
by-pass—
coupling—
d.c. electrolytic—
disc—
dry electrolytic—
electrolytic—
Mansbridge—
paper—
self-sealing—
series-gap—
variable—
wet electrolytic—

condenser (*Eng.*). A chamber into which the exhaust steam from a steam-engine or turbine is delivered, to be condensed by the circulation or the introduction of cooling water; in it a high degree of vacuum is maintained by an air-pump.

See **surface—**
jet—

condenser (*Light*). A large lens or mirror used in an optical projecting system to collect light, radiated from the source, over a large solid angle, and to direct this light on to the object or transparency which is to be focused at a distance by a projection lens. See **mirror arc.**

condenser bushing (*Elec. Eng.*). A type of bushing used for terminals of high voltage apparatus (e.g. transformers and switchgear) in which alternate layers of insulating material and metal foil form the insulation between the conductor and the outer casing; the metal foil serves to improve the voltage distribution. Sometimes called a CONDENSER TERMINAL.

condenser card (*Woollen*). The section of a set of cards (carding engines) which produces the condensed slivers for spinning.

condenser circulating pump (*Eng.*). See **circulating pump.**

condenser leathers (*Textiles*). See **rubbing leathers.**

condenser loudspeaker (*Acous.*). A loudspeaker in which the sound-radiating element forms one electrode of a large condenser, to which polarised modulation voltages are applied.

condenser microphone (*Acous.*). A microphone in which the applied voltage is modulated by the compression of electrodes effected by the applied sound pressures.—HIGH-FREQUENCY CONDENSER MICROPHONE, a condenser microphone in which the polarising voltage is alternating at a high radio-frequency, amplitude modulation of which is detected by a de-modulator and used for audio-frequency transmission.

condenser pick-up (*Acous.*). A pick-up in which the tracking needle moves one electrode of a condenser, thereby modulating a steady potential applied to the condenser through a high resistance.

condenser, reading or **shunted** (*Teleg.*). See **reading condenser.**

condenser terminal (*Elec. Eng.*). See **condenser bushing.**

condenser tissue (*Paper*). Thin rag paper used, in conjunction with aluminium foil, in making fixed electrical condensers.

condenser transmitter (*Acous.*). The same as *condenser microphone*, except that the latter term may be taken to include extra equipment, such as an amplifier, which is essential for the operation of the arrangement as a whole.

condenser-transmitter (or **microphone**) **amplifier** (*Elec. Comm.*). The amplifier immediately associated with a condenser microphone, on account of the low sensitivity and high impedance of the latter.

condenser tubes (*Eng.*). The tubes through which the cooling water is circulated in a *surface condenser* (q.v.), and on whose outer surfaces the steam is condensed.

condenser yarn (*Cotton Spinning*). Yarns of good quality spun from waste material; suitable for cotton blankets, low quality shirtings, etc.

condensing electroscope (*Elec. Eng.*). A gold-leaf electroscope combined with a small condenser which can have its upper plate removed in order to magnify the effect of a charge by decreasing the capacitance of the instrument.

condensing lens (*Photog.*). A simple lens which receives light flux from a source of light at the greatest solid angle possible and concentrates it evenly over the area of a gate, as in a film projector.

conditioned reflex (*Zool.*). A reflex response to a stimulus which depends upon the former experience of the individual.

conditioning (*Cotton Spinning*). The process of adding to yarn, after spinning, the percentage of moisture necessary to bring it up to average conditions; 100 parts of dry cotton will absorb 8½ parts of moisture.

conditioning, air (*Cinema.*). See **air conditioning.**

conditions of severity (*Elec. Eng.*). A term used in connexion with the testing of circuit-breakers to denote the conditions (e.g. power factor, rate of rise of restriking voltage, etc.) obtaining in the circuit when the test is carried out.

conductance (*Elec. Eng.*). The property of a material by virtue of which it allows current to flow through it when a potential difference is applied. It is the reciprocal of resistance.

conductance of a dielectric (*Diel.*). The ratio expressed by the conduction current divided by the voltage. Normally written **G.**

conductimet'ric analysis (*Chem.*). Volumetric analysis in which the end-point of a titration is determined by measurements of the conductance of the solution.

conducting strand (*Bot.*). See **vascular bundle.**

conduction (*Acous.*). See **air—** **bone—**

conduction of heat (*Heat*). The transfer of heat from one portion of a medium to another, without visible motion of the medium, the heat energy being passed from molecule to molecule. See **conductivity (thermal).**

conductivity (*Elec. Eng.*). The conductance, at a specified temperature, between the opposite faces of a cube of material having sides of unit length. It is the reciprocal of volume resistivity.

conductivity (*Zool.*). The ability to transmit stimuli—a characteristic property of nervous tissue.

conductivity bridge (*Elec. Eng.*). A form of Wheatstone bridge used for the comparison of low resistances.

conductivity test (*Elec. Eng.*). See **fall-of-potential test.**

conductivity, thermal (*Heat*). The coefficient of thermal conduction, or the specific thermal conductivity (k) of a substance is the quantity of heat which flows in one second across unit area of a slab of the substance of unit thickness when the temperatures of the faces of the slab differ by one degree. If Q is the quantity of heat conducted in t seconds across area A of a slab of thickness d, whose faces are at temperatures θ_1 and θ_2, then $\frac{Q}{t}=\frac{kA(\theta_1-\theta_2)}{d}$.

conductivity water (*Chem.*). Very pure water prepared for conductivity measurements; its specific conductivity is about 10^{-6} ohm^{-1}.

conductor (*Elec. Eng.*). (1) A material which offers a low resistance to the passage of an electric current.—(2) That part of an electric transmission, distribution, or wiring system which actually carries the current.—(3) One of the wires forming the windings of an electric machine.—(4) The metallic conductor in a cable; it is invariably of copper surrounded by an insulating dielectric.

See

armature—
composite—
steel-cored copper—
stranded—
shaped-conductor cable
solid-laid cable.

conductor (*Plumb.*). A pipe for the conveyance of rain water. Also called LEADER.

conductor-load (*Elec. Eng.*). The total mechanical load to which an overhead electric conductor may be subjected, because of its own weight and that of any adhering matter such as snow or ice.

conductor-rail (*Elec. Eng.*). In some electric traction systems, a bare rail laid alongside the running rails to conduct the current to or from the train. Also called CONTACT RAIL.

conductor-rail anchor (*Elec. Eng.*). A device for anchoring a conductor-rail in order to prevent the longitudinal movement which might be caused by the sliding of the collector-shoes along it.

conductor-rail bond (*Elec. Eng.*). A rail bond used for connecting adjacent lengths of conductor-rail at joints in order to preserve electrical continuity.

conductor-rail insulator (*Elec. Eng.*). An insulator used for supporting a conductor-rail and for insulating it from the earth.

conductor-rail ramp (*Elec. Eng.*). A sloping contact-surface at the beginning and end of a section of conductor-rail; it serves for leading the collector-shoe of the train smoothly on to and off the rail.

conductor-rail system (*Elec. Eng.*). A system of electric traction in which power is supplied to the vehicles by means of a conductor-rail laid alongside the track; current is collected from the conductor-rail by means of collector-shoes on the vehicle.

conduit, kon′dit *or* kun′— (*Elec. Eng.*). A trough or pipe for containing electric wires or cables, in order to protect them against damage from external causes.

See **bituminous—** **earthenware—**
closed— **plain—**

conduit (*Hyd. Eng.*). A pipe or channel, usually large, for the conveyance of water.

conduit box (*Elec. Eng.*). A box adapted for connexion to the metal conduit used in electric wiring schemes. The box forms a base to which fittings (e.g. switches or ceiling roses) may be attached, or it may take the place of bends, elbows, or tees, used in order to facilitate the installation of the wiring.

conduit fittings (*Elec. Eng*). A term applied to all the auxiliary items, such as boxes, elbows, etc., needed for the conduit system of wiring.

conduit system (*Elec. Eng.*). (1) A system of wiring, used for domestic and other premises, in which the conductors are contained in a steel conduit.—(2) A system of current collection used on some electric tramway systems; the conductor-rail is laid beneath the roadway, and connexion is made between it and the vehicle by means of a collector-shoe passing through a slot in the road surface.

condu′plicate (*Bot.*). (1) Folded longitudinally about the midrib, so that the two halves of the upper surface are brought together.—(2) Said of a cotyledon which is folded longitudinally about the radicle.

Condy's fluid (*Chem.*). A disinfectant, usually containing calcium permanganate, sodium permanganate, and possibly sodium nitrate.

con′dyle (*Zool.*). A smooth rounded protuberance, at the end of a bone, which fits into a socket on an adjacent bone, as the *condyle* of the lower jaw, the occipital *condyles*.—*adjs.* **condylar, condyloid.**

condylo′mata (*Med.*). Inflammatory wart-like papules on the skin round the anus and external genitalia, especially in syphilis.—*sing.* **condyloma.**

cone. A solid which may be generated by a straight line, one end of which remains fixed while the other end moves round a closed curve. If this curve is a circle whose plane is at right-angles to the line joining its centre to the fixed point, the cone is termed a *right circular cone*. This is the figure usually referred to when the term cone is used alone.

cone (*Bot.*). See **strobilus.**

cone (*Met.*). A device used on top of blast-furnaces, to enable charge to be put in without permitting gas to escape. Also called BELL.

cone (*Zool.*). A conical percipient structure borne on the outer end of certain visual cells of the retina: a *cone-cell* (q.v.).

cone bearing (*Eng.*). A shaft bearing consisting of a conical journal running in a correspondingly tapered bush, so acting as a combined journal and thrust bearing; used for some lathe spindles.

cone capacitor (*Elec. Eng.*). A capacitor consisting of two conducting cones, one inside the other, separated by insulating material. By moving one cone relative to the other a variable capacitance can be obtained.

cone-cell (*Zool.*). One of the photosensitive cells of the retina. See **cone.**

cone classifier (*Met.*). A general term for various types of machines of conical design used in classifying ores.

cone clutch (*Eng.*). A friction clutch in which the driving and driven members consist of conical frustra. The externally coned (driven) member may be moved axially in or out of the internally coned member for engaging and disengaging the drive. See **clutch, friction clutch.**

cone diaphragm (*Acous*). A diaphragm of doped or bakelised paper driven by an electro-magnetic mechanism at its apex, or electro-dynamically by a coil attached as an annulus; used for radiating sound in loudspeaking receivers

cone drawing (*Textiles*). A method of drawing wool so that the speed of the bobbin on which it is being wound decreases as the diameter of the bobbin and material enlarges.

cone drive or **cone gear** (*Eng.*). A belt drive between two similar coned or tapered pulleys. A variable speed ratio is obtained by lateral movement (by means of a striker) of the belt along the pulleys.

cone drums (*Cotton Spinning*). The driving drums used to vary the speed of delivery rollers or the speed of bobbin spindles.

cone gear (*Eng*). See **cone drive.**

cone loudspeaker (*Acous.*). A loudspeaker in which the main radiating element takes the form of a cone, generally driven at its apex, with the rim elastically suspended. See **surround.**

cone of origin (*Zool.*). The conical hyaline area of a nerve-cell body, at the point of origin of an axon.

cone pulley (*Eng.*). A belt pulley stepped to give two or more diameters; used in conjunction with a similar pulley to obtain different speed ratios. See also **cone drive.**

cone sheets (*Geol*). Minor intrusions which occur as inwardly inclined sheets of igneous rock, and have the form of segments of concentric cones.

Con′emaugh Series (*Geol.*). The lower Barren Coal Measures of the Pennsylvanian, which are succeeded by the productive Monongahela Series.

coney fur (*Furs*). The trade name for different kinds of dressed rabbit skins which are dyed and treated to imitate other furs.

conference system (*Teleph.*). A telephone system used for conference between groups of persons at a distance; high-grade microphones and radiating receivers are employed.

confer′void (*Bot.*). Consisting of delicate filaments.

configuration (*Chem.*). The spatial arrangement of atoms in a molecule, especially in one containing several asymmetric carbon atoms.

configuration (*Psychol.*). See **gestalt.**

conflict (*Cinema.*). In editing, the juxtaposition, in space or time, of photographic or acoustic elements which have a psychological antithesis and therefore interest for the observer.

confluent (*Bot.*). Said of two or more structures which, as they enlarge, grow together and unite.

confluent filter (*Elec. Comm.*). An electric wave-filter so designed that it has two pass or elimination bands two nominal cut-off frequencies of which are co-incident.

conformable strata (*Geol.*). An unbroken succession of strata. See also **unconformity, non-sequence.**

confusion (*Photog.*). See **circle of confusion, circle of least confusion.**

congé, kon^{g}′zhä (*Arch.*). A small circular moulding, either concave or convex, at the junction of a column with its base.

congener′ic (*Zool.*). Belonging to the same genus.

congenital (*Zool.*). Dating from birth.

congested (*Bot.*). Packed into a tight mass.

conges′tin (*Zool.*). A toxic substance produced by certain Sea Anemones.

congestion (*Med.*). Pathological accumulation of blood in a part of the body.

congestion call meter (*Auto. Teleph.*). A meter which counts the number of calls made over the last choice of outlet in a grading scheme.

congestion traffic-unit meter (*Auto. Teleph.*). A meter which registers the traffic flow over the last choice of outlets in a grading scheme.

conglo′bate (*Bot.*). Heaped together.—(*Zool.*) Ball-shaped.

conglomerate (*Bot.*). Clustered.

conglomerate (*Geol*). A cemented clastic rock containing rounded fragments, corresponding in their grade sizes to gravel or pebbles.

conglu′tinate (*Bot.*). United into a mass by a sticky substance.

Congo gum or **Congo copal** (*Chem.*). A natural gum, of yellow or brown colour; sp. gr. 1·059-1·080, saponification value 66-175, acid value 35-95. Soluble in benzene, turpentine, chloroform, ether. Used for varnishes and linoleum.

congregate (*Bot.*). Collected into a dense group.

conic section (*Geom*). A curve obtained by the intersection of a right circular cone by a plane. It may also be defined as the locus of a point which moves in a plane so that its distance from a fixed point, called the *focus*, is in a constant ratio (the *eccentricity*) to its distance from a fixed straight line known as the *directrix*. See **ellipse, hyperbola, parabola.**

conical horn (*Acous.*). A horn in the form of a cone, the apex being truncated to form the throat.

conical pivot (*Horol.*). (1) A pivot formed as a cone, which runs in a screw with a tapered hole, the angle of taper being greater than that of the conical pivot; used for the balance staff of alarm-clock movements, and for certain watches with pin-pallet escapement.—(2) A form of pivot, used in English watches, which has a conical shoulder, the pivot itself being parallel.

conid′ial (*Bot.*). (1) Referring to, or pertaining to, a conidium.—(2) Producing conidia.

conid′iole (*Bot.*). A small conidium, usually budded out from another conidium.

conid′iophore (*Bot.*). A simple or branched hypha bearing one or more conidia.

conid′ium (*Bot.*). An asexually formed spore, produced by many species of fungi. It develops at the end of a hypha, usually by a process of abstriction, and it is never enclosed in a sporangium.—*pl.* **conidia.**

Conif′erae (*Bot.*). The chief class of the *Gymnospermae*, with about 400 species, all woody, and mostly large evergreen trees, forming forests. The main stem usually persists, so that the tree has an elongated conical form. The reproductive organs are borne in cones, which are unisexual. Members of the group, such as pines and spruces, are important timber trees and are now widely used as sources of wood pulp.

conif′erin (*Chem.*). $C_{16}H_{22}O_8$, $2H_2O$, a glucoside contained in the cambium sap of the *Coniferae*, yielding glucose and coniferyl alcohol on hydrolysis; serves for the preparation of vanillin.

conif′erous (*Bot.*). Cone-bearing: relating to a cone-bearing plant.

coniine, kō′ni-ēn (*Chem.*). $C_5H_{10}N(C_3H_7)$, dextrorotatory *α-normal*-propyl-piperidine; b.p. 167° C.; a pyridine alkaloid found in *Conium maculatum*; it can be synthesised by reducing α-allyl-pyridine in alcoholic solution with sodium.

conjugate (*Bot.*). Occurring in pairs.

conjugate deviation (*Med*). The sustained deviation of the eyes in one direction as a result of a lesion in the brain.

conjugate division (*Bot.*). The simultaneous division of a pair of associated nuclei.

conjugate double bonds (*Chem.*). Di-olefinic compounds with an arrangement of alternate single and double bonds between the carbon atoms, viz. R·CH:CH·CH:CH·R. Peculiar additive reactions take place, inasmuch as atoms or radicals become attached to the two outside carbon atoms of the chain, thus creating a new ethylene linkage in the centre.

conjugate foci (*Light*). Two points such that rays of light diverging from either of them are brought to a focus at the other. For a simple convergent lens an object and its real image are at *conjugate foci.*

conjugate impedance (*Elec. Comm.*). Two impedances are conjugate when their resistance components are equal and their reactances are equal but opposite in sign.

conjugation (*Bot., Zool.*). The temporary or permanent union of two cells or individuals preparatory to the development of new individuals: more particularly, the union of isogametes: in *Infusoria*, a type of syngamy in which the participants remain separate and exchange nuclear material.

conjugation tube (*Bot*). A tubular outgrowth by means of which the contents of a male gametangium are conveyed into a female gametangium.

conjunction (*Astron.*). A term signifying that two heavenly bodies have the same celestial longitude or right ascension. Applied to the planets Venus and Mercury it is subdivided into *inferior conjunction* and *superior conjunction*, according as the planet is between the earth and sun, or the sun between the earth and planet, respectively.

conjuncti′va (*Zool.*). In Vertebrates, the modified epidermis of the front of the eye, covering the cornea externally and the inner side of the eyelid.

conjunctive parenchyma (*Bot.*). Parenchymatous tissue occupying the spaces between vascular strands or other specialised tissues.

conjunctivi′tis (*Med.*). Inflammation of the conjunctiva.

connation (*Bot.*). The union of parts of a plant as growth proceeds; applied especially to the union of like parts.—*adj.* **connate.**

connected load (*Elec. Eng.*). The sum of the rated inputs of all consumers' apparatus connected to an electric power supply system.

connecting-rod (*Eng.*). In a reciprocating engine or pump, the rod connecting the piston or crosshead to the crank.

connecting-rod bolts (*Eng.*). Bolts securing the outer half of a split big-end bearing of a connecting-rod to the rod itself. Sometimes known as BIG-END BOLTS.

connecting thread (*Bot.*). A delicate strand of protoplasm passing through a fine perforation in the cell wall, and uniting the protoplasts of contiguous cells.

connective (*Bot.*). (1) Sterile tissue in an anther, lying between the lobes, and usually a prolongation of the filament.—(2) See **disjunctor.**

connective (*Zool.*). A bundle of nerve fibres uniting two nerve centres.

connective tissue (*Zool.*). A group of animal tissues fulfilling mechanical functions, developed from the mesoderm and possessing a large quantity of non-living intercellular matrix, which usually contains fibres; as bone, cartilage, and areolar tissue.

connector-bar (*Elec. Eng.*). See **terminal-bar.**

connector neurone (*Zool.*). See **association neurone.**

connexion- (or **connecting-**) **box** (*Elec. Eng.*). A box containing terminals to which are brought a number of conductors of a wiring or distribution system, in order to facilitate the making of connexions between them.

conni'vent (*Bot.*). Converging and meeting at the tips.

consanguinity (*Geol.*). The term applied to rocks having a similarity or community of origin, which is revealed by common peculiarities of mineral and chemical composition and often also of texture.

consciousness (*Psychol.*). A comprehensive state of awareness of the mind to stimuli from the outside world, and to feelings, emotions, and thoughts from within the individual.

consen'sual (*Zool.*). Said of response to stimuli in which voluntary action and involuntary action are correlated.

consequent drainage (*Geol.*). A river system directly related to the geological structure of the area in which it occurs.

consequent pole (*Elec. Eng.*). A pole of a permanent magnet occurring at a point remote from either end. In an electromagnetic circuit, it refers to a pole occurring at a point between two magnetising coils having their m.m.f.'s in opposition.

consequent-pole generator (or **motor**) (*Elec. Eng*). A generator or motor in which alternate poles do not carry windings, and which are therefore consequent poles.

conservancy system (*San. Eng*). The system of disposing of waste matter from buildings by earth closets and privies, without the use of water to carry it away.

conservation of energy, law of (*Mech.*). 'In any isolated system, the total amount of energy is constant.'

conservation of matter (*Chem.*). See **law of the conservation of matter.**

conservation of momentum, law of (*Mech.*). 'The sum of all the momenta in a closed system (that is, one in which no influences act upon it from outside) is constant and is not affected by processes occurring within the system.'

conservation of movement of the centre of gravity, law of (*Mech.*). 'The state of rest or of motion of the centre of gravity of a system can never be altered by the action of internal forces within the system.'

conservative system (*Mech.*) A system such that, in any cycle of operations at the end of which the configuration of the system is the same as it was at the beginning, the work done is zero.

conservatory (*Build.*). A glazed building in which plants may be grown under controlled atmospheric conditions.

Considère pile, kon-se-dār' (*Civ. Eng.*). A type of reinforced-concrete pile having the main bars grouped symmetrically about the centre of the pile and bound together by a close-set spiral of steel wire or small-section steel rod.

consistom'eter (*Chem.*). An instrument for determining the consistency or hardness of semi-fluid and brittle materials.

consociation (*Bot.*). A subdivision of an association dominated by one of the co-dominants of the association.

consocies, kon-sō'sēz (*Bot.*). A developmental stage in the history of a consociation, before conditions have become stabilised.

console (*Acous.*). The location of the playing controls of an organ; the position where the organist plays the manuals and pedals, and registers his stops and couplers. The console may be integral with the pipe-work and action, as in old organs, but it is now generally detached. In electronic organs, the generators and action may be incorporated in the console or they may be remotely operated.

console (*Build., etc.*). (1) A bracket whose shelf is supported by volutes.—(2) A side or wall table.

consolidation (*Geol.*). (Of strata) the drying, compacting, and induration of rocks, as a result of pressures operating after deposition.

consolidation pile (*Civ. Eng.*). A pile driven (with others) into the ground in order to consolidate the soil and enable it to support heavier loads than would otherwise be possible.

consonant articulation (*Acous*). See **articulation.**

con'sortism (*Bot.*). See **symbiosis.**

consor'tium (*Bot.*). (1) The compound thallus of a lichen.—(2) The mutual relationships of the fungus and the alga in the lichen thallus.

constant (*Elec. Comm.*).

See **attenuation—**
distributed—
phase—
primary—
propagation—
time—
transfer—
wavelength—

constant-current generator (*Elec. Eng.*). A special type of electric generator which is designed to give a constant current at all loads, the voltage being varied to meet variations in the load.

constant-current modulation (*Radio*). See **choke control.**

constant-current motor (*Elec. Eng.*). An electric motor designed to operate at a constant current from a constant-current generator.

constant-current system (*Elec. Eng.*). A system of transmitting electric power in which all the equipment is connected in series and a constant current is passed round the circuit. Variations in power result in a variation of the voltage of the system, constant-current generators being used for the supply. See **series system.**

constant-current transformer (*Elec. Eng.*). A transformer designed to maintain a constant secondary current within a specified working range, for all values of secondary impedance and all values of primary voltage.

constant-frequency oscillator (*Radio*). An oscillator in which special precautions are taken to ensure that the frequency remains constant under varying conditions of load, supply voltage, etc.

constant-k filter (*Elec. Comm.*). An electric-wave filter in which the product of the shunt arm and the series arm is a constant, independent of frequency, the arms therefore being inverse.

constant level tube (*Surv.*). A special form of level tube in which the volume ratio of bubble to liquid is fixed at such a value that decrease in length of the bubble due to expansion of the liquid is exactly counterbalanced by increase in length of the bubble due to diminished surface tension, so that the length of the bubble—and thus the sensitivity of the level tube—remains unaltered by rise in temperature.

constant-mesh gear-box (*Automobiles*). A gear-box in which the pairs of wheels providing the various speed ratios are always in mesh, the ratio being determined by the particular wheel which is coupled to the mainshaft by sliding dogs working on splines.

constant-power generator (*Elec. Eng.*). An electric generator which, by variation of the generated voltage, gives a constant output at varying currents.

constant-pressure cycle (*I.C. Engs.*). See **Diesel cycle.**

constant proportions (*Chem.*). See **law of constant proportions.**

constant resistance network (*Elec. Comm.*). A transmission network in which image impedances are constant and resistive at all frequencies, so that reflection and interaction losses are avoidable.

constant time-lag (*Elec. Eng.*). See **definite time-lag.**

constant-velocity recording (*Acous.*). In gramophone disc recording, the technique whereby the lateral r.m.s. velocity of the sinuous track is made proportional to the root of the electrical power applied to the recorder, irrespective of the frequency. This criterion is necessary for minimum wear and surface noise on the finished record, but has to be modified to constant-amplitude recording below about 250 cycles per second, as a compromise with playing time.

constant-voltage generator (*Elec. Eng.*). The usual type of electric generator; the voltage is maintained approximately constant, the current being varied to meet variations in the load.

constant-voltage motor (*Elec. Eng.*). The usual type of electric motor, designed to operate from a constant-voltage system.

constant-voltage system (*Elec. Eng.*). The usual system of transmission of electric power, in which the voltage between the conductors is maintained approximately constant, and all apparatus is connected to the system in parallel across the conductors.

constant-volume cycle (*I.C. Engs.*). See **Otto cycle.**

constantan (*Elec. Eng.*). An alloy of about 40% nickel and 60% copper, having a high volume resistivity and almost negligible temperature coefficient; used as the resistance wire in resistance boxes, etc.

constellation (*Astron.*). A group of stars, not necessarily connected physically, to which have been given a pictorial configuration and a name (generally of Greek mythological origin) which persist in common use although of no scientific significance.

constipate (*Bot.*). Crowded together.

constipation (*Med.*). A condition in which the faeces are abnormally dry and hard: retention of faeces in the bowel: infrequent evacuation.

constituent (*Met.*). A component of a solid alloy. Four general types of constituents are recognised, viz. pure metals, primary solid solutions, intermediate constituents, and eutectics or eutectoids. See **constitution** (*Met.*).

constituents (*Chem.*). All the substances present in a system.

constitution (*Chem.*). See **chemical constitution.**

constitution (*Met.*). This term refers to the type of constituent or constituents present in a solid metal or alloy, and the proportions of each type concerned.

constitutional changes (*Met.*). Changes in solid alloys which involve the transformation of one constituent to another (as when pearlite is formed from austenite), or a change in the relative proportions of two constituents.

constitutional diagram (*Met.*). A diagram representing the limits of temperature and composition within which the different phases or constituents occurring in an alloy system are stable.

constitutional formula (*Chem.*). A formula which shows the arrangement of the atoms in a molecule.

constitutional water (*Chem.*). See **water of crystallisation.**

constraint, principle of least (*Mech.*). The motions of any number of interconnected masses under the action of forces deviate as little as possible from the motions of the same masses if disconnected and under the action of the same forces. The motions are such that the constraints are a minimum, the constraint being the sum of the products of each mass and the square of its deviation from the position it would occupy if free.

constricted (*Bot., Zool.*). (1) Narrowed suddenly.—(2) Narrowed at one or more points along the length, as if compressed by a thread tightened around the member.

constriction (*Bot.*). (1) Any sudden narrowing in a cylindrical member.—(2) (*Cyt.*) A narrowed localised region in a chromosome, usually difficult to stain.

constrictor (*Zool.*). A muscle which by its contraction constricts or compresses a structure or organ.

construction (*Photog.*). The creative arrangement of the main photographic lines in a picture.

construction way (*Rail.*). The temporary works employed for transport of men and materials during construction of the finished or permanent way.

consumer's terminals (*Elec. Eng.*). The terminals of a consumer's wiring installation which are connected to the supply authorities' service.

consumption (*Med.*). Wasting of the body; pulmonary tuberculosis.

contabes'cence (*Bot.*). Abortion in stamens and pollen.

contact (*Acous.*). The psychological acoustic contact between members of an orchestra, whereby they can play together with ease. This is largely affected if the reverberation is markedly reduced, but restored by local reflections.

contact (*Elec. Comm.*). The juxtaposition of parts, usually of platinum or silver, which, when brought into contact, provide for the passage of a current and, when withdrawn, cause its cessation. For the former, suitable minimum pressures and areas of contact are necessary; for the latter, a sufficiently low recovery voltage, and rapidity of withdrawal of the contacts from each other.

See **back—**
break—
change-over—
front—
make—
make-before-break—
mark—
moving—
space—

contact (*Elec. Eng.*). That part of either of two conductors which is made to touch the other when it is desired to pass current from one to the other, as in a switch.

See **arcing—**
auxiliary—
brush—
carbon—
finger-type—
floor—
inverted-brush—
laminated—
sliding—
sparking—
wedge—

contact action (*Chem.*). See **catalysis.**

contact-bar (*Elec. Eng.*). The conductor of a resistance welding machine, which carries current to the part to be welded and also exerts the necessary mechanical pressure.

contact bed (*Sewage*). A tank filled with material such as broken clinker; used in the final or oxidising stage in sewage treatment, which consists in charging the filtering medium with the liquid sewage, allowing it to stand for a given time, draining it off, and finally keeping the tank empty for a given time. See **percolating filter.**

contact-breaker (*Elec. Eng.*). A device, usually electromagnetic, for repeatedly breaking and making an electric circuit, as in an electric bell or an induction coil.

contact drop (*Elec. Eng.*). The drop in voltage occurring when a current flows across a pair of contacts; it is due to the contact resistance between them.

contact e.m.f. (*Elec. Eng.*). The e.m.f. which sometimes occurs when two conductors of different materials are placed in contact with each other.

contact fingers (*Elec. Eng.*). Contacts pressed by springs against the moving contacts of a drum-type controller.

contact-jaw (*Elec. Eng.*). (1) The clamping device of a resistance welding machine, which secures the parts to be welded and also conducts the current to them.—(2) The fixed part of a switch, with which the moving blade makes contact in closing the circuit.

contact maker (*Elec. Eng.*). Any device used to make an electrical contact in a circuit, although it usually refers to a device arranged to make contact periodically, as required for the sparking-plugs of a petrol engine.

contact metal (*Elec. Comm.*). The metal used for the contacts on the springs of relays, generally silver or platinum or some substitute.

contact metamorphism (*Geol.*). The alteration of rocks caused by their contact with, or proximity to, a body of igneous rock.

contact-point (*Elec. Eng.*). The pointed part of the contact-bar of a resistance welding machine which actually makes contact with the part to be welded.

contact-point insert (*Elec. Eng.*). A metal tip inserted in the contact-point of a resistance welding machine to increase its durability.

contact potential (*Thermionics*). The difference between the electron affinities of the materials of the cathode and the other electrodes in a thermionic tube. The contact potential of the grid is particularly important in determining the cut-off point.

contact pressure (*Elec. Comm.*). The pressure between the contacts on relay springs, a minimum pressure being required for certain contact when the circuit is frequently broken.

contact print (*Photog.*). A positive print obtained by exposure through the negative, which is in contact with the photographic sensitive surface.

contact process (*Chem.*). A process for making sulphuric acid; the dry gases are passed over a catalytic agent to induce the conversion to sulphuric acid.

contact rail (*Elec. Eng.*). See **conductor-rail.**

contact resistance (*Elec. Eng.*). The resistance at the surface of contact between two conductors; e.g. between the brush and commutator of a d.c. machine.

contact roller (*Elec. Eng.*). A rotating disc used in a seam-welding machine to convey current to the parts to be welded and to exert the necessary mechanical pressure.

contact segment (*Elec. Eng.*). Contacts on certain types of motor starter, or other control equipment, which are segment-shaped, so that when in position they form a ring divided by radial gaps.

contact series (*Chem.*). See **electromotive series.**

contact shoe (*Elec. Eng.*). See **collector-shoe.**

contact skate (*Elec. Eng.*). The long conductor placed under an electric vehicle to make contact with the studs used in the surface-contact system of electric traction.

contact spring (*Elec. Comm.*). The flexible metal holder of the contact in a relay. The stiffness of the holder determines the pressure between contacts for a given displacement.

contact strip (*Elec. Eng.*). On a pantograph or bow type of current collector, the renewable strip of soft metal that actually makes contact with the overhead wire of an electric traction system. Also called a BOW STRIP, when used on a bow collector.

contact stud (*Elec. Eng.*). In the surface-contact system of electric traction, the studs in the roadway for making contact with the contact skate on an electric vehicle. The studs are only made alive when the car is actually passing over them.

contact vein (*Mining*). A vein occurring along the line of contact of two different rock formations, one of which may be an igneous intrusion.

contact wire (*Elec. Eng.*). The overhead conductor from which current is collected, by means of suitable forms of collector gear, for the vehicles of some electric traction systems.

contactor (*Elec. Eng.*). A power-operated switch suitable for frequently making and breaking an electric circuit. It may be operated electromagnetically, electro-pneumatically, or mechanically (e.g. by a cam).

contactor controller (*Elec. Eng.*). A controller in which the various circuits are made and broken by means of contactors.

contactor starter (*Elec. Eng.*). An electric motor starter in which the steps of resistance are cut out, or other operations are performed, by means of contactors.

contactor switching starter (*Elec. Eng.*). A switching starter in which the switching operations are carried out by means of contactors.

conta'gion (*Med.*). The communication of disease by direct contact between two persons, or between an infected object and a person.—*adj.* **conta'gious.**

contaminated rocks (*Geol.*). Igneous rocks whose composition has been modified by the incorporation of other rock material.

contemporaneous erosion (*Geol.*). The removal of sediments immediately after deposition or whilst sediments of identical age are being laid down in another area. See **non-sequence.**

conterminous (*Bot.*). Said of marginal ray cells when they form an uninterrupted row.

contiguous (*Bot.*). In contact but not in organic union.

continental conditions (*Geol.*). These obtain when portions of the earth's crust are elevated above sea-level in large land areas remote from the sea. Characteristics are low rainfall, scarcity of rivers, salt lakes. See also **continental deposition.**

continental deposition (*Geol.*). The laying down of rocks under sub-aerial conditions, or in temporary shallow water areas. See **aeolian rocks, glacial deposits, lacustrine deposits.**

continental drift (*Geol.*). The disruption and drifting apart of land masses in the manner postulated by Wegener. See **Gondwanaland.**

continental shelf (*Geol.*). The gently sloping off-shore zone, extending usually to about 100 fathoms.

Continental system of drawing (*Textiles*). See **porcupine system.**

continuity (*Cinema.*). The complete description of the sequences required in the production of a motion-picture: the person who is in charge of the same and who records what is actually shot.

continuity-bond (*Elec. Eng.*). A rail-bond used to maintain the continuity of the track- or conductor-rail circuit at junctions and crossings.

continuity-fitting (*Elec. Eng.*). A device used in electric wiring installations for ensuring a continuous electric circuit between adjacent lengths of conduit.

continuous (*Bot.*). (1) Without septa.—(2) With a smooth surface.—(3) Of even uninterrupted outline or contour.

continuous beam (*Eng., Struct.*). A beam supported at a number of points and continuous over the supports, as distinct from a series of simple independent beams.

continuous brake (*Eng.*). A brake system used on passenger trains, in which operation at one point applies the brakes throughout the train. See **air brake, pneumatic brake, vacuum brake.**

continuous current (*Elec. Eng.*). An obsolete term for *direct current.*

continuous development (*Photog.*). Development of cinematograph film in which the film passes continuously through the chemical and washing baths and drier, the whole process taking about an hour.

continuous-disc winding (*Elec. Eng.*). A type of winding used for transformers; the whole winding is made from one continuous length of conductor instead of being split up into a number of separate coils.

continuous distillation (*Chem.*). An arrangement by which a fresh distillation charge is continuously fed into the still in the same measure as the still charge is distilled off. The contrary process is known as *batch distillation.*

continuous electrode (*Elec. Eng*). A type of carbon electrode used in electric furnaces; the electrode is gradually fed forward as the lower part burns away, and the upper part is renewed by adding fresh material. The furnace can thus be worked continuously, without intervals for electrode renewal.

continuous electrophorus (*Elec. Eng*). The name given to some earlier forms of influence machine which operate on the principle of performing the functions of an electrophorus over and over again.

continuous extraction (*Chem.*). Extraction of solids or liquids by the same solvent, which circulates through the extracted substance, evaporates, and is condensed again, and continues the same cycle over again; or by exhaustive extraction with solvents in counter-current arrangement.

continuous filter (*Sewage*). See **percolating filter.**

continuous furnace (*Met.*). A furnace in which the charge enters at one end, moves through continuously, and is discharged at the other Many methods are used for moving the charge; they vary according to the weight, shape, and nature of the stock being treated.

continuous girder (*Eng.*, *Struct.*) See **continuous beam.**

continuous girder bridge (*Civ. Eng.*). A bridge the principal members of which are continuous girders.

continuous impost (*Build.*). An impost which does not project from the general surfaces of the pier and arch.

continuous (or Krarup) loading (*Elec. Comm.*). The addition of inductance uniformly along a cable by spinning magnetic wire over the conductor and beneath the insulation. Used only for submarine cables, to avoid the bulges if coil loading is used. High permeability material for weak magnetisations are used, such as Permalloy and Mumetal.

continuous mill (*Met.*). A rolling-mill consisting of a series of pairs of rolls in which the stock undergoes successive reductions as it passes from one end to the other end of the mill. See also **pull-over mill, reversing mill, three-high mill.**

continuous oscillations (*Radio*). Oscillations (such as those generated by an alternator, arc, or oscillating valve) which are not broken up into individually decaying groups, as opposed to the damped oscillations of a spark transmitter. Also called UNDAMPED OSCILLATIONS.

continuous printing (*Cinema.*). Contact printing which brings the positive and negative together for printing a cross-line, which progresses along the length of the film as it is drawn continuously by the mechanism.

continuous processing (*Cinema.*). The use of machines which pull exposed film through baths continuously, as contrasted with *frame development* (q.v.).

continuous programme (*Cinema.*). The nearly universal practice of projecting films in cinemas without definite times for the audience to arrive or leave, other than for opening and closing.

continuous projector (*Cinema.*). A cinematograph projector in which the picture is projected on to the screen by a number of lenses travelling without motion relative to the film, which moves continuously and not intermittently, as is normal.

continuous rating (*Elec. Eng.*). An electrical machine, or other piece of apparatus, is said to be *continuously rated* when it gives its rated output continuously without exceeding a certain specified temperature-rise or suffering any ill effects. Cf. *intermittent rating.*

continuous spectrum (*Light*). A spectrum in which, over a considerable range, all wavelengths are represented without any abrupt discontinuity in intensity. Such a spectrum is given by the light emitted from an incandescent solid or liquid or a gas under very high pressure. See **Wien's displacement law.**

continuous variation (*Bot.*, *Zool.*). Variation as shown by slight individual differences between a number of specimens belonging to the same lineage, so that one specimen may shade into another.

continuous vent (*Plumb.*). Extension of a vertical waste pipe above the point of entry of liquid wastes to a point above all windows, to provide ventilation.

continuous-wave telegraphy (*Radio*). Radiotelegraphy in which each signal consists of a train of continuous oscillations.

continuous waves (*Radio*). Radio waves which are radiated from an antenna in which there is a continuously alternating high-frequency current, the envelope of this undamped current forming the transmitted signals. Abbrev. **C.W.** An *interrupted continuous wave* implies low-frequency modulation (which can be perceived on telephones after demodulation or rectification) before being chopped by the transmitted signal. Abbrev. **I.C.W.**

continuously-loaded cable (*Teleg.*). A submarine cable in which the conductors are continuously loaded.

continuously rated (*Elec. Eng.*). A term applied to electrical equipment to denote that it will safely carry its rated load for an indefinite length of time.

Contorta Shales (*Geol.*). A series of black shales with *Avicula*, found in the Rhaetic stage of Britain.

contorted (*Bot.*). Twisted together.

contorted aestivation (*Bot.*). The arrangement of the perianth in the bud, when all the perianth segments overlap by their right-hand edges, or by their left-hand edges.

contortion (*Geol.*). (Of strata) the deformation of rocks by directed pressure or torsion.

contour (*Join.*). The profile of the face of a moulding.

contour (*Surv.*). The imaginary intersection line between the ground surface and any given level surface: a line connecting points on the ground surface which are at the same height above datum.

contour feathers (*Zool.*). See **plumae.**

contour gradient (*Surv.*). A line on the ground surface having a constant inclination to the horizontal.

contour interval (*Surv.*). The vertical distance between adjacent contours in any particular case.

contour recording (*Acous.*). Wax recording in which the mechanical cut is made perpendicular to the surface of the disc, as contrasted with the usual radial cut.

contraceptive (*Med.*). Any agent which prevents the fertilisation of the ovum with a spermatozoon.

contract-demand tariff (*Elec. Eng.*). A form of two-part tariff in which the fixed charge is made proportional to the maximum kilowatt demand likely to be made.

contract-rate tariff (*Elec. Eng.*). See **two-part tariff.**

contrac′tile root (*Bot.*). A somewhat fleshy root which, as it ages, develops transverse corrugations, whereby it is shortened and drags the plant deeper into the soil.

contractile tissue (*Zool.*). A group of animal tissues which possess the property of contractility; more commonly spoken of as muscle.

contractile vacuole (*Zool.*). In some *Protozoa*, a cavity filled with fluid which periodically collapses and expels its contents into the surrounding medium, so ridding the animal of surplus fluid and excreta in solution.

contractility (*Zool.*). The power of becoming reduced in length exhibited by some cells and tissues, as muscle; the power of changing shape.

contraction cavities (*Met.*). The bulk of the contraction that accompanies the solidification of metals is concentrated in the feeder heads and risers, from which molten metal flows to compensate for contraction in the casting or ingot proper. When, however, the supply of molten metal fails at certain points *contraction cavities* are formed.

contraction coefficient (*Elec. Eng.*). A coefficient used in making calculations on the magnetic circuit of an electric machine, to allow for the effect of the fringing of the flux in the air-gap due to open or semi-closed slots. The actual length of the gap is reduced by the coefficient to obtain an effective gap length, which is shorter than the actual value. Cf. *extension coefficient.*

contraction in area (*Met.*). The difference between the original cross-sectional area of a tensile test piece and the area at the point of fracture. Usually stated as a percentage of the original area.

contraction rule (*Pattern-making*). A measuring rule used by a pattern-maker which compensates for the shrinkage of castings; the dimensions shown are longer by about 0·1 inch per foot than the standard units of length.

contrac′ture (*Med.*). Distortion or shortening of a part due to spasm or paralysis of muscles, or to the presence of scar tissue.

contracture (*Zool.*). Muscular contraction which persists after the stimulus which caused it has ceased.

contradecid′uate (*Zool.*). Said of Mammals in which the placenta is largely absorbed by maternal leucocytes at parturition. Cf. *deciduate, indeciduate.*

contrast (*Acous.*). The relation, measured in decibels, between the maximum intensity level and the minimum useful intensity level in programme material such as speech or music.

contrast (*Photog.*). The conflict between light and shade, lines and curves, and other prominent elements in the composition of a photographic image. See also **colour contrast.**

contrast amplification (*Acous.*). Adjustment of a thermionic amplifier so that it increases the contrast between the maximum and minimum intensities in the programme material; this serves as an approximate compensation for the control exercised at the transmitting end in a broadcasting system, or by the recordist in making a record on wax or film.

contrast control (*Television*). Control of the ratio of illumination between the lightest and darkest parts of a reproduced television image.

contrast photometer (*Illum.*). A class of photometer in which measurement is made by comparing the illumination produced on two adjacent surfaces by the lamp under test and by a standard lamp.

contrate wheel (*Horol.*). (1) A toothed wheel the teeth of which are formed at right-angles to the plane of the wheel: a wheel that transmits motion between two arbors at right-angles.—(2) The fourth wheel in a watch with the verge escapement.

contre coup, contrecoup, kon^{g}-tr-koo (*Med.*). Injury at a point opposite to and remote from the point of the blow.

control (*Acous.*). The regulation of the contrast between the highest and lowest power levels in a sound-reproducing system, particularly in broadcasting, in which the possible tolerance of the modulation level with respect to the noise level is limited on reception. Automatic control has not been found artistically satisfactory.

control (*Elec. Comm.*).
See **automatic— volume—**
automatic gain (or **volume**)—

control-board (*Elec Eng.*). A switchboard on which are mounted the operating handles, push-buttons, or other devices for operating switchgear situated remotely from the board. The board usually has mounted on it indicating instruments, key diagrams, and other accessory apparatus connected with the circuits controlled.

control car (*Aero.*). See **car.**

control circuit (*Elec. Eng.*). The circuit which carries the current for operating contactors or other control devices.

control column (*Aero.*). The device by which the aileron and elevator controls of an aeroplane are operated; it may be a pillar, lever, or arch; sometimes carries a handwheel. Colloquially, JOYSTICK.

control electrode (*Thermionics*). An electrode whose primary function is to control the flow of current between two other electrodes, without necessarily carrying current itself.

control impedance (*Elec. Comm.*). A unilateral or control impedance is the electrical property of a device which controls power in one direction only, as a gas-filled relay.

control limit-switch (*Elec. Eng.*). A limit-switch connected in the control circuit of the motor whose operation is to be limited.

control-line (*Elec. Eng.*). A train-line used on multiple-unit trains for connecting master controllers or contactor gear on the different coaches.

control magnet (*Elec. Eng.*). A magnet used in electric indicating instruments to provide a force for controlling the movement of the moving system.

control panel (*Elec. Eng.*). See **panel.**

control room (*Elec. Eng.*). A room used by the engineers of an electric-power supply system for supervising the operation of the entire system. Instrument readings, switch positions, and other information is transmitted from various points on the system to the room, and switches at these points can be operated by remote control, or by telephonic communication between the room and substation attendants.—Similarly (*Radio*), the section of a broadcast transmission system where the outputs from the microphones are combined and adjusted to a suitable level, before being fed into the radio transmitter.

control system (*Radio*). (1) All the apparatus associated with the control room.—(2) The apparatus associated with the modulating process —more correctly called MODULATION SYSTEM.

control trailer (*Elec. Eng.*). A trailer coach for use in a multiple-unit electric train, fitted with a master controller so that the train can be operated from the coach if desired.

controller (*Elec. Eng.*). An assembly of equipment for controlling the operation of electric apparatus.
See **drum—**
faceplate—
liquid—
master—
multiple-switch—
pilot—
potentiometer-braking—
series-parallel—

con'uli (*Zool.*). In certain *Porifera*, conical projections of the surface.

co'nus (*Zool.*). Any cone-shaped structure or organ.

conus arterio'sus (*Zool.*). In some lower Vertebrates, a valvular region of the truncus arteriosus, adjacent to the heart.

conus medulla'ris (*Zool.*). The conical termination of the spinal cord.

convection of heat (*Heat*). The transfer of heat from one part of a fluid to another by flow of the fluid from the hotter parts to the colder. Thus if heat is applied to the bottom of a vessel containing a liquid, the hot liquid, being less dense than the cold, will rise, its place being taken by cold liquid moving down. There is thus set up a circulation of liquid (known as a *convection current*), which keeps the temperature more uniform than if the liquid were stagnant.

convector (*Heating*). A type of heater designed to warm the air of a room as it circulates over the heating elements (electric resistances or steam-heated coils), rather than by direct radiation.

convention of signs (*Light*). The convention usually adopted is that all distances shall be measured from the reflecting or refracting surface being considered, or from the principal planes in the case of a thick lens, and that distances measured in the direction in which the incident light is travelling are given a negative sign, and those in the opposite direction a positive sign.

conventional signs (*Civ. Eng.*, *Surv.*). Standard symbols, universally understood, used in the representation on maps and plans of features which would otherwise be difficult or impossible to represent.

convergence (*Meteor.*). An accumulation of air over a region caused by lack of uniformity of the winds. Convergence results in upward air-currents, causing cloud and rain.

convergence (*Zool.*). See **convergent evolution.**

convergence of meridians (*Surv*). The running together of meridians of longitude with approach towards a pole, due to the spheroidal shape of the earth.

convergent-divergent nozzle (*Eng.*). A steam-turbine or other steam nozzle in which the cross-section first decreases to a throat and then increases to the exit, such a form being necessary for efficient expansion of the steam.

convergent evolution (*Zool.*). The tendency of animals living in a simple and uniform environment to develop similar characteristics, whatever their ancestry, owing to the lack of opportunity for variety of habitat or habits.

convergent lens (*Light*). A lens which increases the convergence or decreases the divergence of a beam of light. A simple lens is convergent if it is double-convex, plano-convex, or concavo-convex with the radius of curvature of the concave face greater than that of the convex.

converging (*Bot.*). Having the tips gradually approaching.

conversion (*Timber*). The process of sawing or otherwise changing the shape of timber.

conversion conductance (*Radio*). The ratio of the component of current of intermediate frequency flowing in the output circuit of a conversion detector, when working into zero impedance, to the signal frequency input voltage. Generally expressed in milliamps per volt.

conversion detector (*Radio*). An arrangement for converting modulated currents of one carrier frequency to similarly modulated currents of another, and generally lower, carrier frequency (the latter is called the *intermediate frequency*, q.v.). An essential part of a super-heterodyne receiver. Also called FIRST DETECTOR.

conversion gain (*Radio*). The effective amplification of a conversion detector, measured as the ratio of the output voltage of intermediate frequency to the input voltage of signal frequency. Expressed in decibels, it is twenty times the logarithm of this ratio.

conversion hysteria (*Psycho-an.*). The type of hysteria in which the unconscious mental conflict comes to expression, with the partially repressed wish, by physical symptoms. Some manifestations of these are paralysis, blindness, deafness, and pains in various parts of the body. Accompanying this conversion is a relief from anxiety, giving this type of hysteria its characteristic feature of a calm and indifferent mental attitude. Called by Janet *la belle indifférence*.

conversion resistance (*Radio*). The reciprocal of conversion conductance.

converter (*Elec. Eng.*). A variant spelling of *convertor* (q.v.).

converter (*Met.*). See **Bessemer converter.**

convertible lens (*Photog.*). A compound lens the units of which can be used separately or in conjunction with other lenses.

converting (*Met.*). See **Bessemer process.**

converting station (*Elec. Eng.*). An electric power system substation containing one or more convertors.

convertor (*Elec. Eng.*). A machine, or other piece of electrical equipment, for converting single or polyphase current at one frequency to currents at another frequency (or d.c.) or another number of phases.
See **frequency—**
mercury-arc—
motor—
phase changer—
rotary—
synchronous—
motor-generator.

convex lens (*Light*). A *convergent lens* (q.v.).

convex mirror (*Light*). A portion of a sphere of which the outer face is a polished reflecting surface. Such a mirror forms diminished virtual images of all objects in front of it.

convex veins (*Zool.*). In Insects, veins which follow the ridges of the wing corrugations.

conveyor (*Eng.*). A device for the continuous transport of small articles or loose material over a short distance, as between two parts of a workshop, or different levels in a building.
See **apron—**
band—
bucket—
chain—
drag—
gravity—
pneumatic—
pneumatic-tube—
worm (or **screw**)**—**
elevator.

con'volute (*Bot.*). Coiled, folded, or rolled, so that one half is covered by the other.—(*Zool.*) Having one part twisted over or rolled over another part; twisted; as the cerebral lobes of the brain in higher Vertebrates, gastropod shells in which the outer whorls overlap the inner.—*n.* **convolution.**

convolute aestivation (*Bot.*). See **contorted aestivation.**

convolution (*Anat.*). Any elevation of the surface of the brain.

convulsion (*Med.*). Generalised involuntary spasm of the muscles normally under control of the will.

cooked (*Cinema.*). Said of an over-developed photographic image.

cooking-space (*Elec. Eng.*). That part of an electric oven or grill not taken up by the heating elements.

coolant (*Eng.*). (1) A mixture of water, soda, oil, and soft-soap, used to cool and lubricate the work and cutting tool in machining operations. See **cutting compound.**—(2) A fluid employed as the cooling medium in the jackets of liquid-cooled I.C. engines; e.g. water, ethylene glycol.

cooled-anode valve (*Thermionics*). A thermionic valve in which special provisions are made for dissipating the heat generated at the anode. Cooling is customarily effected by circulating water, oil, or air around the anode, or by radiation from its surface.

cooling curves (*Met.*). Curves obtained by plotting time against temperature for a metal cooling under constant conditions. The curves show the evolutions of heat which accompany solidification, polymorphic changes in pure metals, and various transformations in alloys.

cooling duct (*Elec. Eng.*). A passage for cooling air provided in the armature or field system of an electric machine or other apparatus.

cooling, Newton's law of (*Heat*). 'The rate of cooling (by convection and radiation) of a hot body is proportional to its excess temperature over its surroundings.' The law is empirical and is only approximate, but may be used for small excesses of temperature.

cooling plate (*Cinema.*). A metal screen to protect mechanisms from the heat from arcs in projectors.

cooling pond (*Eng.*). An open pond in which water, heated through use in an industrial process, or after circulation through a steam-condenser, is, before re-use, allowed to cool through evaporation.

cooling tower (*Eng.*). A tower of wood, concrete, etc., used to cool water after circulation through a condenser. The water is allowed to trickle down over wood slats, thus exposing a large surface to atmospheric cooling.

coombe rock (*Geol.*). Unstratified angular chalk rubble found over the plain tracts of southern England; believed to have been formed over a frozen subsoil.

coop (*Cinema.*). Abbrev. for *Cooper-Hewitt lamp.*

Cooper-Hewitt lamp (*Illum.*). An early form of mercury-vapour lamp, usually in the form of a long tube, tilted by hand for starting.

cooperite (*Min.*). Sulphide and arsenide of platinum, crystallising in the orthorhombic system. It occurs in minute and irregular grains in igneous rocks.

co-ordinating gap (*Elec. Eng.*). A spark-gap, used in power transmission schemes, so arranged that it will break down at a voltage bearing a definite relation to the breakdown voltage of other apparatus in the system, thereby enabling surge voltages to be safely discharged to earth.

co-ordination number (*Chem.*). The number of atoms or groups surrounding the central atom of a complex salt.

cop (*Cotton Spinning*). The yarn package, varying in size according to the type and the count of yarn, which is produced by the mule.

copai'ba balsam (*Chem.*). A light-yellow or brown liquid, of peculiar odour, sp. gr. 0·940-0·990, saponification value 88-100, acid value 75-100. It is an oleo-resin containing sesquiterpenes.

co'palite or co'paline (*Min.*). A pale-yellow waxy substance, found in the London Clay at Highgate. Also called HIGHGATE RESIN.

co'pals (*Paint.*). A class of natural resins of recent or recent-fossil origin, consisting of resin acids, resenes, and essential oils. They furnish raw material for the varnish and linoleum industries. Important copals are Congo, Dammar, Kauri, Zanzibar, amber, and others.

cope (*Foundry*). The upper half of a mould; the top half of a moulding box.

Copep'oda (*Zool.*). A class of *Crustacea*, generally of small size, many of which are parasitic; there is usually no carapace; the abdomen is without appendages, but the thorax bears several pairs of biramous oar-like swimming feet; the eggs are usually carried by the female in a pair of sacs formed of a hardened glutinous secretion.

Coper'nican System (*Astron.*). The heliocentric theory of planetary motion; called after Copernicus, who introduced it in 1543. It eventually superseded the geocentric, or Ptolemaic, System.

coping (*Build., Civ. Eng.*). A stone or brick covering to the top of a wall exposed to the weather; it is designed to throw off the water, and is preferably wider than the wall, with *drips* (q.v.) cut in its projecting under-surfaces.

coping (*Masonry*). The operation of splitting stone by driving wedges into it.

coping (*Vet.*). The operation of paring or cutting the beak or claws of a bird, particularly of hawks.

coping brick (*Build.*). Specially shaped brick used for capping the exposed top of a wall; used sometimes with a creasing and sometimes without, in which latter case the brick is wider than the wall and has drips under its lower edges.

co-planar grid valve (*Thermionics*). A four-electrode valve containing two control grids intermeshed with, but insulated from, each other, and exercising equal control effects on the anode current. Used as a detector and as a high output amplifier where the anode supply voltage is limited.

copper (*Met.*). A metallic element in the first group of the periodic system. Symbol, Cu. At. no. 29, at. wt. 63·6, specific electrical resistivity at 20° C. 1·682 microhms per cm^3. Native copper crystallises in the cubic system. It frequently occurs in thin sheets or plates, filling narrow cracks or fissures. Copper is ductile, with high electrical and thermal conductivity, good resistance to corrosion; it has many uses, notably as an electrical conductor. Basis of brass, bronze, aluminium bronze, and other alloys.

copper bit (*Plumb.*). A tool consisting of a pointed piece of copper fastened at the end of an iron rod held in a wooden handle. When the copper part is heated it may be used to melt solder. Also called SOLDERING IRON.

copper brushes (*Elec. Eng.*). Brushes occasionally used for electric commutator machines where high conductivity is required; they are made of copper strip, wire, or gauze.

copper circuit (*Elec. Comm.*). A circuit in which a direct current can flow; essential for television signals, which require the transmission of zero frequency.

copper-clad steel conductor (*Elec. Eng.*). See **steel-cored copper conductor.**

copper-cored carbon (*Illum.*). Arc-lamp carbon in which the solid core is covered with a coating of copper in order to improve the conductivity.

copper factor (*Elec. Eng.*). A term used in electric machine design to denote the ratio of the cross-sectional area of the copper in a winding to the total area of the winding, including insulating material and clearance space.

copper glance (*Min.*). A popular name for *chalcocite.*

copper glazing (*Build.*). Glazing formed of a number of individual panes separated by copper strips on the edges of which small flanges of copper have later been formed by deposition to retain the glass. Also called COPPERLITE GLAZING.

copper loss (*Elec. Eng.*). The loss occurring in electric machinery or other apparatus due to the current flowing in the windings; it is proportional to the product: $(\text{current})^2 \times$ resistance.—(*Radio*) The power dissipated as heat in an antenna, or other oscillatory circuit, due to Joule effect, including that due to eddy currents in the conductors and nearby metallic objects.

copper master (*Acous.*). See **master.**

copper nickel (*Min.*). See **niccolite.**

copper number (*Chem.*). The number of milligrams of copper obtained by the reduction of Fehling's solution by one gram of a carbohydrate.

copper-oxide rectifier (*Radio*). A rectifier element dependent on the unidirectional conducting properties of the junction of a layer of cuprous oxide formed on a copper plate. It may be used for the rectification of high-frequency signals if the dimensions are kept small.

copper pyrite (*Min.*). See **chalcopyrite.**

coppersmith's hammer (*Eng.*). A hammer having a long curved ball-pane head, used in dishing copper plates.

copper sulphate (*Chem.*). $CuSO_4$. A salt, soluble in water, used in copper-plating baths; formed by the action of sulphuric acid on copper; crystallises as hydrous copper sulphate, $CuSO_4 \cdot 5H_2O$, in deep-blue monoclinic crystals. See **blue vitriol, chalcanthite.**

copper (or **cupro-**) **uranite** (*Min.*). See **torbernite.**

copper voltameter (*Elec. Eng.*). An electrolytic cell consisting of two copper plates in a solution of copper sulphate; used to measure current, by weighing the amount of copper deposited on the cathode plate in a given time.

cop'peras (*Min.*). Iron sulphate, $FeSO_4 \cdot 7H_2O$. See **melanterite.**

copperas, white (*Min.*). Goslarite.

coppered carbons (*Illum.*). Arc-lamp carbons coated, by electroplating, with an external covering of copper to improve their conductivity.

Copperlite glazing (*Build.*). See **copper glazing.**

copping (or **shaper**) **rail** (*Cotton Spinning*). A rail of special shape which controls the movement of the yarn guide while yarn is being wound on the cop.

coprodae'um (*Zool.*). That part of the cloaca into which the anus opens.

coprola'lia (*Med.*). The utterance of filthy words by the insane.

cop'rolite (*Geol.*). Strictly applied to the fossilised excreta of animals, but now extended to other phosphatic nodules. Coprolite-rich beds are quarried and used as fertilisers.

cop'rolith (*Med.*). A hard concretion of faecal matter.

coproph'agous (*Zool.*). Dung-eating.

coprophil'ia (*Psycho-path.*). Pleasure or gratification obtained from any dealing with faeces.

coprophi'lous, coprophi'lic (*Bot.*). Growing on or in dung.

copros'terol (*Chem.*). $C_{27}H_{47}OH$, a constituent of the faeces, a reduction product of cholesterol.

coprozo'ic (*Zool.*). Living in dung, as some *Protozoa.*

copula (*Zool.*). A structure which bridges a gap or joins two other structures, as the series of unpaired cartilages which unite successive gill arches in lower Vertebrates.

copula'rium (*Zool.*). In certain *Gregarinidea*, a cyst formed round two associated gametocytes.

copulation (*Zool.*). In *Protozoa*, a type of syngamy in which the gametes fuse completely: in higher animals, union in sexual intercourse.

copulation path (*Zool.*). The path of the sperm nucleus in the ovum during fertilisation.

copulation tube (*Bot.*). See **conjugation tube.**

cop'ulatory spicules (*Zool.*). In male *Nematoda*, chitinous rods which arise from a dorsal pocket of the cloaca and assist the process of copulation.

copy (*Typog.*). Any matter which is to be reproduced in type.

copy or draft (*Paper*). A standard size of writing or drawing paper, 16 × 20 in.

copyholder (*Typog.*). (1) One who reads aloud from the copy as the proof-corrector follows the reading in his proof.—(2) A contrivance for holding up sheets of copy on typesetting machines.

copying (*Photog.*). The general description of processes for the precise reproduction of documents, paintings, etc., by photographic means.

copying machine (*Eng.*). A machine for producing numbers of similar objects by an engraving tool or end-cutter, which is guided automatically from a master pattern or template.

cor bovi'num (*Med.*). Gross enlargement of the heart due to hypertrophy of its muscle.

Coraciifor'mes (*Zool.*). An order of *Coracomorphae* most of which are short-legged arboreal forms, nesting in holes and having nidicolous young. King-fishers, Owls, Night-jars, Swifts, Humming-birds, Trogons, Jacamars, and Toucans

Coraciomor'phae (*Zool.*). A legion of *Aves* of very ancient origin, including the Cuckoos, Parrots, Kingfishers, Swifts, Swallows, Toucans, Owls, Perching and Singing Birds. See **Coraciiformes, Passeriformes, Opisthocomiformes.**

cor'acoid (*Zool.*). In Vertebrates, a paired posterior ventral bone of the pectoral girdle, or the cartilage which gives rise to it.

coracoid process (*Zool*). In Mammals, the reduced coracoid bone, which persists only as a small process fused to the ventral end of the scapula.

coral (*Zool.*). The massive calcareous skeleton formed by certain species of *Anthozoa* and some *Hydrozoa*: the colonies of polyps forming this skeleton.—*adjs.* **coralline, coralloid, coralliferous, corallaceous, coralliform.**

coral reef (*Geol*). A calcareous bank formed of the skeletons of corals which live in colonies. The various formations of coral reefs are known as *atolls, barrier reefs*, and *fringing reefs* (qq.v.).

Coral'lian (*Geol.*). A division of the Upper Jurassic rocks, comprising sandstones, shelly limestones, and clays, with coral reefs well developed, for example, at Steeple Ashton.

Cor'alline Crag (*Geol.*). A division of the Pliocene rocks of East Anglia, consisting of current-bedded sands containing broken fragments of shells and bryozoa.

Coralline Oölite (*Geol.*). A subdivision of the Upper Jurassic rocks. It is a limestone which usually consists of a mass of comminuted shells. This rock has been much quarried near Oxford for building purposes.

cor'allite (*Zool.*). The cup-like portion of a coral surrounding a single polyp.

cor'alloid (*Bot.*). Having a general appearance like that of a piece of much branched coral.

coral'lum (*Zool.*). The hard calcareous skeleton of coral polyps.

corbeille, kor-bī' (*Build.*). Carved work representing a basket, used as a form of decoration.

corbel (*Build.*). Bricks or stones, frequently moulded, projecting from a wall to support a load.

corbel-piece (*Carp.*). See **bolster.**

corbel-table (*Build.*). A cornice supported by corbels.

cor'belling (*Build.*). Projecting courses of brick or stone forming a ledge used to support a load.

corbic'ula (*Zool.*). The pollen basket of Bees, consisting of the dilated posterior tibia with its fringe of long hairs.

corbie step gable (*Build.*). A gable having a series of regular steps up each slope. Also called CROW-STEP GABLE.

cor'bula (*Zool.*). A phylactocarp having the costae well-developed and the hydrothecae suppressed.

cord (*Teleph.*). A flexible cable, usually containing covered tinsel conductors, for use in cord circuits and telephone leads. See also **patch cord.**

cord (*Textiles*). (1) A connexion between a jacquard hook and the mails controlling the warp threads.—(2) A rib effect in a fabric, produced according to plan.

cords (*Bind.*). Lengths of hemp across the back of a book, to which the sections are attached by sewing. See **bands.**

cord circuit (*Teleph.*). The temporary connexion circuit used by an operator to connect subscribers together, or subscribers to junction lines. In the usual central-battery systems, it provides current for the distant transmitters, supervisory relays and lamps, and means for the operator to speak to subscribers.

cord circuit repeater (*Teleph.*). A cord circuit containing a small-gain repeater, for insertion at trunk exchanges between subscribers' lines or junctions, which together introduce a loss which is greater than tolerable.

cord-de-chêne (*Textiles*). A light-weight worsted dress material with a slight longitudinal cord, made from a Botany warp and a silk weft.

cord (*Timber*). A timber measure, 128 cu. ft. (8 × 4 × 4 ft.).

cordate (*Bot.*). Said of a leaf base which has the form of the indented end of a conventional heart

corded way (*Build.*). A sloping path formed with deep sloping steps separated by timber or stone risers.

cor′dierite or **i′olite** (*Min.*). A silicate of aluminium, iron, and magnesium with water, which crystallises in the orthorhombic system; occurs chiefly in metamorphic rocks.

cord′iform (*Bot.*). Said of an ovate leaf with a pointed apex and a cordate base.

Cordite (*Ammunition*). A propellant consisting of a mixture of nitrocellulose, nitroglycerine, and a mineral jelly (100 : 60 : 10). Stable in hot climates and relatively smokeless. Used extensively in ammunition for the British Navy and Army.

cordless board (*Teleph.*). Small exchange boards, usually private, in which all the connexions between lines and subscribers are made with keys and not with flexible cords.

cor′duroy (*Textiles*). A fabric with a rounded cord or rib of weft pile running longitudinally; made entirely from cotton, or of cotton with a rayon pile.

core (*Bot.*). (1) See **centrum.**—(2) The plant material which forms the inner part of a periclinal chimaera.

core (*Build.*). The material removed from a mortise.

core (*Cables*). The assembly consisting of the conductor and surrounding insulation of a cable or part of a cable, but not including the protective covering. It constitutes the electrical circuit for communication.

core (*Cinema.*). The inner part of the positive arc carbon. This is impregnated with salts, principally cerium fluoride, to increase the brilliance of the crater formed at the termination of the arc.

core (*Civ. Eng.*). A watertight wall built within a dam or embankment as an absolute barrier to the passage of water.*

core (*Elec. Eng.*). That part of a magnetic circuit around which the winding is placed. In the case of a transformer it refers to the whole of the magnetic circuit.

See **armature—**
pole—
rotor—
slotted—
smooth—
stator—

core (*Foundry*). A solid mass of sand or loam placed in a mould to provide a hole or cavity in the casting.

core balance protective system (*Elec. Eng.*). An excess-current protective system for electric power systems, in which any leakage current to earth in a three-phase circuit is made to produce a resultant flux in a magnetic circuit surrounding all three phases; this flux produces a current in a secondary winding on the magnetic circuit, which operates a relay controlling the appropriate circuit-breakers.

core bar (*Foundry*). (1) An iron bar on which cylindrical loam cores are built up. The bar is supported horizontally and rotated while a loam board is pressed against the core.—(2) An iron rod for reinforcing a sand core.

core box (*Pattern-making*). A wooden box shaped internally for moulding sand cores in the foundry.

core disc (*Elec. Eng.*). See **armature core disc.**

core losses (*Elec. Eng.*). The losses occurring in electric machinery and equipment owing to hysteresis and eddy current losses set up in the iron of the magnetic circuit, which are due to an alternating or varying flux.

core of the atom (*Phys.*). In the atoms of the alkali metals, the nucleus, together with all but the outermost of the planetary electrons, may be considered to be a core, around which the valency electron revolves in a manner analogous to the revolution of the single electron in the hydrogen atom around the nucleus. In this manner the simple Bohr theory may be made to give an approximate representation of the alkali spectra.

core oven (*Foundry*). A foundry oven used for drying and baking cores before insertion in a mould.

core plate (*Elec. Eng.*). See **lamination.**

core plates (*Foundry*). Discs attached to a *core bar* (q.v.) in order to reinforce large cores.

core prints (*Pattern-making*). Projections attached to a pattern in order to provide recesses in the mould at points where cores are to be supported.

core register (*Foundry*). Corresponding flats or vees formed on cores and core prints, when correct angular location is necessary.

core sand (*Foundry*). Moulding sand to which a binding material such as linseed oil has been added in order to obtain good cohesion and porosity after drying.

core-type induction furnace (*Elec. Eng.*). An induction furnace in which there is an iron core to carry the magnetic flux.

core-type transformer (*Elec. Eng.*). A transformer in which the windings surround the iron core, the former usually being cylindrical in shape.

cored carbon (*Illum.*). An arc-lamp carbon which has a core of softer material than that used for the outer part and is designed to have certain special effects on the arc.

cored electrode (*Elec. Eng.*). A metal electrode provided with a core of flux or other material; used in arc welding.

cored hole (*Eng.*). A hole formed in a casting by the use of a core, as distinct from a drilled hole.

cored solid solution (*Met.*). See **coring.**

coreless armature (*Elec. Eng.*). An alternator armature having no iron core; employed in certain old types of machine.

coreless induction furnace (*Elec. Eng.*). A high-frequency induction furnace in which there is no iron magnetic circuit other than the charge in the furnace itself.

core′miform (*Bot.*). Forming a tight bundle of elongated elements.

core′mium (*Bot.*). (1) A rope-like strand of anastomosing hyphae.—(2) A tightly packed group of erect conidiophores, somewhat resembling a sheaf of corn.

corf (*Mining*). A basket with an iron loop used in early days for bringing coal to the surface.

coria'ceous, co'rious (*Bot., Zool.*). Firm and tough, like leather in texture.

coring (*Build.*). The process of keeping a core of rags, straw, or shavings in a flue in course of construction to catch falling mortar or bricks, and of finally passing it right through to clear obstructions.

coring (*Cables*). See **carbon core.**

coring or **cored solid solution** (*Met.*). A solid solution in which the non-uniform distribution of the constituent elements that occurs in each crystal, as a result of the process of solidification, has not been eliminated by annealing.

corium (*Zool.*). The broad area of the hardened basal part of the hemelytron of *Hemiptera*, distant from the scutellum: the dermis of *Vertebrata*.

cork (*Bot.*). A layer of dead cells on the outside of a stem or root, having suberised walls, and relatively impermeable to air and water. The cells are formed by a special cambium, the phellogen, and the cork protects the living cells inside against desiccation, mechanical injury, and the attacks of parasites.

cork cambium (*Bot.*). See **phellogen.**

cork crust (*Bot.*). A thick layer of corky cells, consisting mainly of large, soft-walled cells, with some intermingled narrow strips of flattened cells.

cork film (*Bot.*). A layer of corky cells, two or three cells thick, mostly flattened.

cork wart (*Bot.*). A small localised corky growth on the surface of a leaf.

cork wood (*Bot.*). Wood of very low specific gravity containing many large, thin-walled parenchymatous cells.

corking (*Carp.*). See **cogging.**

corkscrew staircase (*Build.*). A helical staircase built about a solid central newel.

corkscrew weave (*Weaving*). A type of twill weave giving a diagonal warp rib which runs across the fabric at a low angle.

Corliss valve (*Eng.*). A steam-engine admission and exhaust valve in the form of a ported cylinder which is given an oscillating rotary motion over the steam port by an eccentric-driven wrist-plate.

corm (*Bot.*). A rounded, swollen underground stem, resembling a bulb in general appearance, but solid, and not composed of overlapping, fleshy leaf bases.

corm (*Zool.*). In certain types of biramous crustacean limbs, an axis formed by the large endopodite with the protopodite, upon which the exopodite stands laterally.

cormid'ium (*Zool.*). In *Siphonophora*, an assemblage of individuals borne on the coenosarc.

cor'mophyte (*Bot.*). A plant of which the body is differentiated into roots, stems, and leaves.

cormus (*Bot.*). A plant body in which a definite shoot system is developed.

corn (*Bot.*). In Britain, *corn* means wheat chiefly, as well as other cereals; in America, it means maize.

Cornbrash (*Geol.*). A rather thin limestone occurring in the Jurassic rocks of Britain. It has an admixture of argillaceous and ferruginous material and yields a good soil for agriculture, as the name implies.

corn oil (*Chem.*). A pale yellow oil obtained from Indian corn; m.p. 17-23° C., sp. gr. 0·920-0·925, saponification value 188-193, iodine value 111-123, acid value 1·7-20·6. Also called MAIZE OIL.

cornstalk disease (*Vet.*). See **haemorrhagic septicaemia.**

cornstone (*Geol.*). An arenaceous or siliceous limestone, particularly characteristic of some of the Palaeozoic Red Sandstone formations.

corn (*Med.*). Localised overgrowth of the horny layer of the skin due to local irritation, the overgrowth being accentuated at the centre.—(*Vet.*) A local inflammation due to bruising or compression of the keratogenous membrane of the posterior portion of the horse's foot.—SEPTIC CORN, an abscess localised to the sole of a bird's foot.

corne'a (*Zool.*). In *Invertebrata*, a transparent area of the cuticle covering the eye, or each facet of the eye: in *Vertebrata*, the transparent part of the outer coat of the eyeball in front of the eye.—*adj.* **cor'neal.**

corne'agen layer (*Zool.*). In the compound eyes of *Arthropoda*, a layer of the hypodermis underlying the cornea, which it produces by secretion.

cornelian (*Min.*). A synonym for *carnelian.*

cor'neoscute (*Zool.*). One of the horny epidermal scales of Reptiles.

cor'neous (*Bot., Zool.*). Resembling horn in texture.

corner (*Bind.*). The piece of leather covering each of the outer corners of a half-bound volume.

cornerbead (*Build.*). An *angle-staff* (q.v.).

corner chisel (*Carp.*). A special chisel having two straight cutting edges meeting at right-angles; used for cutting the corners of mortises.

corner horn (*Acous.*). A horn for coupling a closed or open diaphragm with the outer air, so arranged that its position in a corner of a room utilises the side-walls as an approximate extension of its flare.

corner tool (*Foundry*). A sleeking tool for finishing off the internal corners of a mould.

cornice (*Build.*). A projecting moulding decorating the top of a building, window, etc.

cornice plane (*Join.*). A plane with shaped sole and iron; used for forming mouldings.

cornicles (*Zool.*). In certain *Hemiptera*, a pair of tubes which secrete a waxy substance as a protection against predaceous enemies.

cornic'ulate, cornute (*Bot., Zool.*). (1) Shaped like a horn.—(2) Bearing a horn or horn-like outgrowth.

cor'niform (*Bot.*). Shaped like a horn.

Cornish boiler (*Eng.*). A horizontal boiler with a cylindrical shell provided with a single longitudinal furnace tube or flue.

Cornish 'diamond' (*Min.*). Like other 'diamonds' prefixed by a place name, this is merely clear crystalline quartz.

Cornish granite (*Build., Civ. Eng.*). A coarse-grained granite, light-grey to whitish in colour, quarried in Cornwall; used for heavy construction.

Cornu prism (*Light*). A 60° quartz prism formed of two 30° prisms cemented together, one being of right-handed and the other of left-handed quartz, the optic axes of the two being parallel to the ray passing through the prism at minimum deviation, that is, parallel to the base. This device overcomes a defect due to double refraction.

Cornu spiral (*Light*). A spiral figure used for the graphical solution of diffraction problems.

Cornu-Hartman formula (*Light*). A formula of empirical type which expresses with some accuracy the relation between the deviation, D, produced by a prism and the wavelength, λ, of the light. The formula is

$$\lambda=\lambda_0+\frac{C}{D-D_0},$$

λ_0, C, and D_0 being constants for a particular case.

cor'nua (*Zool.*). Horn-like processes; as the posterior *cornua* of the hyoid.—*adjs.* **cornual, cornute.**

corol'la (*Bot.*). The general name for the whole of the petals of a flower; it is often brightly coloured, and then forms the most conspicuous part of the flower.

Corolliflo'rae (*Bot.*). See **Sympetalae.**

cor'olline (*Bot.*). Appertaining to the corolla.

coro'na (*Arch.*). The part of a cornice showing a broad projecting face and throated underneath to throw off the water.

corona (*Bot.*). (1) A trumpet-like outgrowth from the perianth, as in the daffodil.—(2) A ring of small leafy upgrowths from the petals, as in campion.—(3) A crown of small cells on the oögonium of *Charophyta.*

corona (*Diel.*). The phenomenon of air breakdown when the electric stress at the surface of a conductor exceeds a certain value. At higher values the stress results in a luminous discharge. See **critical voltage.**

corona (*Meteor.*). A system of coloured rings seen round the sun or moon when viewed through very thin haze. They are caused by diffraction by water droplets. The diameter of the corona is inversely proportional to the size of the droplets. See also **corona (solar).**

corona (*Zool.*). In *Echinoidea,* the shell or test: in *Crinoidea,* the disc and arms as opposed to the stalk: in *Rotifera,* the discoidal anterior end of the body: the head or upper surface of a structure or organ.—*adj.* **coro'nal.**

corona discharge (*Diel.*). See **corona.**

corona power loss (*Diel*). The value is $P=(390/\delta)(f+25)[\sqrt{(r/D)}](E-E_0)^2\ 10^{-5}$ kW per mile, where E is voltage to neutral, f frequency in cycles per second; for other quantities see **critical voltage (disruptive).**

corona radia'ta (*Zool.*). In some Mammals, a layer of cells surrounding an ovum.

corona, solar (*Astron.*). A halo, pearly white in colour, surrounding the sun; it is seen during a total solar eclipse, and is of irregular shape and size, but roughly circular, extending to about two solar diameters.

corona ve'neris (*Med.*). A syphilitic rash on the forehead round the margin of the hair.

corona voltmeter (*Elec. Eng*). An instrument for measuring high voltages by observing the conditions under which a corona discharge takes place on a specially designed wire.

coro'nal (*Jewel.*). A small crown: a head garland.

coronal (*Zool.*). See **frontal.**

coro'nary (*Zool.*). Crown-shaped: a small conical bone of the lower jaw in Reptiles.

coronary circulation (*Zool.*). In Vertebrates, the system of blood-vessels which supply the muscle of the heart-wall with blood.

coronary thrombosis (*Med.*). The formation of a clot in one of the arteries of the heart consequent upon disease of these arteries.

cor'onate (*Bot.*). Having a corona.

coronate (*Zool.*). (Of shells) having a row of bosses encircling the apex.

coronet (*Vet.*). The junction of the skin of the pastern with the horn of the hoof of a horse.

coronet (*Zool.*). The knob at the base of the antler in deer.

coro'nium (*Astron.*). A constituent, otherwise unknown, of the solar corona which emits the characteristic green coronal ray of wavelength 5303; first observed by Young in 1869.

cor'onoid (*Zool.*). (1) In some Vertebrates, a membrane bone on the upper side of the lower jaw.—(2) More generally, beak-shaped.

cor'pora. *Pl.* of Latin *corpus,* body. See also articles given in singular form below, viz. under **corpus.**

corpora alla'ta (*Zool.*). In Insects, a pair of oval whitish bodies lying close behind the supra-oesophageal ganglia; believed to be endocrine glands.

corpora amyla'cea (*Zool.*). See **brain-sand.**

corpora bigem'ina (*Zool.*). In Vertebrates, the optic lobes of the brain.

corpora caverno'sa (*Zool.*). In Mammals, a pair of masses of erectile tissue in the penis.

corpora genicula'ta (*Zool.*). In the Vertebrate brain, paired protuberances lying below and behind the thalamus.

corpora lu'tea (*Zool.*). In Mammals, yellowish glandular nodules which develop from the Graafian follicles, after the expulsion of the ova.

corpora quadrigem'ina (*Zool.*). The optic lobes of the Mammalian brain, which are transversely divided.

corporal (*Mining*). The leading man in a batch of men on a contract for mining coal.

corpus. Latin for *body.* See also articles given in plural form above, viz. under **corpora.**

corpus adipo'sum (*Zool.*). (*Pl.* **corpora adiposa.**) See **fat-body.**

corpus al'bicans (*Zool.*). (*Pl.* **corpora albican'tia.**) See **corpus mamillare.**

corpus callo'sum (*Zool.*). In the Vertebrate brain, a commissure connecting the cortical layers of the two lobes of the cerebrum.

corpus mamilla're (*Zool.*). In the brains of higher *Vertebrata,* a protuberance on the floor of the hypothalamic region in which the fornix terminates.

corpus spongio'sum (*Zool*). In Mammals, one of the masses of erectile tissue composing the penis.

corpus sterni (*Zool.*). See **gladiolus.**

corpus stria'tum (*Zool.*). In the Vertebrate brain, the basal ganglionic part of the wall of each cerebral hemisphere.

corpus subthalam'icum (*Zool.*). A lens-shaped mass of grey matter, lying in the subthalamus of the Vertebrate brain.

cor'puscle (*Bot.*). Any very minute particle in a cell.

corpuscle (*Zool.*). A cell which lies freely in a fluid or solid matrix and is not in continuous contact with other cells.

corpus'cular theory of light. The view, held by Newton, that the emission of light consisted of the emission of material particles at very high velocity. Although this theory was discredited by observations of interference and diffraction phenomena, which could only be explained on the wave theory, there has been, to some extent, a return to the corpuscular idea in the conception of the photon.

corrasion (*Geol.*). This is the work of vertical or lateral cutting performed by a river by virtue of the abrasive power of its load. See **rivers (geological work of).**

correcting signal (*Teleg.*). In a multiplex telegraph system, the signal which is sent to correct the synchronising between the sending and receiving distributors.

correction. The correction to a reading of an instrument, or of a measure on a scale, is the magnitude to be added to the perceived magnitude to obtain the true magnitude, i.e. the magnitude which would be observed with an instrument or scale of the highest precision. The use of a *standard* (q.v.) of measurement implies no possibility of correction. Correction is the negative of error.

correction (*Typog.*). An emendation or alteration made on a proof by author or proof corrector.

correction (*Elec. Comm.*).
See **attenuation— distortion—**

correction of angles (*Surv.*). The process of adjusting the observed angles in any triangle so that their sum shall equal 180°.

correction, phase (*Elec. Comm.*). See **phase compensation.**

correction signal (*Teleg.*). The signal sent to line between the working signals in a Baudot system to correct any deviation of the receiving distributor from keeping in step with the transmitting distributor.

corrector of the press (*Typog.*). A printer's reader; one whose work is primarily to compare proofs with the author's copy in order to ensure that the correct wording, etc. has been reproduced.

correlation (*Biol.*). Mutual relationship.

correlation (*Bot.*). The condition of balance existing between the various organs of a plant.

correlation (*Geol.*). The linking together of strata of the same age occurring in separate outcrops.

correlation (*Maths.*). The mathematical statement respecting the degree to which one variable is dependent on another variable, either by observation or experiment.*

correlation coefficient (*Maths.*). The ratio (nominally, theoretically, or ostensibly unity) between one variable and another which makes the sum of the squares of the deviations of the one variable from proportionality with the other a minimum. With exact proportionality, the coefficient is unity; if there is no relationship at all, the coefficient is zero. Complete inverse proportionality makes the coefficient −1.

correspondence principle (*Light*). For electron orbits remote from the nucleus of the atom there is agreement between the frequency of radiation calculated from the quantum theory and that given by classical methods. By assuming that this correspondence extends to other properties of the emitted light, Bohr was able to formulate valuable 'selection rules' for determining which of the possible electron transitions would actually occur. See **Bohr theory.**

corresponding states (*Phys.*). Substances are said to be in *corresponding states* when their pressures and temperatures are equal fractions of the critical values. A general form of van der Waals' equation may then be used which is applicable to all gases.

corridor (*Build.*). A passage-way within a building, giving access to rooms on one side or both.

corrie (*Geol.*). See **cirque.**

corroding lead (*Met.*). Lead of purity exceeding 99·94%, suitable for the production of white lead.

corrosion (*Chem.*). The slow wearing away of solids, especially metals, by chemical attack; in the latter case the mechanism is thought to be electrochemical. See also **direct oxidation.**

corrosion (*Geol.*). The modification of crystals formed early in the solidification of an igneous rock by the chemical action of the residual magma.

corrosion-fatigue (*Met.*). The phenomenon of the failure of metals when subjected to repeated cycles of stress while exposed to corrosive attack. Influenced by the same factors as fatigue, and also by time and by the corrosive effect of the environment.

corrosive sublimate (*Chem.*). Commercial name for *mercuric chloride.*

cor'rugate, corrugated (*Bot.*). Having a ridged or wrinkled surface.

corrugated furnace tube (*Eng.*). A steam-boiler furnace tube provided with circumferential corrugations to give greater resistance to collapse under external pressure.

corrugated iron (*Build.*). Sheet-iron formed with parallel corrugations to increase stiffness; used as a roof covering and for other temporary building purposes.

cor'rugator (*Zool.*). A muscle which by its contraction produces wrinkling.

cor'rugmeter (*Civ. Eng.*). See **roughness integrator.**

corsite (*Geol.*). A variety of coarse-grained basic igneous rock, exhibiting orbicular texture (orbicular gabbro), occurring in Corsica; consists essentially of bytownite and amphiboles. By some = napoleonite.

cortex (*Bot.*). (1) A cylinder of chiefly parenchymatous cells lying between the epidermis and the starch sheath (or the endodermis) in a young stem, and between the piliferous layer and the endodermis in a young root.—(2) A similar, but usually less conspicuous, cylinder in older stems and roots.—(3) A cellular coating on the outside of the thalli of some algae.—(4) The outer layers of the thallus in lichens, and in some fungi.—(*Zool.*) The superficial or outer layers of an organ, especially if they differ histologically from the central part; cf. *medulla.*

cortical (*Bot., Zool.*). (1) Relating to bark.—(2) Relating to the cortex.—(3) Living on bark.

cortical bundle (*Bot.*). A vascular bundle in the cortex of a stem or root.

corticate (*Bot.*). (1) Having a cortex.—(2) Covered with an unbroken sheet of interwoven hyphae.

cortication (*Bot.*). A covering of cells around the main threads of some algae.

cor'tico'lous (*Bot.*). Living on the surface of bark.

corti'na (*Bot.*). A cobwebby veil hanging from the margin of the pileus of some agarics.

cor'tinate (*Bot.*). Having a cortina.

cortinate (*Zool.*). See **craspedote.**

Corti's organ (*Zool.*). In Mammals, the modified epithelium forming the auditory apparatus of the ear.

Corti's rods (*Zool.*). In Mammals, stiff striated rod-like structures of the organ of Corti, forming a double row, with their upper ends in contact and their lower ends resting on the basilar membrane.

Corti's tunnel (*Zool.*). In the organ of Corti, the tube-like space enclosed by the basilar membrane and the rods of Corti.

corundum (*Min.*). Oxide of aluminium, crystallising in the trigonal system. It is next to diamond in hardness, and hence is used as an abrasive. See also **white sapphire.**

corve (*Mining*). A small tram for carrying minerals underground.

coryd'aline (*Chem.*). $C_{22}H_{27}O_4N$, an alkaloid of the isoquinoline group, obtained from the root of the *Corydalis* species. It crystallises in six-sided prisms; m.p. 135° C.

cor'ymb (*Bot.*). A racemose inflorescence in which the flower stalks become shorter and shorter as they arise closer to the top of the inflorescence axis. As a result, the flowers lie in a flat-topped cluster.—*adj.* **corymbose.**

cory'za (*Med.*). See **cold.**

coryza, gangrenous (*Vet.*). See **catarrhal fever (malignant).**

coryza, infectious (*Vet.*). See **catarrh (contagious).**

cos (*Maths.*). See **trigonometrical ratios.**

cos φ (*Elec. Eng.*). An expression often used to denote the power factor of a circuit, the power factor being equal to the cosine of the angle (ϕ) of the phase difference between the current and voltage in the circuit.

cosec, cosecant (*Maths.*). See **trigonometrical ratios.**

cosh (*Maths.*). See **hyperbolic functions.**

cosine (*Maths.*). See **trigonometrical ratios.**

cosine law (*Illum.*). A law used in illumination calculations. It states that the illumination on a surface produced by a light source, at a given distance from the surface, is proportional to the cosine of the angle of inclination between the axis of the light beam and the surface. See **Lambert's law.**

Coslettising (*Metal Protection*). The protection of steel against corrosion by boiling in a solution of phosphoric acid to produce a surface coating of phosphate. See **Parkerising.**

cosmic radiation (*Astrophysics*). The name given to a phenomenon, first studied by Millikan, in which extremely hard penetrating radiation, of wavelength shorter than γ-rays, is detected by an electroscope; it is thought to enter the earth's atmosphere from interstellar space.

cosmin (*Zool.*). The dentine-like substance forming the outer or middle layer of some Fish scales.

cosmog'ony (*Astron.*). The science of the origins of stars, planets, and satellites. It deals with the genesis of the galaxy and the solar system.

cosmology (*Astron.*). The branch of theoretical astronomy that deals with the known universe as a systematised whole. It comprises our knowledge of the structure, dimensions, and relative connexions of the Galaxy, star-clusters, nebulae, etc.

cosmoid scale (*Zool.*). In Fish, a type of scale consisting of an outer layer of cosmin and an inner layer of isopedin.

costa (*Bot.*). (1) A general term for a rib or vein.—(2) The midrib of the thallus of a liverwort.—(3) A rib on the valve of a diatom.

costa (*Zool.*). In Vertebrates, a rib: in *Plumulariidae*, one of a number of protective branches which form a basket-work enclosing the gonangia: in Insects, one of the primary veins of the wing: in *Ctenophora*, one of the meridional rows of ctenes: more generally, any rib-like structure.—*adjs.* **costal, costate.**

costal'gia (*Med.*). Pain in the ribs.

costa'lia (*Zool.*). In *Chelonia*, bony plates of the carapace representing modified ribs: in *Crinoidea*, the primary brachial series of ossicles.

costate (*Bot.*). Ribbed or veined, especially when the ribs are parallel.

costeaning (*Mining*). The removal of soil and subsoil by a rush of water, in order to expose rock formations in prospecting for reefs or lodes.

cot bar (*Join.*). A semicircular bar in a sash. Also called CRADLE BAR.

cot, cotangent (*Maths.*). See **trigonometrical ratios.**

coter'minous (*Zool.*). Having a similar distribution.

Cotham Beds (*Geol.*). A series of greenish-yellow marls and limestones occurring in the Rhaetic rocks of the south-west of England.

Cotham Marble (*Geol.*). A member of the Rhaetic rocks of England. It is an impure limestone characterised by arborescent or moss-like markings; a type of landscape marble.

cotter (*Eng.*). A tapered wedge, usually of rectangular section, passing through a slot in one member and bearing against the end of a second encircling member whose axial position is to be fixed or adjustable.

cotter pin (*Eng.*). A split-pin inserted in a hole in a cotter or other part, to prevent loosening under vibration.

cotter way (*Eng.*). The slot cut in a rod to receive a *cotter* (q.v.).

Cotteswold (or Cotswold) Sands (*Geol.*). A local subdivision of the Upper Lias, consisting of yellowish sands occurring beneath the oölites of the Cotteswold Hills. See also **Yeovil Sands.**

cotton. The downy fibre covering the seeds of the cotton plant (genus *Gossypium*, family *Malvaceae*); it is separated from the seed for textile purposes. The length of fibre ranges from ⅜ in. to 1¼ in., 1 in. being about the average. Besides textile uses, the fibre is much used for insulating wires; it is of special use when the wires are immersed in oil.

cotton blanket (*Textiles*). A heavy cotton fabric, usually grey or coloured, finished with a raised surface.

cotton bleaching (*Textiles*). The processes to which cotton, either in the loose state, as yarn, or fabric, is subjected in order to render it white. The processes include (1) steeping in a 1% hot solution of caustic soda or sodium carbonate; (2) rinsing; (3) steeping in a cold solution of a hypochlorite; (4) washing; (5) treating with cold dilute solution of a mineral acid, and (6) finally washing until free from acid. Cotton cloth is singed before being bleached.

cotton-covered wire (*Elec. Eng.*). An electrical conductor of copper or resistive alloy, insulated with one or more layers of cotton yarn; frequently used for electrical purposes. See **d.c.c.** and **s.c.c.**

cotton gin (*Cotton*). A machine used for separating cotton fibres, which form the seed coat, from the seed itself. The saw gin and the Macarthy gin are used in America, the latter for cotton of extra long staple.

cotton linters. Short fibres, from ⅛ in. to ¼ in. in length, which remain on the cotton seed after the removal of the longer fibres; they are removed by a linter, and are a source of paper, rayon, and cellulose plastics.

cottonseed oil (*Chem.*). Oil from the seeds of *Gossypium herbaceum*, a yellow, brown, or dark-red liquid, m.p. 34°-40° C., sp. gr. 0·922-0·930, saponification value 191-196, iodine value 105-114, acid value 0.

cotton spinning. The process by which cotton fibre, in the form of a roving, is transformed into a twisted thread by means of a ring spinning frame or by a mule.

cotton wool (*Med.*). Loose cotton which has been bleached and pressed into a sheet; used as an absorbent or as a protective agent. Medicated cotton wool sometimes has a distinguishing colour to indicate its special property.

cotton-wool patches (*Med.*). Areas of white exudate in the retina occurring in nephritis.

cottony (*Bot.*). See **tomentose.**

cotty wool (*Textiles*). A term applied to wool in a matted condition; usually due to sheep disease.

cotyle'don (*Bot.*). (1) One of the leaves of the embryo in flowering plants.—(2) The first leaf developed by a young fern plant.

cotyle'donary placentation (*Zool.*). Having the villi in patches, as Ruminants.

cotyl'iform (*Bot.*). Shaped like a dish or a wheel, and having a distinct upraised rim.

cot'yloid (*Zool.*). Cup-shaped; pertaining to the acetabular cavity.

co'type (*Zool.*). An additional type specimen, being a brother or sister of the same brood as the type specimen.

couch (*Paint.*). An undercoat serving as a base on which to apply colour.

couch (*Paper*). In hand paper-making, to deposit the web sheet on a felt for pressing and drying.

couch roll (*Paper*). A cylinder covered with felt, used to press out water from the damp web of paper, and to cause the fibres to felt more thoroughly.

couching (*Brew.*). The process of spreading the steeped grain (barley) to a depth of 12-14 in. on the cement floor of the malthouse, where germination takes place. See **steeping, flooring.**

couching (*Surg.*). Displacement of the lens in the treatment of cataract.

coudé, coudé mounting, koo-dā (*Astron.*). An equatorial telescope mounting, clock-driven in the usual way, in which the object is viewed after two reflections. The observer looks down one tube, which is always parallel to the polar axis. A second tube, in which the object glass is fixed, can be so adjusted in accordance with the declination of the object observed that the same field is kept continuously in view.

coulisse, koo-lēs' (*Carp.*). A grooved piece of timber in which usually another member slides. Also called CULLIS.

coulomb, koo-lom' (*Elec. Eng.*). The practical unit of quantity of electricity, being the amount of electricity passing in a circuit when 1 ampere flows for one second.

Coulomb's law (*Elec. Eng.*). A fundamental law of electrical engineering which states that the electrostatic attraction or repulsion between two charged bodies is proportional to the magnitudes of their charges and inversely proportional to the square of the distance between them.

coulometer (*Elec. Eng.*). See **voltameter.**

coulter (*Agric. Mach.*). A knife, or a steel disc, which, attached to a plough, makes the vertical cut in the ground to form the furrow slice. See **share.**

coumar'ic acids (*Chem.*). $HO{\cdot}C_6H_4{\cdot}CH{:}CH{\cdot}COOH$, hydroxy-cinnamic acids.

coumarin, koo'-- (*Chem.*). Odoriferous principle of tonquin beans and woodruff, $C_9H_6O_2$, b.p. 200° C.; used for scenting tobacco.

cou'marone (*Chem.*). The condensation product of a benzene nucleus with a furan ring. Coumarone is a very stable, inert compound, b.p. 169° C.; found in coal-tar. Strong acids effect polymerisation into para-coumarone and coumarone resins.

coumarone resins (*Plastics*). Condensation and polymerisation products obtained from *coumarone* (q.v.); used for varnishes, in printing ink, and as plasticisers for moulding powders. They are neutral and acid—and alkali-resisting.

count of yarn (*Textiles*). A number which designates the size of a yarn. Usually a count represents the number of units of length contained in a unit of weight, but in certain classes of yarn the count represents the number of units of weight in a unit of length. The units of length and weight vary in districts. WOOLLEN: The *Yorkshire skein*=256 yds.; unit of weight 1 lb. The *American run*=100 yds.; unit of weight 1 oz. WORSTEDS: The *British* and *American hank*=560 yds.; unit of weight 1 lb. COTTON: The *cotton hank*=840 yds.; unit of weight 1 lb. The count is the number of hanks of 840 yds. which weigh 1 lb. LINEN: The count is the number of leas of 300 yds. which weigh 1 lb. JUTE YARNS: The count is the number of lbs. in a spindle of 14,400 yards, the unit of length.

counter (*Eng.*). An instrument for recording the number of operations performed by a machine or the revolutions of a shaft.—(*Elec. Eng.*) The part of an integrating electricity meter which indicates the number of revolutions made by the spindle of the meter, this indication being proportional to the amount of energy which has passed through the circuit. Also occasionally called DIAL or CLOCK.

counter (*Boots and Shoes*). The stiffener for the part of a boot or shoe that encircles the heel.

counter (*Ship Constr.*). A description applied to a form of ship's stern, implying an overhung portion of deck, abaft the stern post; hence the term 'under the counter.'

counter-arched (*Civ. Eng.*). Said of a revetment having arches turned between the counterforts.

counterbalancing (*Eng.*). The system of neutralising the effect of a force by a counterweight which provides an opposite effect. See **balance box, balance weight.**

counterboring (*Eng.*). The operation of boring the end of a hole to a larger diameter.

counterbracing (*Eng., Struct.*). The provision of two diagonal tie-rods in the panels of a frame girder or other structure. Also called CROSS-BRACING.

counter-coupling (*Radio*). See **negative feedback.**

counter drain (*Civ. Eng.*). A drain running along the foot of an embankment, to carry off water.

counter-e.m.f. (*Elec. Eng.*). See **back e.m.f.**

counter-e.m.f. cells (*Elec. Eng.*). See **back-e.m.f. cells.**

counter-flap hinge (*Join.*). A hinge which is arranged, by the provision of separate centres of rotation for each leaf, so that it may fold back to back.

counter-floor (*Carp., Join.*). An inferior floor laid as a base for a better surface (e.g. parquet).

counterflow jet condenser (*Eng.*). A *jet condenser* (q.v.) in which the exhaust steam and air flow upwards to the airpump suction in the opposite direction to that of the descending spray of cooling water.

counterfort (*Civ. Eng.*). A buttress giving lateral support to a retaining wall, to which it is bonded.

counter-gauge (*Carp.*). See **mortise-gauge.**

counter-irritation (*Med.*). Therapeutic irritation for the relief of pain due to inflammation.

counterlathing (*Plast.*). See **brandering.**

counter-mure (*Masonry*). A wall-facing.

counter-plate (*Engraving*). A secondary engraved metal plate used in producing additions on an engraving.

counterpoise (*Elec. Eng.*). A buried wire connected to the towers of an overhead electric transmission line in order to reduce the impedance between the towers and earth, thereby reducing the probability of insulator flashovers due to lightning surges.

counterpoise antenna (*Radio*). A system of wires placed a short distance above the ground and insulated therefrom; used in place of the earth connexion in an antenna, to reduce losses in the ground. Also called BALANCING ANTENNA, CAPACITY EARTH.

counterpoise bridge (*Civ. Eng.*). A bridge, such as a bascule or lift bridge, in which the raising of the platform is assisted by counterpoise weights.

counterpoise earth (*Radio*). See **artificial earth.**

counter-proof (*Engraving, Print.*). A proof taken off another proof while the first is still wet, producing a reversed version.

countershaft (*Eng.*). An intermediate shaft interposed between driving and driven shafts in a belt drive, either to obtain a larger speed ratio or where direct connexion is impossible.

countersinking (*Eng.*). The provision of a conical enlargement at the end of a hole to receive the head of a screw or rivet. See **counterboring.** —(*Dec., etc.*) The driving of the head of a screw or nail below the surface so that it may be hidden by a plug.

counter-stern (*Ship Constr.*). A type of ship's stern construction. It is virtually an excrescence to the main hull, and is not waterborne.

counter-vault (*Civ. Eng.*). An inverted arch.

counterwedging (*Join.*). A method of bringing closely together the butting edges of thin surfaces, such as counter tops, by tightening up parallel wedges between a slot in a batten across the back of one of the surfaces and corresponding slots in two battens across the back of the other surface.

countess (*Build.*). A roofing slate, 20 by 10 in.

counting glass (*Textiles*). A magnifying-glass with a special base, often ¼, ½, or 1 in. square; used when counting the number of threads in a given space in a fabric.

country rock (*Mining*). The valueless rock forming the walls of a reef or lode.

coup, kowp (*Build.*). A Scottish term for a shooting of rubbish.

couple (*Build.*). A Scottish term for a rafter.

couple (*Mech.*). A pair of non-collinear equal parallel forces oppositely directed. The moment of a couple is equal to the product of the magnitude of one of the forces and the perpendicular distance between their lines of action.

couple-close roof (*Build.*). A roof-form derived from the couple roof by connecting the lower ends of the two rafters together with a tie, so as to prevent spreading of the roof under load.

couple roof (*Build.*). A roof composed of two rafters not braced together.

coupled-circuit effect (*Radio*). The property, exhibited by any two resonant circuits coupled by mutual reactance greater than a certain critical value, of showing maxima of response at two frequencies, neither of which coincides with the resonant frequencies of the separate resonant circuits.

coupled switches (*Elec. Eng.*). See **linked switches.**

coupled wheels (*Eng.*). The wheels of a locomotive which are connected by coupling rods in order to distribute the driving effort over more than one pair of wheels.

coupler (*Acous.*). A paralleling arrangement in an organ console for playing stops on one manual from the keys on another manual, or from pedals.

coupler (*Elec. Eng.*). A short length of tubing for making connexions between adjacent lengths of conduit in an electric wiring system. The term is also used to denote various devices for connecting electric circuits. See **bus-coupler switch, bus-wire coupler, plain coupler.**

coupler plug (*Elec. Eng.*). A plug on a jumper cable, such as that used for making connexion between the two coaches of an electric multiple-unit train.

coupler socket (*Elec. Eng.*). A socket for receiving a coupler plug.

couplet (*Gen.*). A pair of allelomorphs.

coupling (*Gen.*). The tendency for dominant characters to remain in association.

coupling (*Elec. Comm.*). An arrangement for transferring electrical energy from one circuit to another, in one or both directions.

See **capacity**
(or **electro-static**)—
direct (d.c.)—
inductive—
mutual—
parafeed—
paraphase—
resistance—
resistance-capacity—
transformer—
valve—

coupling (*Eng.*). (1) A device for connecting two vehicles, as railway coaches.—(2) A connexion between two co-axial shafts, conveying a drive from one to the other.

See **claw**—
flange—
flexible—
muff—

coupling (*Plumb.*). A short collar screwed internally at each end to receive the ends of two pipes which are to be joined together.

couplings (*Textiles*). The loops which connect the mails to the harness cords and lingoes of a jacquard harness.

coupling coefficient (*Radio*). The ratio of the total effective positive (or negative) reactance common to two resonant circuits to the geometric mean of the total positive (or negative) reactances of the two separate circuits.

coupling coil (*Radio*). A coil whose inductance is generally a small fraction of the total inductance of the circuit of which it forms a part; used for the inductive transfer of energy to or from the circuit.

coupling condenser (*Radio*). Any condenser used for coupling two circuits, but particularly that for coupling the antenna to a transmitter or receiver.

coupling factor (*Radio*). Another name for *coupling coefficient.*

coupling resistance (*Elec. Comm.*). A common resistance between two circuits for the transference of energy from one circuit to the other.

coupling system (*Radio*). The system of resonant circuits and transmission lines used for the transfer of energy from a transmitter to the antenna.

course (*Build.*). A horizontal layer of bricks or building-stones running throughout the length and breadth of a wall. See also **cushion course.**

course (*Hosiery*). The series of stitches in a knitted fabric, regarded horizontally.

course (*Surv.*). The known length and bearing of a survey line.

course (*Weaving*). (1) A series of heald eyes, one on each shaft.—(2) A series of mails, one row from back to front in a jacquard harness.—(3) One repeat of a pattern.

coursed masonry (*Civ. Eng.*). Work consisting of stone blocks laid on their beds in courses; e.g. in some breakwater construction.

coursing joint (*Build., Masonry*). The mortar joint between adjacent courses of brick or stone.

coussinet, koo-sē-nā (*Build.*). A *cushion* (q.v.).

Cou'tchiching' Group (*Geol.*). Intensely metamorphosed sedimentary rocks represented chiefly by mica-schists and paragneisses: the oldest sedimentary series known, occurring in the Canadian Shield, notably at Rainy Lake, the type-locality, and in Manitoba. See also **Loganian System.**

coutil (*Textiles*). A cotton fabric, usually a 2-and-1 twill with a 'herring-bone' effect; used for corsets.

co-valency (*Chem.*). The union of two atoms by the sharing of a pair of electrons.

co-valency, dative (*Chem.*). See **semi-polar bond.**

cove (*Join.*). A hollow cornice, usually large.

coved ceiling (*Build.*). A ceiling which is formed at the edges to give a hollow curve from wall to ceiling, instead of a sharp angle of intersection.

covel'lite (*Min.*). Sulphide of copper crystallising in the hexagonal system, usually occurring as thin plates. The colour is indigo-blue or darker. Also called INDIGO COPPER.

cover (*Build.*). In coursed work, the hidden or covered width of a slate or tile.

cover (*Civ. Eng.*). The thickness of concrete between the outer surface of any reinforcement and the nearest surface of the concrete. See **effective depth.**

cover flashing (*Plumb.*). A separate flashing fastened into the upright surface and overlapping the flashing in the angle between the surfaces.

cover glass (*Microscopy*). The thin slip of glass used for covering a specimen that is being observed under a microscope.—(*Photog.*) A transparent square of glass bound by the edges to a photographic transparency in the making of a lantern slide; its purpose is to protect the photographic image.

cover iron (*Carp.*). See **back iron.**

cover stones (*Build.*). Flat stones covering girders, etc., and serving as a foundation for walls above.

coverage or **covering power** (*Photog.*). The area over which a lens can give a sharply focused image.

covered electrode (*Elec. Eng.*). A metal electrode covered with a coating of flux; used in arc-welding.

covering power (*Paint.*). The area which a given quantity of paint will cover without thinning unduly.

covering strips (*Dec.*). Strips of wood, etc., to cover butted joints or mitres.

covert coating (*Textiles*). A wool or wool-and-cotton fabric of twill weave; generally shower-proof.

coverts (*Zool.*). See **tectrices.**

coving (*Build.*). The upright splayed side of a fireplace opening.

co-volume (*Chem.*). The volume actually occupied by the molecules of a gas (the symbol *b* in van der Waals' equation).

cow-hocked (*Vet.*). Said of horses whose hocks are abnormally close to each other.

cow-pox (*Med.*, *Vet.*). See **vaccinia.**

cow-pox, false (*Vet.*). See **impetigo (bovine).**

cow-tail (*Textiles*). An obsolete term formerly applied by woolsorters to coarse wool from the tail end of a low lustre fleece.

cowl (*Build.*). A cover, frequently louvred and either fixed or revolving, fitted to the top of a chimney to prevent down draught.

Cowles furnace (*Elec. Eng.*). An early form of electrolytic furnace used for the manufacture of aluminium alloys; it consisted of a long trough with carbon electrodes at the ends.

cowling (*Aero.*). A casing of sheet-metal placed round an air-cooled aero-engine to direct the cooling air on to the cylinders and reduce drag.

Cowper stoves (*Met.*). See **hot-blast stoves.**

Cowper's glands (*Zool.*). In Mammals, paired glandular masses lying on either side of the urinogenital canal.

coxa (*Zool.*). In Insects, the proximal joint of the leg.—*adj.* **coxal.**

coxa valga (*Med.*). A deformity of the hip in which the angle between the neck and the shaft of the femur exceeds 140°.

coxa vara (*Med.*). A deformity of the hip in which the angle between the neck and the shaft of the femur is less than 120°.

coxa vera (*Zool.*). In Insects in which the coxa is divided, the anterior portion.

coxal'gia (*Med.*). Pain in the hip.

coxop'odite (*Zool.*). The proximal joint of the protopodite.

C.P. (*Chem.*). An abbrev. for *chemically pure*, indicating the highest grade of purity of a reagent.

C.P. (*Surv.*). Abbrev. for *change point.*

C.P.S., cps., c/s. (*Elec. Comm.*). Abbrevs. for *cycles per second*, the usual measure of frequency.

Cr (*Chem.*). The symbol for *chromium.*

C.R.-law (*Elec. Comm.*). (1) When a condenser is charged by a potential applied to a resistance in series with it, the rate of rise of potential of the plates on the condenser depends only on the product of the resistance and the capacity.—(2) In a uniform submarine cable, the phenomenon of transmission depends on the product of total capacity and total resistance. The speed of signalling is inversely proportional to this product.—Formerly termed the K.R.-LAW.

crab (*Eng.*). The travelling lifting-gear of a gantry crane, mounted on a bogie and running on rails carried by the gantry.

crabbing (*Textiles*). A process applied to worsted fabrics, usually before scouring, in order to prevent cockling in the finishing stages.

crabbing machine (*Textiles*). A machine, consisting of a trough with a crabbing or boiling roller, tensioning brakes, etc., in which crabbing is carried out.

cracked ends (*Textiles*). Threads which have become broken in a lustre worsted fabric during manufacture.

cracked heels (*Vet.*). See **grease.**

cracking (*Oils*). A process of breaking up the heavier petroleum distillates in order to obtain a larger supply of lighter products, e.g. petrol. The process is carried out in a still, under pressure.

crackle (*Pot.*). A system of decorating in which the glaze is covered with small cracks during firing, the size and pattern of crackles being more or less controlled by choice of glaze and temperature.

cradi'na (*Bot.*). An enzyme able to break down proteins, present in the juice of the stem, leaves, and fruit of the fig.

cradle. Generally, any support which partially embraces the object mounted in it; e.g. a gun cradle (see next article). Specific senses are indicated in articles below.

cradle (*Artillery*). That part of the gun carriage which supports the recoiling parts.

cradle (*Dec.*). (1) A movable scaffold; see **cradle scaffold.**—(2) A frame of laths on which scrim is stretched to receive plaster in forming coved or other heavy cornices, etc.

cradle (*Elec. Eng.*). An earthed metal net placed below a high-voltage overhead transmission line where it crosses a public highway, railway, or telephone circuit; a conductor, if broken, falls on the net and is earthed without doing damage.

cradle (*Mining*). (1) The trough-shaped metal support for a mounted pneumatic drill.—(2) The means of supporting men and tools during shaft-sinking or repair.—(3) See **rocker.**

cradle (*Textiles*). Cam blocks which support the catch bar end trucks in a lace machine.

cradle (*Vet.*). A frame encircling the neck of a horse; used as a means of restraint.

cradle bar (*Join.*). See **cot bar.**

cradle scaffold (*Build.*). A form of suspended scaffolding consisting of a strong framework fitted with guard rails and boards for the working platform, and slung from two fixed points or from a wire rope secured between two jibs. Also called BOAT SCAFFOLD.

cradling (*Carp.*, *Join.*). (1) Rough timber work fastened around a beam as a basis for lathing.—(2) See **cradle** (*Dec.* 2).

cradling piece (*Carp.*). A short timber fixed at each side of a fireplace hearth, between chimney breast and trimmer, to support the ends of floor boards.

craft. (1) The skill employed by a worker doing a manual task.—(2) A trade or occupation.

Crag (*Geol.*). A local type of shelly and sandy rocks which have been deposited in relatively shallow water; found in the Pliocene rocks of East Anglia.

crag-and-tail (*Geol.*). A land form consisting partly of solid rock shaped by ice action, with a *tail* of morainic material banked against it on the lee-side.

Craigleith stone (*Build.*). A very hard and durable, whitish-grey sandstone quarried near Edinburgh; used for ashlar and building purposes generally.

Cramer's test (*Chem.*). A test for the presence of saccharoses, based upon the reduction of a mercuric salt to metallic mercury.

crammed stripe (*Textiles*). A fancy-stripe pattern produced by arranging a larger number of threads in one part of the pattern than in the ground texture.

cramming (*Plumb.*). The operation of temporarily plugging a pipe before making a joint or doing repairs.

cramp (*Join.*). A contrivance for holding parts of a frame in place during construction. It usually consists of a steel bar along which slide two brackets between which the work is fixed, one of the brackets being pegged into a hole in the bar while the other is adjustable for position by means of a screw.

cramp (*Masonry*). A locking bar of incorrodible metal used to bind together adjacent stones in a course, and having bent ends, one of which is fastened into each stone. Also called a CRAMP-IRON. See also **slate cramp, lead plug.**

cramp (*Med.*). Painful spasm of muscle.

cramps (*Med.*). Heat cramps. Painful contractions of muscles in those who work in high temperatures, due to excessive loss of salt in the sweat.

cramp-iron (*Masonry*). See **cramp.**

crampon or **crampoon** (*Build.*). An appliance for holding stones or other heavy objects which are to be hoisted by crane. It consists of a pair of bars hinged together like scissors, the points of which are bent inwards for gripping the load, while the handles are connected by short lengths of chain to a common hoist-ring.

Crampton's muscle (*Zool.*). In Birds, a muscle of the eye which by its contraction decreases the diameter of the eyeball and so aids the eye to focus objects near to it.

crane (*Eng.*). A machine for hoisting and lowering heavy weights.

See **balance**—
breakdown—
cantilever—
derricking jib—
floating—
jib—
level-luffing—
overhead travelling—
portal jib—
tower—

crane magnet (*Elec. Eng.*). A lifting magnet.

crane motor (*Elec. Eng.*). A motor specially designed for the operation of a crane or hoist. It should be very robust and have a high starting torque.

crane post (*Eng.*). The vertical member of a jib crane, to the top of which the jib is connected by a tie-rod.

crane rating (*Elec. Eng*). A term sometimes employed to denote a method of specifying the rating of a motor for intermittent load, such as that of a crane. The maximum power and the load factor are stated.

crane shot (*Cinema.*). In motion-picture production, a shot taken with the camera mounted on a crane-like structure, to get vertical panning or a combination of vertical and horizontal panning.

crane tower (*Build.*). See **king tower.**

cranial flexures (*Zool.*). Flexures of the brain in relation to the main axis of the spinal cord, transitory in lower Vertebrates, permanent in higher Vertebrates. See **primary flexure, nuchal flexure, pontal flexure.**

Crania'ta (*Zool.*). A subphylum of *Chordata* characterised by the possession of a distinct head marked by specialised sense-organs, brain, and skull.

cranio- (Greek *kranion*, skull). A prefix used in the construction of compound terms; e.g. *cranioclasis* (q.v.).

craniocla'sis (*Obstet.*). The instrumental crushing of the foetal skull in obstructed labour.

cra'nioclast (*Obstet.*). An instrument for gripping and crushing the foetal skull in obstructed labour.

craniosa'cral outflow (*Zool.*). See **parasympathetic nervous system.**

craniota'bes (*Med.*). Thinning of the bone of the skull in rickets or in congenital syphilis.

craniot'omy (*Obstet.*). Incision of the foetal skull and removal of its contents in obstructed labour.

cranium (*Zool.*). That part of the skull which encloses and protects the brain; the brain-case. —*adj.* **cranial.**

crank (*Eng.*). An arm attached to a shaft, carrying at its outer end a pin parallel to the shaft; used either to give reciprocating motion to a member attached to the pin, or to transform such motion into rotary motion of the shaft.

crank-brace (*Tools*). A brace having a bent handle by which it may be rotated.

crankcase (*Eng.*). A box-like casing, usually cast-iron or aluminium, which encloses the crankshaft and connecting-rods of some types of reciprocating engines, air-compressors, etc.

crank effort (*Eng.*). The effective force acting on the crank pin of an engine in a direction tangential to the circular path of the pin.

crank pin (*Eng.*). The pin which is fitted into the web or arm of a crank, and to which a reciprocating member or connecting-rod is attached.

crankshaft (*Eng.*). The main shaft of an engine or other machine which carries a crank or cranks for the attachment of connecting-rods.

crank throw (*Eng.*). (1) The radial distance from the mainshaft to the pin of a crank, equal to one half the stroke of a reciprocating member attached to the pin.—(2) The web or webs and pin of a crank.

crank web (*Eng.*). The arm of a crank, usually of flat rectangular section.

cranked (*Eng.*). Bent or shaped like a crank.

crash (*Textiles*). A linen cloth of coarse texture, used for towelling, etc.

crash helmet (*Aero., etc.*). A helmet with cushions of resilient material, intended to protect the head in case of accident.

crashes (*Radio*). Powerful atmospherics of relatively long duration.

cras'pedote (*Zool.*). Having a velum.

crater (*Geol.*). The orifice of a volcano, usually in the shape of an inverted cone, through which the lavas and gases are emitted during activity.

crater (*Illum.*). See **arc crater.**

crater'iform (*Bot., etc.*). Hollowed out; like a cup.

crawling (*Dec.*). A defect in paint or varnish work, characterised by the formation of wrinkles before drying. Also called CURTAINING.

crawling (*Elec. Eng.*). A phenomenon sometimes observed with induction motors, the motor running up to about only one-seventh of full speed on account of the presence of a pronounced seventh harmonic in the field form. The phenomenon is also observed with other harmonics. Also called BALKING.

craze or **crazing** (*Build*). The minute hair cracks which sometimes appear on the surface of precast concrete work or artificial stone.—(*Paint*) Fissuring of faulty coats of paint or varnish in irregular criss-cross cracks.—(*Pot.*) Hair-like cracks appearing in a glaze. *

cream-laid (*Paper*). White writing-paper made with a laid water-mark.

cream of tartar (*Chem.*). Commercial name for acid potassium tartrate.

cream separator (*Agric. Mach.*). A machine, either hand- or power-driven, in which cream is separated from whole milk by centrifugal force; cream, the lighter fraction, passes out of the machine at one outlet, and the heavier skim milk through another outlet.

cream-wove (*Paper*). White writing-paper, in the manufacture of which a wove dandy has been used.

creasing (*Build.*). See **tile creasing.**

cre'atine (*Chem.*). Methylguanido-acetic acid, methylglycocyamine, $HN{:}C(NH_2){\cdot}N(CH_3){\cdot}CH_2{\cdot}COOH$, a weakly basic, crystalline compound, soluble in water and present in muscle. It has been synthesised from cyanamide and methylamino-acetic acid.

creatinine, krē-at'— (*Chem.*). Methylglycocyamidine, formed from creatine in acid solution by the elimination of water between the amino and carboxyl groups. The white prisms decompose at 270° C., and are strongly basic. It occurs in muscle and urine.

creatinu'ria, krē-at'— (*Med.*). The presence of creatinine in the urine.

creatorrhoe'a, creatorrhe'a (*Med.*). The abnormal presence of muscle fibres in the faeces.

creel (*Textiles*). The frame which holds the supply bobbins at the spinning-frame, beam warper, or other machine.

creep (*Chem.*). (1) The rise of a precipitate on the wet walls of a vessel.—(2) The formation of crystals on the sides of a vessel above the surface of an evaporating liquid.

creep (*Eng.*). (1) A slow relative movement between two parts of a structure.—(2) The slow relative motion of a belt over the surface of a pulley, due to its continual extension and relaxation as it passes from tight to slack side.

creep (*Met.*). Continuous deformation of metals under steady load. Exhibited by iron, nickel, copper, and their alloys at elevated temperature, and by zinc, tin, lead, and their alloys at room temperature.

creep (*Mining*). Gradual rising of the floor in a coal-mine due to pressure in the strata. See **crush.**

creep limit (*Eng.*). The maximum tensile stress which can be applied to a material at a given temperature without resulting in measurable creep.

creep tests (*Met.*). Methods for measuring the resistance of metals to creep. Time-extension curves under constant loads are determined. The methods used vary with respect to the duration of the tests and the procedure adopted in estimating behaviour during long periods of time.

creeping (*Bot.*). Growing along the surface of the ground, and rooting at the nodes.

creeping (*Paint.*). Said of a new paint or varnish film which moves downwards. See also **crawling.**

cremas'ter (*Zool.*). In the pupae of *Lepidoptera*, an organ of attachment developed from the tenth abdominal somite: in Mammals, a muscle of the spermatic cord.

Cremnitz white (*Paint.*). See **Vienna white.**

cre'mocarp (*Bot.*). A fruit which splits into two or more one-seeded portions.

cren'ate (*Bot.*). Having a margin bearing rounded teeth all more or less of the same size; when the teeth are themselves crenate, the margin is *doubly crenate*.

cren'ulate (*Bot.*). Having small rounded teeth on the margin.

cre'osote oil (*Chem.*). A coal-tar fraction, boiling between 240° and 270° C. The crude creosote oil is used as raw material for producing tar acids, etc., or used direct as a germicide, insecticide, or disinfectant in various connexions (e.g. soaps, sheep dips, impregnation of railway sleepers, etc.).

creosoting cylinder (*Civ. Eng.*). A container in which timber may be impregnated with creosote under pressure. See **Bethell's process.**

crêpe, krep (*Textiles*). A dress material, worsted, silk, or cotton, with a specially produced rough surface.

crêpe-de-chine, —shēn (*Textiles*). A fabric with crêpe effect, usually made with Botany worsted yarns, warp, and weft; originally made with silk warp and Botany worsted weft.

crêpe weaves (*Textiles*). Weaves in which an irregular arrangement of the warp and weft produces a broken surface effect, without twill or rib lines.

crepitation, crepitus (*Med.*). (1) A crackling sensation felt by the observer on movement of a rheumatic joint.—(2) The fine crackling noise made when two ends of a broken bone are rubbed together.—CREPITATIONS, fine crackling sounds heard over the chest in disease of the pleura or of the lungs.

crepitation (*Zool.*). The explosive discharge of an acrid fluid by certain Beetles, which use this as a means of self-defence.

crep'oline, —lēn (*Worsted*). A light-weight dress material with a rib-crêpe appearance.

crepus'cular (*Zool.*). Active at twilight or in the hours preceding dawn.

crepuscular rays (*Meteor.*). The radiating and coloured rays from the sun below the horizon, broken up and made apparent by clouds or mountains: also, the apparently diverging rays from the sun passing through irregular spaces between clouds.

crescent (*Horol.*). The circular notch cut in the periphery of the roller of the lever escapement to allow the passing of the guard pin or safety finger. Also known as PASSING HOLLOW.

cre'sols (*Chem.*). A technical name for the hydroxytoluenes, $CH_3{\cdot}C_6H_4{\cdot}OH$, monohydric phenols. There are three isomers, viz.

o-cresol, m.p. 30° C., b.p. 191° C.
m-cresol, m.p. 4° C., b.p. 203° C.
p-cresol, m.p. 36° C., b.p. 202° C.

Only *meta-* and *para*-cresol form nitro-compounds with nitric acid, whereas the *ortho*-cresol is oxidised. Important raw materials for plastics, especially the *meta*-compound; also used for explosives, as intermediates for dyestuffs, and as antiseptics.

cresol resins (*Plastics*). Resins made from *meta-* and *para*-cresol and an aldehyde, similar in properties to the phenolics. The *ortho-* compound reacts but slowly, and is therefore likely to remain partly unchanged and act as a softener or plasticiser.

crest (*Build.*, *Civ. Eng.*, *etc.*). The top of a slope or parapet: the ridge of a roof.

crest (*Zool.*). A ridge or elongate eminence, especially on a bone.

crest factor (*Elec. Eng.*). See **peak factor.**

crest-tile (*Build.*). A purpose-made tile having a V-shape specially suiting it to location astride the ridge-line of a roof.

crest value (*Elec. Eng.*). See **peak value.**

crest voltmeter (*Elec. Eng.*) See **peak voltmeter.**

cresting (*Build.*). Ornamental work along a ridge, cornice, or coping of a building. Also called BRATTICING or BRATTISHING.

cresting (*Furn.*). An erect carved or pierced ornament used as edging to a chair or settee back.

cresyl'ic acids (*Chem.*). A mixture of the various cresol isomers, also containing higher homologues, e.g. xylenols.

Creta'ceous System (*Geol.*). The rocks which succeed the Jurassic and precede the Tertiary System. The most striking member of this system is the Chalk in Britain. See also **Cretacic.**

Creta'cic (*Geol.*). Equivalent to the Upper Cretaceous of Europe, the Lower Cretaceous constituting the *Comanchean* (q.v.) of American stratigraphers. For Cretacic see **Coloradoan, Laramian,** and **Montanan.**

cre'tinism (*Med.*). A congenital condition in which there is failure of mental and physical development, due to absence or insufficiency of the secretion of the thyroid gland.

cretonne' (*Textiles*). A cotton material, either printed or made from a printed warp; used for coverings and curtains.

crevasse' (*Geol.*). A fissure, often deep and wide, in a glacier or ice-sheet.

crevasse curve (*Radio*). A curve showing the sharpness of response of a piezo-electric crystal to changes of frequency. It is obtained by taking a resonance curve of a parallel resonant circuit across which the crystal is connected. A sharp 'crevasse' in the curve occurs at the resonant frequency of the crystal.

crew (*Teleph.*). A group of trained persons who perform intelligibility and articulation tests over telephone circuits or parts thereof.

crew, camera (*Cinema.*). See **camera crew.**

crew factor (*Teleph.*). The factor which is applied to the results of testing with a given crew so as to obtain the ideal articulation of the system tested, thus eliminating effects due to degree of training and physiological condition of the crew.

crib (*Mining*). (1) An interval from work underground for croust, bait, snack, downer, piece, chop, snap, bite, or tiffin.—(2) A job.—(3) A form of timber support.

cribwork (*Civ. Eng.*). Timber cribs or boxes, filled with concrete, which are sometimes sunk below water-level to carry the foundations of bridges.

cribbing (*Civ. Eng.*). An interior lining for a shaft, formed of framed timbers backed with boards; used to support the sides and keep back water.

cribel'lar glands (*Zool.*). The silk glands which open on the cribellum in certain Spiders.

cribel'lum (*Zool.*). In certain Spiders, a perforate oval plate, lying just in front of the anterior spinnerets, which produces a broad strip of silk composed of a number of threads.

crib'riform (*Zool.*). Perforate, sieve-like; as the **cribriform plate,** a perforate cartilaginous element of the developing Vertebrate skull, which later gives rise to the ectethmoid.

crib'rose (*Bot.*). Pierced with many holes: resembling a sieve.

cric'oid (*Zool.*). Ring-shaped; as one of the cartilages of the larynx.

Crimp and Bruges formula (*San. Eng.*). A formula giving the rate of discharge through sewers constructed of good brickwork, or of cast-iron pipes in good condition. It states that

$$v = 124\,m^{\frac{2}{3}}i^{\frac{1}{2}},$$

where v = velocity of flow in ft. per sec.; m = hydraulic mean depth; i = virtual slope.

crimp cloth (*Textiles*). A cotton fabric in which a stripe effect is produced by yarns at different tensions during weaving; or by printing plain cloth with stripes of caustic soda, which causes contraction of the parts printed.

crimper (*Civ. Eng.*). See **indenter.**

crimping (*Eng.*). The compressing of a thin metal ring or cap into corrugations so as to reduce its diameter.

crin'anite (*Geol.*). A basic igneous rock, consisting of intergrown crystals of feldspar, titanaugite, olivine, and analcite. Similar to *teschenite.*

Crinoi'dea (*Zool.*). Sea Lilies. A class of *Echinodermata,* having a flower-shaped body, with branching arms sharply differentiated from the disc; the tube-feet lack ampullae and occur on the upper surface; the anus and mouth are on the upper surface; the madreporite is internal; there is a well-developed skeleton; stalked sessile forms. Crinoids are found fossil in many limestones (crinoidal limestone).

cripple-timber (*Carp.*). See **jack-timber.**

crisis (*Glass*). An old term, not much used now, denoting the stage of melting when the firing could be reduced to allow the glass to cool off and the last traces of bubble to disappear.

crisis (*Med.*). (1) A painful paroxysm in tabes dorsalis.—(2) The rapid fall of temperature marking the end of a fever.

cris'pate, crisped (*Bot.*). Having a frizzled appearance.

criss-cross inheritance (*Gen.*). Occurs when the reciprocal cross of a female with an allelomorphic character X and a male with the corresponding character Y results in all males of the first filial generation having X and all the females Y.

crissum (*Zool.*). In Birds, the region surrounding the cloaca or the feathers situated on that area.—*adj.* **crissal.**

crista (*Zool.*). A ridge or ridge-like structure; as the projection of the transverse crests of lophodont molars.

crista acu'stica (*Zool.*). (1) A chordotonal apparatus forming part of the tympanal organ in *Tetigoniidae* and *Gryllidae.*—(2) An inwardly projecting ridge of the auditory ampullae in Vertebrates, marking the entrance of the nerve fibres.

cris'tate (*Bot.*). Bearing a crest.

cristo'balite (*Min.*). Silica which crystallises in white octahedrons. This is a high-temperature modification of quartz, being formed above 1470° C. It may have two varieties, one tetragonal and the other cubic.

crithid'ial (*Zool.*). Pertaining to, or resembling, the flagellate genus *Crithidia*; said of a stage in the life-cycle of some Trypanosomes.

critical angle (*Light*). The largest value which the angle of incidence may have for a ray of light passing from a denser to a less dense medium. If the angle of incidence exceeds the critical angle, the ray does not enter the less dense medium but is totally internally reflected back into the denser medium. The sine of the critical angle is equal to the refractive index from the denser medium to the less dense.

critical corona voltage (*Elec. Eng.*). The voltage at which a corona discharge just begins to take place around an electric conductor.

critical coupling (*Radio*). The maximum value of the coupling coefficient before the coupled circuit effect is evidenced.

critical damping (*Elec. Eng.*). Damping in an oscillatory electric circuit or in an oscillating mechanical system (such as the movement of an indicating instrument) which is just enough to prevent oscillations from actually taking place.

critical point (*Phys.*). The point on the *isothermal* (q.v.) for the critical temperature of a substance at which the pressure and volume have their critical values. At the critical point the densities (and other physical properties) of the liquid and gaseous states are identical.

critical points (*Met.*). See **arrest points.**

critical pressure (*Phys.*). The pressure at which a gas may just be liquefied at its critical temperature.

critical range (*Met.*). The range of temperature in which the reversible change from austenite (stable at high temperature) to ferrite, pearlite, and cementite (stable at low temperature) occurs. The upper limit varies with carbon content; the lower limit for slow heating and cooling is about 700° C.

critical rate (*Met.*). The rate of cooling required to prevent the formation of pearlite and to secure the formation of martensite in steel. With carbon steel this means cooling in cold water, but it is reduced by the addition of other elements, hence oil- and air-hardening steels.

critical reaction (*Radio*). The maximum degree of reaction in a regenerative system before self-oscillation commences.

critical solution temperature (*Chem.*). The temperature above which two liquids are miscible in all proportions.

critical speed (*Eng.*). The rotational speed of a shaft at which some periodic disturbing force coincides with the fundamental or some higher mode of the natural frequency of torsional or transverse vibration of the shaft and its attached masses.

critical state (*Phys.*). The condition of a gas at its critical point, when it appears to hover between the liquid and gaseous states.

critical temperature (*Elec. Eng.*). The temperature at which magnetic materials lose their magnetic properties; about 800° C. for iron and steel.—(*Met.*) The temperature at which some change occurs in a metal or alloy during heating or cooling; i.e. the temperature at which an arrest or critical point is shown on heating or cooling curves.—(*Phys.*) The temperature above which a given gas cannot be liquefied. See **gases (liquefaction of).**

critical velocity (*Hyd.*). The velocity at which the nature of a given fluid flow in a particular case changes from viscous to eddy flow or vice versa.

critical voltage, disruptive (*Diel.*). The value is $E_0 = 21{\cdot}1\ m\delta r \log_e (D/r)\ kV$ (r.m.s.) to neutral; where m is 1·0 for clean wires, 0·95 for weathered wires, and 0·84 for stranded wires; δ is $3{\cdot}92\ b/(273+T)$ where b is the barometric height in cm. and T the temperature in degrees C.; r is the radius of the wire in cm. and D is the spacing.

critical voltage, visual (*Diel.*). This requires an energy supply so that E_v is the disruptive critical voltage multiplied by $(1+0{\cdot}3/\sqrt{\delta r})$. See **critical voltage (disruptive)**.

critical volume (*Phys.*). The volume of unit mass of a substance under critical conditions of temperature and pressure.

crizzling (*Glass*). Fine cracks in the surface of the glass, occasioned by local chilling during manufacture.

crochet, krotch′et (*Zool.*). A hook which aids in locomotion, and is associated with the apex of the abdominal legs in Insect larvae.

crocidolite, krō-sid′— (*Min.*). A silicate of sodium and iron, crystallising in the monoclinic system and belonging to the amphibole group of rock-forming minerals. Usually considered to be a fibrous variety of riebeckite. See also **tiger's eye.**

crockery (*Pot.*). A term covering all kinds of domestic pottery.

crocodile truck (*Eng.*). A high-capacity railway truck consisting of a long open platform carried between two four-wheeled bogies. The low floor-level facilitates the loading of heavy and bulky freight.

Crocodil′ia (*Zool.*). See **Loricata.**

crocodiling (*Dec.*). A defect on a painted or varnished surface, characterised by the formation of ridges or cracks in irregular patches. Sometimes known as ALLIGATORING.

cro′coite, cro′coisite (*Min.*). Chromate of lead, crystallising in the monoclinic system; bright-red in colour.

croissant vitellogène, krwa-sahn^g′ vē-tel-ō-zhen′ (*Zool.*). In the developing oöcyte, a crescentic area surrounding the archoplasm, in which the mitochondria are grouped.

Croixian (*Geol.*). The rocks of Upper Cambrian age in the Pacific Province in N. America, so named from St. Croix (Minnesota), where they are typically developed. Cf. *Bretonian.*

Crookes dark space (*Phys.*). A dark region separating the cathode from the luminous 'negative glow' in an electrical discharge in a gas at low pressure. The thickness of the Crookes dark space increases as the pressure is reduced. For air it is about 0·6 cm. thick at 0·1 mm. pressure.

crook′esite (*Min.*). Selenide of copper and thallium, often with 1%-5% silver. It is massive and compact, and displays metallic lustre.

crop (*Geol.*). See **outcrop.**

crop (*Met.*). See **discard.**

crop (*Zool.*). See **proventriculus.**

crop bound (*Vet.*). A term applied to birds suffering from impaction of the crop or ingluvies.

cropped (*Bind.*) Said of the edges of a book which have been cut down to an extent that mars the appearance of the pages.

cropper (*Typog.*). A small platen printing machine.

cropping (*Met.*). The operation of cutting off the end or ends of an ingot to remove the pipe and other defects.

cropping (*Textiles*). *Cutting* (q.v.).

cropping (*Vet.*). The operation of amputating a part of the comb or wattles of birds, or of the ears of dogs.

cropping machine (*Linen*). A machine comprising spiral knives and a ledger plate, used to remove loose ends and knots from linen cloth.

cross (*Plumb.*). A special pipe-fitting having four branches mutually at right-angles; used as a junction at the intersection of two pipe lines.

cross (*Gen.*). An individual whose parents belong to different breeds or races.

cross-ampere-turns (*Elec. Eng.*). The component of the armature ampere-turns which tends to produce a field at right-angles to the main field.

cross arm (*Elec. Comm.*). The horizontal cross-member attached to telegraph poles, or power transmission line poles, for supporting the insulators which carry the conductors.

cross-axle (*Rail.*). A driving axle having cranks mutually at right-angles.

cross band (*Textiles*). A breadth of lace, such as flouncings, made across a Levers machine.

cross band, warp twist, left-hand twine (*Textiles*). Terms used in the woollen industry to indicate yarns with the twist from right to left; in the worsted trade the term is generally *left-hand twist.*

cross-bearing (*Surv.*). A check bearing taken between stations which are not adjacent to one another in the survey.

cross-blast explosion pot (*Elec. Eng.*). An explosion pot in which the pressure generated by the arc in the pot causes a stream of oil to be directed across the arc path at right-angles to it.

cross-blast oil circuit-breaker (*Elec. Eng.*). An oil circuit-breaker in which the pressure generated by the arc causes a stream of oil to be forced through ports placed opposite one pair of contacts, thereby cutting across the arc stream.

cross-bond (*Elec. Eng.*). A rail-bond for connecting together the two rails of a track or the rails of adjacent tracks.

cross-bonding (*Cables*). The sheath of Cable 1 is connected to that of Cable 2 and farther on to Cable 3. The total induced e.m.f. vanishes and there are no sheath-circuit eddies.

cross-bracing (*Eng.*, *Struct.*). See **counter-bracing.**

crossbred (*Textiles*). A term applied to wool obtained from sheep crossed in breed (long-wool lustre class and merino). The wool is coarser than merino, brighter in appearance, and crisp. Used for worsted serges, Cheviot quality woollens, and hosiery.

cross-connexion field (*Teleph.*). In a distribution frame, the space in which the flexible jumpers are accommodated.

cross-cut (*Mining*). In metal mining, a level or tunnel driven through the country rock, generally from a shaft, to intersect a vein or lode.

cross cuts (*Furs*). Cuts carried across skins.

cross-cut chisel (*Eng.*). A cold chisel having a narrow cutting edge carried by a stiff shank of rectangular section; used for heavy cuts. See **cold chisel.**

cross-cut file (*Eng.*). A file in which the cutting edges are formed by the intersection of two sets of teeth crossing each other.

cross-cutting saw (*Carp.*). A saw designed for cutting timber across the grain.

cross dyeing (*Textiles*). A method of dyeing a mixture cloth in which the warp and the weft yarns are acted on by different dyes, thus producing different shades.

cross fade (*Cinema.*). The same as *dissolve.*

cross-fertilisation (*Biol.*). The fertilisation of the female gametes of one individual by the male gametes of another individual.

cross field (*Elec. Eng.*). The component of the flux in an electric machine which is assumed to be produced by the cross ampere-turns.

cross fire (*Teleph.*). The impulse clicks in a telephone circuit, due to superposed telegraph channels.

cross-frogs (*Rail.*). See **crossings**.

cross front (*Photog.*). The sliding front carrying the lens in cameras; used to avoid the consequence of tilting the axis of a camera away from normality with an object.

cross garnet (*Join.*). A form of *strap hinge* (q.v.).

cross girders (*Eng.*). (1) Short girders acting as ties between two main girders.—(2) The members which transmit the weight of the roadway to the main girders of a bridge.

cross-grained float (*Plast.*). A float made of a piece of cross-grained wood; used in finishing corners and arrises formed in quick, hard-setting cements.

crosshair (*Surv.*). A spider's thread fixed across the diaphragm of a level or theodolite.

crosshead (*Eng.*). A reciprocating block, usually sliding between guides, forming the junction piece between the piston-rod and connecting-rod of an engine.

cross joint (*Build.*). The vertical mortar joint at the sides or back of a brick in position in a wall.

cross-lines (*Cinema.*). Lines cut on the surface of ground glass to facilitate accurate focusing of lens.

cross modulation (*Radio*). The impression of the envelope of one modulated carrier upon another carrier, due to non-linearity in the medium transmitting both carriers; may also occur in any other part of the channel.

cross-over (*Plumb.*). A special pipe-fitting with its middle length cranked out so that one pipe line may be laid across another when the two pipes are to be in the same plane.

cross-over (*Rail.*). A communicating track between two parallel lines, enabling rolling-stock to be transferred from one line to the other.

cross-overs (*Elec. Comm.*). The points at which the circuits on pole routes are changed over in transposing.

cross-over unit (*Gen.*). A 1% frequency of interchange between a pair of linked genes.

cross-pane hammer (*Tools*). A fitter's hammer the head of which has a flat striking face at one end and a blunt chisel-like edge, parallel with the shaft, at the other.

cross pollination (*Bot.*). The conveyance of pollen from an anther of one flower to the stigma of another, either on the same or on a different plant of the same species.

cross recording (*Cinema.*). The using of independently generated sounds for mixing with the primary sounds, in recording a complex shot in sound-film production.

cross seams (*Furs*). Seams carried across skins.

cross section. The section of a body (e.g. a girder or moulding) at right-angles to its length: a drawing showing such a section.

cross shake (*Timber*). A shake in cross-grained timber.

cross-sill (*Rail.*). See **sleeper**.

cross slide (*Eng.*). That part of a planing machine or lathe on which the toolholder is mounted, and across which it may be traversed at right-angles to the bed of the machine.

cross-springer (*Build.*). In a groined arch, the rib following the line of a groin.

cross staff (*Surv.*). An instrument for setting out right-angles in the field. It consists of a frame or box having two pairs of vertical slits, giving two lines of sight mutually at right-angles.

cross-stone (*Min.*). See **chiastolite**.

cross-talk (*Teleph.*). The interference caused by energy from one conversation invading another circuit by electrostatic or electromagnetic coupling. See **far-end cross-talk**, **near-end cross-talk**.—(*Radio*) Interference from an unwanted transmission.

cross-talk meter (*Teleph.*). An arrangement for measuring the attenuation between circuits which are liable to permit cross-talk.

cross-tie (*Rail.*). See **sleeper**.

cross-tie (*Weaving*). See **London tie**.

cross-ties (*Bot.*). Small veins in the leaf which run in a straight course between larger veins, giving a ladder-like appearance.

cross-tongue (*Join.*). A wooden tongue for a *ploughed and tongued joint* (q.v.), cut so that the grain is at right-angles to the grooves.

cross-tree (*Ship Constr.*). A lateral formation on a ship's mast; its uses are for rigging to top masts, hooks, tackle, etc. The term is derived from antique wooden ships.

cross weaving (*Silk*). See **gauze**.

crossed lens (*Light*). A simple lens the radii of curvature of which have been chosen to give minimum spherical aberration for parallel incident rays. For a refractive index of 1·5, the radii should be in the ratio 1 : 6, the surface of smaller radius facing the incident light.

crossed Nicols (*Light*). Two Nicol prisms arranged with their principal planes at right-angles, in which position the plane-polarised light emerging from one nicol is extinguished by the other.

crossed shed (*Weaving*). A type of shed made in gauze weaving, one thread being crossed over or under another.

crossette′ (*Build.*). A projection formed on the flank of a voussoir at the top, giving it a bearing upon the adjacent voussoir on the side towards the springing.

crossing end (*Weaving*). The end which, in gauze weaving, crosses under or over another.

crossing-over (*Cyt.*). Mutual exchanges between homologous pairs of chromosomes during maturation division.

crossings (*Rail.*). The notches made in rails to allow passage for the wheel-flanges at places where one line crosses another. Also CROSS-FROGS.

Crossopterygii, —rij′i-i (*Zool.*). A subclass of *Pisces* possessing lobate paired fins and cycloid scales. See **Dipnoi**. Some regard *Polypterus* and one or two other living forms as Crossopterygians.

crotchet (*Zool.*). A hooked or notched chaeta.

cro′tonal′dehyde (*Chem.*). $CH_3·CH:CH·CHO$, a liquid, of pungent odour, b.p. 105° C., an unsaturated aldehyde, obtained from acetaldehyde by heating with dilute hydrochloric acid or with a solution of sodium acetate. As an intermediate product *aldol* (q.v.) is formed.

croton′ic acid (*Chem.*). $CH_3·CH:CH·COOH$, an olefinic monocarboxylic acid. There are two stereoisomers, viz. crotonic acid, m.p. 71° C., b.p. 180° C.; and iso- or allo-crotonic acid, m.p. 15° C., b.p. 169° C. The first form is the *cis*-, the latter one the *trans*- form. The crotonic acids are also isomers of methacrylic acid and of vinylacetic acid.

croup (*Med.*). Inflammation of the larynx and trachea in children, associated with a peculiar ringing cough; present especially in diphtheria.

croupous inflammation (*Med.*). Inflammatory reaction characterised by an excess of fibrin in the exudate.

crowbar (*Tools*). A round iron bar, pointed at one end and flattened to a wedge shape at the other, used as a lever for moving heavy objects.

crow-step gable (*Build.*). See **corbie step gable**.

crow twill, swansdown twill (*Weaving*). Terms sometimes used to denote the 3-and-1 twill.

crown (*Bot.*). A very short rootstock.

crown (*Build., Civ. Eng.*). The highest part of an arch. Also called the VERTEX.

crown (*Paper*). A standard size of printing paper, 15×20 in. (U.S. 15×19 in.)

crown (*Zool.*). The part of a polyp bearing the mouth and tentacles: the distal part of a deer's horn: the grinding surface of a tooth: the disc and arms of a Crinoid: crest: head.

crown bar (*Civ. Eng.*). A heavy log, about 12 in. diameter and 15 ft. long, fixed along the top of a heading for a tunnel and supporting the poling boards with which the heading is lined. The crown bar is kept in position by props at each end.

crown-gate (*Hyd. Eng.*). A canal-lock head-gate.

crown glass (*Glass*). Glass of the alkali-lime-silica type, as opposed to lead glass (flint glass); used for electric-lamp bulbs. Also called SODA-LIME GLASS.

crown leather (*Leather*). A leather which is specially suited for belt laces, washers, etc. The method of manufacture somewhat resembles tawing. Also called HELVETIA LEATHER.

crown octavo (*Typog.*). A book size, 7½ × 5 in.

crown-post (*Carp.*). A *king-post* (q.v.).

crown rail-bond (*Elec. Eng.*). A rail-bond consisting of a flexible copper cable with solid terminals which are expanded into holes in the rail by means of drift pins.

crown-tile (*Build.*). An ordinary flat tile. Also called a PLANE-TILE.

crown wheel (*Eng.*). The larger wheel of a bevel reduction gear. See **bevel gearing.**

crowned (*Bot.*). (1) Bearing a terminal outgrowth such as a pappus.—(2) Having an appendage on the upper side of the leaf or petal.

croy (*Civ. Eng.*). A protective barrier built out into a stream to prevent erosion of the bank at a particular point.

crozier (*Bot.*). The young ascus when it is bent in the form of a hook.

crozzle (*Build.*). An excessively hard and misshapen brick which has been partially melted and overheated.

cruciate, cruciform (*Bot.*). Having the form of, or arranged like, a cross.

cruciate basidium (*Bot.*). A septate basidium in which the spindles of the dividing nuclei lie on a level across the basidium.

crucible (*Chem., Met.*). A refractory vessel or pot in which metals are melted. In chemical analysis, smaller crucibles, made of porcelain, nickel, or platinum, are used for igniting precipitates, fusing alkalies, etc.

crucible furnace (*Met.*). A furnace, fired with coal, coke, oil, or gas, in which metal contained in crucibles is melted.

crucible steel (*Met.*). Steel made by melting blister bar or wrought-iron, charcoal, and ferro-alloys in crucibles which hold about 100 lbs. This was the first process to produce steel in a molten condition, hence product called *cast-steel* (q.v.). Mainly used for the manufacture of tool steels, but now largely replaced by the electric-furnace process.

crucible tongs (*Chem., Met., etc.*). Tongs used for handling crucibles.

crude fibre (*Bot.*). The residues in the soil derived from the woody parts of plants.

crude oil. See **petroleum.**

cruiser stern (*Ship Constr.*). A type of ship's stern construction. It is integral with the main hull for strength and form, and is partially water-borne. It assists in manœuverability and wave formation, and provides underdeck roominess. See **counter.**

crump (*Mining*). A burst due to mechanical pressure of the ground.

crumpled (*Bot.*). See **corrugate.**

cru'or (*Zool.*). The coagulated blood of Vertebrates.

crup butt (*Leather*). Leather made from the back part of a horse hide; used for uppers of waterproof boots.

cru'ra (*Zool.*). See **crus.**

crura cer'ebri (*Zool.*). Two thick cylindrical masses of nervous matter, forming the floor of the mid-brain in Vertebrates.

crural (*Zool.*). Pertaining to or resembling a leg. See **crus.**

crure'us (*Zool.*). A leg muscle of higher Vertebrates.

crus (*Zool.*). The zeugopodium of the hind-limb in Vertebrates: the shank: any organ resembling a leg or shank.—*pl.* **crura.**—*adj.* **crural.**

crush (*Mining*). The broken condition of pillars of coal in a mine due to pressure of the strata. See **creep.**

crush breccia (*Geol.*). A rock consisting of angular fragments, often re-cemented, which has resulted from the faulting or folding of pre-existing rocks. See also **crush conglomerate, fault breccia.**

crush conglomerate (*Geol.*). A rock consisting of crushed and rolled fragments, often re-cemented; it has resulted from the folding or faulting of pre-existing rocks.

crusher gauge (*Artillery*). A steel cylinder with piston, used for measuring pressure in the bore of a gun.

crushing test (*Civ. Eng.*). A test of the suitability of stone to be used for roads or building purposes; a cylindrical specimen of the stone, 1 in. diameter and 1 in. long, is subjected to axial compression in a testing machine.

crust leather (*Leather*). The name for a light skin which, after tanning, has been shaved on the flesh side and lightly oiled on the grain side, preparatory to finishing.

crust of the earth (*Geol.*). See under **earth.**

crusta (*Zool.*). In the Vertebrate brain, a mass of nerve fibres lying on the ventral aspect of each half of the mesencephalon, lateral and ventral to the tegmentum: any hard coating.

crusta petro'sa (*Zool.*). A layer of lamellated bone covering the dentine of a tooth beyond the enamel.

Crusta'cea (*Zool.*). A subphylum of *Arthropoda* most of whose members are aquatic and breathe by gills; they possess biramous appendages; the head is not distinct from the thorax, and bears two pairs of antennae; the legs vary in number and are rarely all alike. Shrimps, Water Fleas, Barnacles, Fish Lice, Woodlice, Prawns, Lobsters, and Crabs, etc.

crustaceous (*Bot.*). (1) Forming a crust on the surface of anything.—(2) Thin, and brittle in texture.

crustose (*Bot.*). Forming a more or less interrupted crust.

crut (*Mining*). A short heading or tunnel into the face of a coal-seam.

crutch (*Horol.*). The lever or rod which transmits the impulse from the pallets to the pendulum rod. The end of the crutch may be in the form of a fork to embrace the pendulum rod, or else in the form of a pin which enters a slot in the pendulum rod.

crutching (*Vet.*). The operation of removing the wool from around the tail and quarters of sheep as a preventive of myiasis.

cry'olite or **Greenland spar** (*Min.*). Fluoride of aluminium and sodium, crystallising in the monoclinic system. It usually occurs as a vein in granite rocks, and is used in the manufacture of aluminium and white porcellanous glass.

cryoplank'ton (*Bot.*). Algae which live on the surface of snow and ice in polar regions and on high mountains.

cryoscop'ic method (*Chem.*). The determination of the molecular weight of a substance by observing the lowering of the freezing-point of a suitable solvent.

crypt (*Zool.*). A small cavity: a simple tubular gland.

cryptic coloration (*Zool.*). Protective or aggressive resemblance to some part of the environment or to another species.

crypto- (Greek *kryptos*, hidden). A prefix used in the construction of compound terms; e g. (*Zool.*) *cryptoneurous*, having a hidden nervous system, i.e. with no nervous system or with nervous system not apparent.

Cryptoceph'ala (*Zool*). A subclass of *Polychaeta* in which the body is divided into two regions, the thorax and the abdomen, distinguished by the form and arrangement of the setae; eyes and cirri are usually absent and the tentacles much reduced; the palps are much enlarged and branched, and the prostomium is hidden by the peristomium.

cryptocrystalline (*Crystal.*). Consisting of very minute crystals.

cryp'togam (*Bot.*). A plant without flowers, and often without distinct stems, leaves, and roots.—*adjs.* **cryptogam'ic, cryptogam'ous.**

cryp'tomere (*Gen.*). A genetic factor which is not seen.

cryp'tomer'ism (*Gen.*). The failure of characters to show in offspring, which nevertheless contain the corresponding hereditary *x* factors.

cryptom'eter (*Chem.*). An instrument used to determine the obliterating or hiding power, or the opacity, of paints and pigments.

cryptomito'sis (*Zool.*). A form of mitosis occurring in *Protozoa*, in which the chromatin concentrates on the equator of the spindle as a dense mass in which no chromosomes are visible.

Cryptomonadi'na (*Zool.*). An order of *Phytomastigina*, comprising forms generally with two flagella; green, yellow, brown, or colourless; rarely of amoeboid form; with a gullet or a longitudinal groove, but without a transverse groove; and having food-reserves generally of starch; without a contractile vacuole.

cryp'tophyte (*Bot.*). A plant which forms its resting buds beneath the surface of the soil.

cryp'toplasm (*Bot.*). The portion of the cytoplasm which appears to be devoid of granular contents.

cryp'torchid (*Zool.*). Said of testes which remain within the abdomen and do not descend into a scrotal sac.—(*Vet.*) An animal so affected.

cryptorhe'tic (*Zool.*). See **endocrine.**

cryptosto'ma (*Bot.*). A flask-shaped cavity in the thallus of some large brown seaweeds, containing hairs which secrete mucilage.

cryptozo'ic (*Zool.*). Living in dark places, as in holes, caves, or under stones and tree-trunks.

crystal. A body, generally solid, whose atoms are arranged in a definite pattern, the crystal faces being an outward expression of the regular arrangement of the atoms.

crystal (*Horol.*). The glass that covers the dial of a watch.

crystal boundaries (*Met.*). The surfaces of contact between adjacent crystals in a metal. Anything not soluble in the crystals tends to be situated at the crystal boundaries, but in the absence of this the boundary between two similar crystals is simply the region where the orientation changes.

crystal cell (*Television*). A form of Kerr cell using a quartz or other suitable crystal in place of the more usual nitro-benzine.

crystal control (*Radio*). Control of the frequency of a radio transmitter by means of an oscillating piezo-electric crystal, usually of quartz.

crystal detector (*Radio*). Another name for *crystal rectifier.*

crystal drive (*Radio*). A system in which oscillations of low power are generated in a crystal oscillator, being subsequently amplified up to the level requisite for transmission.

crystal face (*Crystal.*). One of the bounding surfaces of a crystal. In the case of small, undistorted crystals each face is an optically plane surface. A *cleavage face* is the smooth surface resulting from cleavage; in such minerals as mica, the cleavage face may be almost a plane surface, diverging only by the thickness of a molecule.

crystal filter (*Radio*). A band-pass filter in which the place of certain of the reactance elements is taken by piezo-electric crystals, in order to produce the very sharp frequency-discrimination characteristics necessary for short-wave single-sideband operation.

crystal gate receiver (*Radio*). A superheterodyne receiver in which one (or more) piezo-electric crystals is included in the intermediate-frequency circuits, so as to obtain a high degree of selectivity.

crystal glass (*Glass*). A glass of good quality and fine appearance, which may be 'lead crystal' or 'lime crystal.' (A somewhat misleading term since it denotes different things in different glass-making districts.)

crystal microphone (*Acous.*). The same as *piezo microphone.*

crystal nuclei (*Chem.*). The minute crystals whose formation is the beginning of crystallisation.

crystal oscillator (*Radio*). A thermionic valve oscillator in which the place of one of the resonant circuits or reactance elements is taken by a piezo-electric crystal. It is characterised by a high degree of frequency stability.

crystal oven (*Radio*). A chamber for containing a piezo-electric crystal; maintained at a very constant temperature to ensure constancy of the frequency of oscillation of the crystal.

crystal pattern (*Chem.*). See **crystallogram.**

crystal receiver (*Radio*). A simple form of radio receiver in which the incoming high-frequency currents are rectified by a crystal rectifier.

crystal rectifier (*Radio*). A point contact between a metal and a crystal (such as copper and galena), or between two crystals (such as zincite and bornite); it has marked unidirectional conductivity.

crystal sac (*Bot.*). A cell almost filled with crystals of calcium oxalate.

crystal structure. This consists of the whole assemblage of rows and patterns of atoms, which have a definite arrangement in each crystal.—(*Met.*) The arrangement in most pure metals may be imitated by packing spheres, and the same applies to many of the constituents of alloys. See **body-centred cubic structure, face-centred cubic structure, close-packed hexagonal structure.**

crystal systems (*Crystal.*). A classification of crystals based on the intercepts made on the crystallographic axes by certain planes.

crystal texture (*Crystal.*). The size and arrangement of the individual crystals in a crystalline mass.

crystal varnish (*Photog.*). A special gum varnish for protecting transparent photographic images.

crystal violet (*Chem.*). A dyestuff of the rosaniline series, hexamethylpararosaniline.

cryst'alline. Clear, transparent.—(*Bot.*) Having a shining appearance.

crystalline cone (*Zool.*). The outer refractive body of an ommatidium which is surrounded by the vitrellae.

crystalline form (*Crystal.*). The external geometrical shape of a crystal.

crystalline lens (*Zool.*). The transparent refractive body of the eye in *Vertebrata*, *Cephalopoda*, etc. It is compressible by muscles and focuses images of objects emitting light on to the retina.

crystalline liquids (*Chem.*). See **liquid crystals.**

crystalline overgrowth (*Crystal.*). The growth of one crystal round another, frequently observed with isomorphous substances. Cf. *cubic system.*

crystalline rocks (*Geol.*). These consist wholly, or chiefly, of mineral crystals. They are usually formed by the solidification of molten rock, by metamorphic action, or by precipitation from solution.

crystalline schists (*Geol.*). A group of rocks which have resulted from heat and pressure. Their structures are controlled by the prevalence of flaky crystals, like mica, and such rocks have a tendency to split in a direction parallel to these flat crystals. See **foliation, schistosity.**

crystalline solid (*Chem.*). A solid in which the atoms or molecules are arranged in a regular manner, the values of certain physical properties depending on the direction in which they are measured. When formed freely, a crystalline mass is bounded by plane surfaces (faces) intersecting at definite angles.

crystalline style (*Zool.*). In *Pelecypoda* and some *Gastropoda*, a transparent rod-shaped mass secreted by a diverticulum of the intestine; composed of protein with an adsorbed amylolytic ferment.

crystallisation (*Chem.*). The preparation of a solid, especially from solution, in the form of crystals.

crystallised (*Paint.*). Said of an enamelled or varnished surface which presents the appearance of galvanised iron.

cryst'allites (*Chem.*). Very small, imperfectly formed crystals.—(*Min.*) Minute bodies occurring in glassy igneous rocks, and marking a stage in incipient crystallisation.

crystalloblas'tic texture (*Geol.*). The description applied to metamorphic rocks which have recrystallised under conditions of directed pressure and high viscosity.

cryst'allogram (*Chem.*). A photograph of the X-ray diffraction pattern produced by a crystal.

crystallograph'ic axes (*Crystal.*). See **axes.**

crystallographic notation (*Min.*). A concise method of writing down the relation of any crystal face to certain axes of reference in the crystal.

crystallographic planes (*Met.*). Any set of parallel and equally spaced planes that may be supposed to pass through the centres of atoms in crystals. As every plane must pass through atomic centres and no centres must be situated between planes, the distance between successive planes in a set depends on their direction in relation to the arrangement of atomic centres.

crystallographic system. Any of the major units of crystal classification, embracing one or more symmetry classes.

crystallog'raphy. The study of the forms, properties, and structure of crystals.

cryst'alloid (*Bot.*). A crystal of protein, occurring in large numbers in the cells of seeds and other storage organs.

crystalloid (*Chem.*). An obsolescent term for a substance which dissolves to form a true solution.

crystallolumines'cence (*Chem.*). The emission of light during crystallisation.

crystall'otype (*Photog.*). The early name for photography on glass. See **hyalography.**

cryst'odyne (*Radio*). A type of crystal detector in which a d.c. voltage is maintained across the crystal contact.

crysto'leum (*Photog.*). A positive after it has been transferred to a glass support from its paper vehicle, and then coloured.

Cs (*Chem.*). The symbol for *caesium.*

c/s (*Elec. Comm.*). See **C.P.S.**

ctene, tēn (*Zool.*). One of the comb-plates or locomotor organs of *Ctenophora*, consisting of a row of strong cilia of which the bases are fused.

ctenidium, ten-id'i-um (*Zool.*). Generally, any comb-like structure: in aquatic *Invertebrata*, a type of gill consisting of a central axis bearing a row of filaments on either side: in *Insecta*, a row of spines resembling a comb.

cte'nocyst (*Zool.*). The aboral sense-organ of *Ctenophora.*

cten'oid (*Bot.*). Comb-like, pectinate.—(*Zool.*) Said of scales which have a comb-like free border.

Ctenophora, tē-nof'— (*Zool.*). A subphylum and class of *Coelenterata*, the members of which usually do not possess cnidoblasts, and generally show biradial symmetry; they have a system of gastrovascular canals and typically eight meridional rows of swimming plates or ctenes, composed of fused cilia. Sea Acorns, Comb-Bearers.

Cu (*Chem.*). The symbol for *copper.*

cube (*Civ. Eng.*). A paving block.

cubic system (*Crystal.*). The crystal system which has the highest degree of symmetry; it embraces such forms as the cube and octahedron.

cubical epithelium (*Zool.*). A form of columnar epithelium in which the cells are short.

cubicle-type switchboard (*Elec. Eng.*). See **cellular-type switchboard.**

cubing (*Build., etc.*). An approximate method for estimating costs of buildings. The volume of a building is multiplied by a figure known from experience to represent a fair average figure for the cost of unit volume of such building.

cu'bitals (*Zool.*). See **secondaries.**

cu'bitus (*Zool.*). In Insects, one of the primary veins of the wing.—*adj.* **cubital.**

cuboid (*Geom.*). A rectangular parallelepiped.—(*Bot.*) Cubical.

Cubomedu'sae (*Zool.*). An order of *Scyphozoa*, comprising active marine forms with four perradial tentaculocysts; there is a square manubrium, a broad pseudo-velum and other peculiar features; regular alternation of generations occurs.

cu'cullate (*Bot., Zool.*). Hood-shaped.

cu'cullus (*Zool.*). In *Ricinulei*, a wide, oval plate articulating with the anterior edge of the prosoma: in *Chelonethi*, that part of the carapace anterior to the eyes: any hood-shaped structure.—*adj.* **cucullate.**

cudbear (*Chem.*). A purplish-red powder, soluble in water, obtained from *Rochelle de Candolle* and other lichens. Used as a dye.

cue (*Cinema.*). An indication, visual or aural, for action or speech on the part of someone, during continuity.

cue light (*Cinema.*). A signal lamp, operated by a push-button (particularly by the director), for giving a cue to artists.

cue mark (*Cinema.*). The mark made by a marker light on the edge of cinematograph film as it passes through the camera, to indicate to the cutter a point of synchronisation between strips of film from different cameras and the sound camera.

cue signal (*Cinema.*). A buzzer or bell operated in a studio by the recordist; once for *get ready*, twice (*O.K.*) for *proceed*, thrice for *query*, and a long signal for stopping proceedings on account of serious error.

cuffing (*Med.*). The accumulation of white cells round a blood-vessel in certain infections of the nervous system.

cuiller, kwē-yā (*Zool.*). In some male Insecta, a spoon-like expansion at the end of a clasper.

cu'ing scale (*Acous.*). A graduated scale attached to gramophone-disc reproducers to enable the needle to be dropped into a selected groove with certainty.

cuir bouilli, cuir bouilly, kwĕr boo-yē (*Dec.*). Leather soaked in hot water and pressed into decorative moulds.

cul-de-sac (*Civ. Eng.*). A road which is stopped at one end.

cullet (*Glass*). Waste glass used with the 'batch' to improve the rate of melting and to save waste of materials.

cullet (*Jewel*). A faceted stone with small flat-top and broad base.

cullis (*Carp.*). See **coulisse.**

culm (*Bot.*). The stem of a grass or of a sedge.

culms (*Brew.*). The rootlets removed (by screening) from malt after it has been kilned; used as cattle food.

culm (*Geol.*). The name given to the rocks of Carboniferous age in the south-west of England, consisting of fine-grained sandstones and shales, with occasional thin bands of crushed coal or 'culm.'

culm (*Mining*). Anthracite dust; more accurately, anthracite which will pass through a screen with ⅛-in. holes.

culmen (*Zool.*). In Birds, the edge of the upper beak.

cul'micole (*Bot.*). Growing on stems of grasses.

culmination (*Astron.*). The highest or lowest altitude attained by a heavenly body as it crosses the meridian. *Upper culmination* indicates its meridian transit above the horizon, *lower culmination* its meridian transit below the horizon, or, in the case of a circumpolar, below the elevated pole.

cultel'lus (*Zool.*). In certain blood-sucking *Diptera*, a sword-shaped organ forming part of the mouth-parts.

cultivator (*Agric. Mach.*). A wheeled frame, horse- or tractor-drawn, fitted with two rows of strong curved teeth which enter the ploughed soil and pulverise it. The teeth are generally mounted on springs. See **grubber.**

cul'triform (*Bot.*). Shaped like a knife.

culture (*Bot., etc.*). An experimental preparation containing a micro-organism growing on a medium.

culvert (*Civ. Eng.*). Any construction providing for the free passage of water under a road or railway embankment, in cases where the latter has been laid over a ditch or stream which has not been stopped or diverted.*

Cuma'cea (*Zool.*). An order of *Peracarida*, in which the carapace is fused dorsally with the first three or four somites; the eyes are usually coalesced and sessile, and the uropods are styliform; small marine forms most of which burrow in mud.

cumarone (*Chem.*). See **coumarone.**

cumene (*Chem.*). *Iso*propyl-benzene, $C_6H_5{\cdot}CH(CH_3)_2$, b.p. 153° C.

cumulative errors (*Maths.*). See **systematic errors.**

cumulative grid rectifier (*Radio*). A thermionic valve rectifier in which the signals are applied to the grid of the valve through a condenser, shunted by a high-resistance leak. The flow of grid current which occurs each half-cycle results in a progressive depression of the mean grid potential, which in turn decreases the anode current.

cumulatively compound machine (*Elec. Eng.*). A compound-wound machine in which the series and shunt windings assist each other.

cu'mulo-nimbus (*Meteor.*). Great masses of cloud rising in the form of mountains or towers or anvils, generally having a veil or screen of fibrous texture at the top and a cloud mass similar to nimbus at the bottom. This is the type of cloud associated with thunderstorms. The top of such a cloud may reach a height of 30,000 ft.

cumulo-stratus (*Meteor.*). A cloud combination produced when a cumulus cloud spreads out on top to form a layer of strato-cumulus or alto-cumulus.

cu'mulus (*Meteor.*). Thick cloud the upper surface of which is well defined and dome-shaped and exhibits protuberances, while the base is generally horizontal.

cumulus (*Zool.*). See **corona radiata.**

cu'neate, cu'neal, cu'neiform (*Bot.*). Shaped like a wedge, and attached to something by its point.

cu'neus (*Zool.*). In some *Hemiptera*, a triangular apical portion of the corium.

cup (*Bot.*). An apothecium.

cup-and-ball (*Gas Fittings*). A universal joint of the ball-and-socket type, used in brackets and pendants.

cup chuck (*Eng.*). A lathe chuck in the form of a cup or bell screwed to the mandrel nose. The work is gripped by screws in the walls of the chuck. Also called BELL CHUCK.

cup-feed drill (*Agric. Mach.*). A drill consisting of a seed-box, mounted on a chassis, from which the seed falls by gravity into a series of chambers; it is conveyed by cups rotating on a spindle to the seed tubes, through which it drops into the shallow trenches formed by the coulters. The rate of feed can be regulated.

cup grease (*Lubricants*). See **greases.**

cup head (*Eng.*). A rivet or bolt head shaped like an inverted cup.

cup joint (*Plumb.*). A joint formed between two lead pipes in the same line by opening out the end of one pipe to receive the tapered end of the other.

cup leather (*Eng.*). A ring of leather moulded to U-section, used in hydraulic machinery to prevent leakage past plungers, etc.

cup shake (*Timber*). A shake between concentric layers. Also called RING SHAKE.

cupboard lock (*Join.*). A small lock, having a single key-operated bolt, screwed on the interior surface of a cupboard door.

cu'pel (*Met.*). A thick-bottomed shallow dish made of bone ash; used in the cupellation of lead beads containing gold and silver, in the assay of these metals.

cupellation (*Met.*). The operation employed in recovering gold and silver from lead. It involves the melting of the lead containing these metals and its oxidation by means of an air-blast.

cupid's darts (*Min.*). See **flèches d'amour.**

cu'pola (*Build.*). A *lantern* (q.v.) constructed on top of a dome.

cupola (*Geol.*). A dome-shaped offshoot rising from the top of a major intrusion.

cupola furnace (*Met.*). A shaft furnace used in melting pig-iron (with or without iron or steel scrap) for iron castings. The lining is firebrick. Metal, coke, and flux (if used) are charged at top, and air is blown in near the bottom.

cupped wire (*Met.*). Wire in which internal cavities have been formed during drawing.

cupping cell (*Bot.*). A swollen hyphal attachment formed by some fungi which parasitise other fungi; in it accumulates nutritive material derived from the host.

cuprammon'ia (*Chem.*). A solvent for cellulose, prepared by adding ammonium chloride and then excess of caustic soda to a solution of a copper salt, washing and pressing the resulting precipitate, and then dissolving it in strong ammonia.

cuprammonium (or **copper**) **rayon** (*Textiles*). Rayon made from bleached cotton linters by treatment with copper sulphate and ammonia. See **rayon.**

cupric (*Chem.*). Containing divalent copper. Cupric salts are blue or green when hydrated and are quite stable.

cuprif'erous pyrite (*Min.*). See **chalcopyrite.**

cuprite (*Min.*). Oxide of copper, crystallising in the cubic system. It is usually red in colour and often occurs associated with native copper; a common ore.

cupro-nickel (*Met.*). An alloy of copper and nickel; usually contains 15, 20, or 30% of nickel; is very ductile, and has high resistance to corrosion; used for condenser tubes, turbine blades, bullet envelopes.

cupro-uranite (*Min.*). See **torbernite.**

cuprous (*Chem.*). Containing monovalent copper. Cuprous salts generally form colourless solutions and are readily oxidised to the cupric state.

cu'pula (*Zool.*). Any dome-like structure; as the apex of the lungs, the apex of the cochlea: a small sucker.

cu'pular, cu'pulate (*Bot.*). Shaped like a little cup.

cu'pule (*Bot*). (1) A small cup-shaped outgrowth from the thallus of a liverwort, containing gemmae.—(2) A cup-shaped envelope more or less surrounding the fruit of some trees, especially obvious in the acorn.

curb (*Carp.*). A wall-plate carrying a dome at the springings.

curb (*Civ. Eng.*). A hollow timber or cast-iron cylinder used in sinking and lining a shaft or well, for which purpose it is laid over the site, and then, as earth is excavated from beneath it, the lining is built upon it and sinks with the curb. Also called CUTTING CURB, DRUM-CURB. See also **kerb.**

curb (*Mining*). A socket of wrought-iron or steel for attaching a ring hook or swivel to the end of a rope used for mine hoisting or haulage.

curb (*Vet.*). A thickening of the calcaneometatarsal ligament of the horse.

curb pins (*Horol.*). The two vertical pins attached to the index embracing the balance spring, near to the point of attachment of the outer coil. By moving the pins nearer to or farther away from the point of attachment a delicate regulation of the time of vibration of the balance is obtained.

curb-plate (*Build.*). The wall-plate supporting a dome.

curb roof (*Build.*). See **mansard roof.**

curb transmitter (*Teleg.*). A slip-operated telegraph transmitter for cable code, which reverses the sending polarity after an adjusted percentage of every signal.

curbing (*Teleg.*). In the transmission of cable-code signals over a submarine cable, the reversal of the sending polarity after a fraction of the signal period, to enhance the definition of the received signals.

curdling (*Paint.*). Thickening of varnish in the can.

cure (*Leather, etc.*). A dehydrating agent such as salt, or salts of arsenic, capable of arresting decomposition in skins and hides.

curet'tage (*Surg.*). The scraping of the walls of cavities (especially of the uterus) with a curette.

curette', curet (*Surg.*). A spoon-shaped instrument for scraping material out of cavities.

curine (*Chem.*). $C_{18}H_{19}O_3N$, an alkaloid of the quinoline group, found in curare extract obtained from various *Strychnos* species. It crystallises from benzene with one molecule of benzene, m.p. 161° C., m.p. (dry) 212° C., and forms four-sided prisms.

curing (*Chem.*). A term applied usually to a fermentation or ageing process of natural products; e.g. rubber, tobacco, etc.

curing (*Civ. Eng.*). A method of reducing the cracking of concrete on setting; the surface is kept covered for a time with damp sacks, or with damp sawdust or sand.

curing (*Leather, etc.*). The process of treating rawhides and skins with a *cure* (q.v.), to preserve them during transport or storage.

curing (*Plastics*). The chemical process undergone by a thermo-setting plastic by which the hot, liquid resin sets to a solid at the same temperature. Curing generally takes place during the moulding operation, and may require from 45 seconds to 30 minutes for its completion.

curl or **rotation** (*Elec. Eng.*). A vector of which the flux across a vanishingly small surface is equal to the *circulation* (q.v.) of the given vector round the contour of the surface.

curl yarn (*Textiles*). A yarn with curls or loops at intervals. Made by folding a fine and a coarse yarn, the coarse thread being folded slackly round the fine one. This two-fold thread is subsequently folded, in the reverse direction, with another fine thread.

curly grain (*Bot.*). A wavy pattern on the surface of worked timber due to the undulate course taken by the vessels and other elements of the wood.

current. A flow, e.g. of water, air, etc.; see senses below.

current (*Build*). The inclination at which a surface is laid in order that rain water may be carried off.

current (*Elec.*). The passage of electricity through a body by virtue of a drift of negatively charged electrons through it. Usually measured and expressed in *amperes.*

See **alternating—**
blowing—
charging—
circulating—
direct—
double—
earth—
feed—
impulsive—
ionic—
longitudinal—
loop—
marginal—
marking—
photo—
single—
space—
spacing—
thermionic—
earth currents.

current balance (*Elec. Eng.*). See **current weigher.**

current bedding (*Geol.*). The steeply inclined bedding of rocks which have been deposited in shallow water and under strong current action.

current-carrying capacity (*Cables*). The current which a cable can carry before the temperature rise exceeds a permissible value (usually 40° C.). It depends on the size of the conductor, the thermal resistances of the cable, and surrounding medium.

current circuit (*Elec. Eng.*). The electrical circuit associated with the current coil of a measuring instrument or relay.

current coil (*Elec. Eng.*). A term frequently used in connexion with wattmeters, energy meters, or similar devices, to denote the coil connected in series with the circuit and therefore carrying the main current.

current-collector (*Elec. Eng.*). The device used on the vehicles of an electric traction system for making contact with the overhead contact wire or the conductor-rail.

See **bow—**
pantograph—
plough—
shoe—
trolley system—

current density (*Elec. Eng.*). The quantity of current flowing in unit cross-sectional area of a conductor; usually expressed in amperes per sq. cm. or amperes per sq. in. In electrochemistry it is the current per unit area of the electrode surface.

current-efficiency (*Elec. Eng.*). The ratio of the mass of substance liberated in an electrochemical process by a given current to that which should theoretically be liberated according to Faraday's law.

current-fender (*Hyd. Eng.*). A protective construction to deflect a current from a bank which might otherwise be undermined by it.

current limiter (*Elec. Eng.*). A relay connected in a circuit for the purpose of giving a visible or audible indication when the current in the circuit exceeds a predetermined value.

current-limiting reactor (*Elec. Eng.*). A reactor inserted in an electric circuit in order to limit the current to a predetermined value. Usually employed for limiting short-circuit currents.

current meter (*Hyd.*). An instrument for measuring the velocity of flow of running water; it consists of a wheel which rotates under the impact of the water, the rate of revolution being recorded; this constitutes a measure of the velocity, as the instrument has previously been calibrated.

current resonance (*Elec. Eng.*). The condition when the positive reactance of a circuit is balanced by the negative reactance, so that, for a given applied potential difference, the current increases to a maximum (at the resonant frequency) as the frequency is increased from a low to a high value.

current sensitivity (*Elec. Eng.*). The magnitude of the deflection of a current-measuring instrument produced by a given change in current. The term is usually applied to galvanometers, and is then generally expressed as the deflection in mm. produced by a current of 1 micro-ampere.

current-transformer (*Elec. Eng.*). An instrument transformer for producing in its secondary circuit a current proportional to the current in the primary, the primary being connected in series with the main circuit. Sometimes called a SERIES TRANSFORMER.

See **bar-type— bushing—**

current weigher (*Elec. Eng.*). An accurate current-measuring device in which the attraction between fixed and moving coils carrying the current to be measured is balanced against the gravitational force of weights.

currents, earth (*Elec. Comm.*). See **earth currents.**

currying (*Leather*). The process of treating leather with grease mixtures to make it pliable; applied to leather intended for boot uppers, belting, harness, etc.

cursor (*Instruments*). The adjustable fiducial part of a drawing or other instrument; e.g. the moving limb of beam-compasses, and the glass slide bearing the reference line and capable of movement along a slide-rule.

cursorial (*Zool.*). Adapted for running.

cur'tail step (*Build.*). A step which is not only the lowest step in a flight but is also shaped at its outer end to the form of a scroll in plan.

curtain (*Bot.*). See **cortina.**

curtain machine (*Textiles*). A machine for weaving lace curtains. It has three sets of yarn: (1) the main warp (or ground warp); (2) the spool warp, the function of which is similar to that of weft in a woven texture; (3) the brass-bobbin yarn, which acts as a binder between the main and spool warps.

curtain wall (*Build.*). A thin wall whose weight is carried directly by the structural frame of the building, not by the wall below.

curtaining (*Paint.*). See **crawling.**

curvature (*Bot.*). A change in the general direction of an elongated plant member, due to one side growing faster than the other, or to one side containing more water than the other.

curvature (*Maths.*). A measure of the departure of a line from the straight, or a surface from the plane. The curvature of a line is the reciprocal of its radius of curvature.

curvature (*Surv.*). The difference in height at any point between the horizontal and the level lines through some other point on the earth's surface.

curvature correction (*Civ. Eng.*). A correction employed in the calculation of quantities for earthworks following a curved line in plan; the quantities are taken out as if the line were straight, and a curvature correction made to account for the fact that it is not straight.

curvature correction (*Surv.*). A correction employed in the computation of levels when long sights are used. See **curvature.**

curvature of spectrum lines (*Light*). In a spectrum produced by a prism the lines are slightly convex towards the red end. Rays from the ends of the slit are inclined at a small angle to the plane at right-angles to the refracting edge of the prism, and so suffer a slightly greater deviation than rays from the centre of the slit, appearing bent towards the violet end of the spectrum.

curvature of the field (*Photog.*). The description of a camera lens defect in which the image of a rectangular body shows curvature.

curve (*Civ. Eng.*). A railway, highway, or canal bend.

curve (*Instruments*). An instrument used by the draughtsman for drawing curves other than circular arcs. It consists of a thin flat piece of wood, celluloid, or other material, having curved edges which are used as guides for the pencil.

curve of light distribution (*Illum.*). A graph showing the relation between the luminous intensity of a light source and the angle of emission.

curve ranging (*Surv.*). The operation of setting out on the ground points which lie on the line of a curve of given radius.

curvilin'ear distortion (*Photog.*). The non-linearity, in a camera image, of straight lines in the object.

cu.-sec. (*Hyd. Eng.*). A common abbrev. for *cubic feet per second*, a unit of volumetric rate of flow.

Cushing's syndrome (*Med.*). The concurrence of obesity, hairiness, linear atrophy of the skin, loss of sexual function, and curvature of the spine, due to a tumour in the pituitary gland.

cushion (*Bot.*). The central portion of the prothallus of a fern; it is several layers of cells in thickness, and bears rhizoids and archegonia.

cushion (*Build.*). The capping stone of a pier.

cushion course (*Civ. Eng.*). A layer of sand, or sand and dry Portland cement, or mortar, spread over the foundation of a road to receive a surface of special bricks. Also called BEDDING COURSE or SUB-CRUST (the preferable term).

cushion steam (*Eng.*). The steam shut in the cylinder of a steam-engine after the closing of the exhaust valve. See **cushioning** (*Eng.*).

cushioning (*Acous.*). The use of resilient material for isolating sensitive devices, such as microphones or recorders, from the influence of external vibrations.

cushioning (*Eng.*). The compression of a small quantity of steam in a steam-engine cylinder towards the end of the exhaust stroke to assist in bringing the piston to rest at the dead-centres and minimise inertia forces.

cusp (*Bot., Zool.*). A sharp-pointed prominence, as on teeth.—*adj.* **cus'pidate.**

cut (*Cinema.*). (1) The junction between one strip of continuous film of motion-picture and the next.—(2) The signal for cameras to stop; given to technicians by the director after he has decided that the artists have finished performing for a shot.

cut (*Civ. Eng.*). The material removed to make a *cutting* (q.v.).

cut (*Eng.*). The thickness of the metal shaving removed by a cutting tool.

cut (*Hyd. Eng.*). The water-way between the pontoons of a pontoon-bridge.

cut (*Textiles*). (1) A length of warp or cloth.—(2) An alternative term for a linen lea, a length of 300 yards.

cut (*Typog.*). A *block* (q.v.).

cut-and-cover (*Civ. Eng.*). A method often adopted in the construction of underground railways at only a moderate depth, when there are streets or very valuable property overhead. A cutting is first excavated to accommodate the railway; it is then covered over to original ground-level by arching supported on side walls.

cut-and-fill (*Civ. Eng.*). A term used to describe any cross-section of highway or railroad earthworks which is partly in cutting and partly in embankment.

cut-and-mitred string (*Carp.*). A *cut string* (q.v.) which is mitred at the vertical parts of the notches in the upper surface, so that the end grain of the risers may be concealed.

cut-and-mitred valley (*Build.*). A valley formed in a tiled roof by cutting one edge of the tiles on both sides of the valley so that they form a mitre, which is rendered watertight by lead soakers bonded in with the tiles.

cut backs (*Civ. Eng.*). Blends of asphaltic bitumen with various solvents, for use at comparatively low temperatures for road surfacing.

cut edge (*Bind.*). A book edge cut clean by guillotine, giving a flat surface.

cut-in notes (*Typog.*). Notes occupying a rectangular space, set into the text at the outer edge of a paragraph.

cut-off (*Eng.*). The per-cent. of the stroke at which the admission of steam to an engine cylinder is terminated by the closing of the valve.

cut-off frequency (*Elec. Comm.*). The frequency at which the attenuation of a communication system begins to increase markedly, in comparison with the attenuation of those frequencies which are freely transmitted and which are said to lie within the pass-range. In loss-free filters, the cut-off frequencies are precise, but in practical circuits, the cut-off frequency becomes indefinite.

cut-off voltage (*Thermionics*). The negative voltage which must be applied to the grid of a thermionic valve to reduce the anode current substantially to zero; approximately equal to the anode voltage divided by the amplification factor.

cut-out (*Elec. Eng.*). A term used to denote a device for automatically opening a circuit under abnormal conditions; its use is generally confined to small circuit-breakers and fuses.

See **automatic— battery— fusible—**

cut-over (*Acous.*). The cutting through of the plane surface from one spiral to the next, in cutting waxes for disc records.

cut-over (*Teleph.*). The rapid transfer of large numbers of subscribers' lines from one exchange to another, particularly from a manual to an automatic exchange.

cut pile (*Textiles*). See under **pile.**

cut-stone (*Masonry*). A stone hewn to shape with a chisel and mallet.

cut string (*Carp.*). A string whose upper surface is shaped to receive the treads and risers of the steps, while the lower surface is parallel to the slope of the stair. Also called an OPEN STRING.

cut-up trade (*Hosiery*). The section of the hosiery trade dealing with goods made as round webbing on a circular knitting-machine; the material is afterwards cut to shape, pieces being sewn together to form the final article.

cut-water (*Civ. Eng.*). The angular edge of a bridge-pier, shaped to lessen the resistance it offers to the flow of water.

cuta'neous (*Zool.*). Pertaining to the skin.

cutch. See **catechu.**

cu'ticle (*Bot.*). A deposit of waterproof, waxy material forming the external layer of the outer walls of epidermal cells.

cuticle (*Zool.*). The epidermis: the outer layers of the integument: a non-living pellicle overlying the epidermis.

cutic'ular diffusion (*Bot.*). The passage of oxygen and of carbon dioxide through the cuticle of a plant.

cuticular transpiration (*Bot.*). The loss of water vapour from a plant through the cuticle.

cutic'ularisa'tion (*Bot.*). The development of a cuticle.

cu'tin (*Bot.*). A mixture of fatty substances which is deposited on or in the outer layer of cell walls as cuticularisation proceeds.

cutinisation (*Bot., Zool.*). The impregnation of a cell wall or of part of a cell wall with fatty substances: the formation of cutin.

cu'tis (*Zool.*). The dermis or deeper layer of the Vertebrate skin.

cutter (*Acous.*). The sapphire or diamond point which removes the thread of wax in gramophone-disc recording or in a dictaphone.

cutter (*Cinema.*). The man, usually the editor, acting under the director, who does the actual cutting and selection of the strips of film to be used in the release prints.

cutter (*Eng.*). A rotary cutting tool with multiple cutting edges on the face or the periphery; used in milling operations. See **milling machine.**

cutters (*Build.*). Bricks which are made soft enough to be cut with a trowel to any shape required, and then rubbed to a smooth face and the correct shape. Also called RUBBERS.

cutters (*Geol.*). The joints in rocks which are parallel to the dip of the strata.

cutters (*Quarrying*). See **backs.**

cutter dredger (*Civ. Eng.*). A dredger of the sand-pump or suction type (see **sand-pump dredger**) adapted to the raising of stiff clay by the addition of rapidly rotating cutters around the bottom of the pipe.

cutting (*Bot.*). A portion of a plant, usually of a stem or root, which is cut off, induced to form roots, and so serves as a means of vegetative propagation.

cutting (*Cinema.*). The last creative operation in selecting the strips of motion-picture required in the final positive, the negatives being then cut to suit before release printing.

cutting (*Civ. Eng.*). An open excavation through a hill, for carrying a highway or railroad at a lower level than the surrounding ground.

cutting or **graining** (*Soap*). A term signifying the separation of soap from the aqueous fluids and glycerol during the process of manufacture.

cutting (*Textiles*). A term used to denote the production of tufts of pile on a cloth surface, long floating threads or loops being cut by special mechanism. In the finishing of woollen fabrics it refers to the removal of loose or projecting fibres in order to secure a clear-finished surface.

cutting compound (*Eng.*). A mixture of water, oil, and soft soap, etc. used for lubricating and cooling the cutting tool in machining operations. See **coolant.**

cutting curb (*Civ. Eng.*). See **curb.**

cutting edge (*Cinema.*). A colloquialism for the demarcation between the black and transparent parts of the sound-track in variable-area sound recording on film.

cutting-gauge (*Carp.*). A tool similar to the *marking-gauge* (q.v.) but having a cutting edge in place of the pin, enabling the tool to be used for cutting thin strips of wood along the grain.

cutting iron (*Carp.*). That part of a bench plane which actually shapes the work.

cutting list (*Furn., &c.*). A list giving dimensions—sometimes with diagrams of sections—of timber required for any given work.

cutting machines (*Textiles*). (1) Machines for cutting long floating threads in velveteen and corduroy fabrics in order to produce a pile surface.—(2) In woollen manufacture, machines for removing fibre from the cloth surface in order to secure a clear finish.

cutting-over (*Furs*). The cutting-up of skins for making up into larger skins or for removing damaged parts.

cutting plane (*Carp.*). A smoothing plane.

cutting room (*Cinema.*). The department in a film studio where the cutting is done under the direction of the director.

cutting speed (*Eng.*). The speed of the work relative to the cutting tool in machining operations; usually expressed in feet per minute.

cutting stylus (*Acous.*). See **stylus.**

cutting tools (*Eng.*). Steel tools used for the machining of metals.

See **broach**
cutter
lathe tools
milling cutter
planer tools
reamer
screwing die
shaper tools
slotting tools
tap
twist drill.

cutting-up (*Foundry*). The operation of roughening the surface of a mould at a part where fresh sand is to be added, in order to assist adhesion.

cuttling (*Textiles*). The operation of folding a fabric to make it convenient to handle.

Cuvier'ian ducts (*Zool.*). In lower Vertebrates, a pair of large venous trunks entering the heart from the sides.

Cuvierian organs (*Zool.*). In *Holothuroidea*, modified branches of the respiratory trees, covered with a viscous substance which can be extruded by rupture of the body-wall, and which give rise to sticky threads which entangle an enemy.

Cy (*Chem.*). A symbol for the cyanogen radical CN—.

cy'an-, cy'ano- (Greek *kyanos*, a dark-blue substance). A prefix used in the construction of compound terms; e.g. *cyanines*, *cyanosis* (qq.v.).

cyan'amide process (*Chem.*). The fixation of atmospheric nitrogen by heating calcium carbide in a stream of the gas. Calcium cyanamide, $CaCN_2$, is thus formed, and this, on treatment with water, a little soda, and steam under pressure, yields ammonia.

cy'anates (*Chem.*). Salts containing the monovalent acid radical CNO'.

cyanhy'drins (*Chem.*). A series of compounds formed by the addition of hydrogen cyanide to aldehydes and ketones. Their general formula is $R'\cdot C(OH)(CN)\cdot R''$ and they are useful for the preparation of α-hydroxy-acids.

cyanidation vat (*Met.*). A large tank, with a filter bottom, in which sands are treated with sodium cyanide solution to dissolve out gold.

cy'anides (*Chem.*). (1) Salts of hydrocyanic acid.—(2) See **nitriles.**

cyanide hardening (*Met.*). Case-hardening in which the carbon content of the surface of the steel is increased by heating in a bath of molten sodium cyanide.

cyaniding (*Met.*). The process of treating finely ground gold and silver ores with a weak solution of sodium cyanide, which readily dissolves these metals. The precious metals are obtained by precipitation from solution with zinc.

cy'anin (*Chem.*). The colouring matter of the cornflower and the rose. It is an anthocyanin, and on hydrolysis yields cyanidin and two molecules of glucose.

cyanines (*Chem.*). A group of strongly basic blue dyes obtained by treating a mixture of the iodo-alkyl derivatives of quinoline and quinaldine with alkali. They are used as sensitisers of photographic emulsions.

cyanite (*Min.*). See **kyanite.**

cyan'ogen (*Chem.*). A very poisonous, colourless gas with a smell of bitter almonds. It is soluble in 4 volumes of water, ammonium oxalate being formed on standing. Its formula is C_2N_2, or $(CN)_2$, and it somewhat resembles the halogens in its chemical behaviour.

Cyanophy'ceae (*Bot.*). See **Myxophyceae.**

cy'anoplast (*Bot.*). A minute pigmented granule present in the cytoplasm of cells of the *Myxophyceae.*

cyano'sis (*Med.*). Blueness of the skin and the mucous membranes due to insufficient oxygenation of the blood.

cy'anotype (*Photog.*). The ferroprussiate process, familiar as blue-printing; it depends on the light reduction of a ferric salt to a ferrous salt, with production of Prussian blue on development with water.

cyanu'ric acid (*Chem.*). A tribasic, heterocyclic acid, having the formula $H_3C_3N_3O_3$.

cya'thiform (*Bot.*). Deeply cup-shaped.

cya'thium (*Bot.*). The inflorescence characteristic of spurges. It consists of a number of bracts surrounding a group of staminate flowers each consisting of a single stamen, with a central pistillate flower of a stalked tricarpellary ovary. The whole simulates a flower of peculiar appearance.

cyathozo'oid (*Zool.*). In *Salpida* and *Pyrosomatida*, the primary zooid arising from an ovum, which gives rise, by budding, to the secondary zooids.

cyc-arc welding (*Elec. Eng.*). An arc-welding process for attaching studs, etc. to steel plates; an arc is drawn between the stud and the plate, and the two are then pressed together to complete the weld.

cyclanes (*Chem.*). A synonym for *cyclo*paraffins, or polymethylenes, hydrocarbons containing saturated carbon rings.

cycle. A series of occurrences in which conditions at the end of the series are the same as they were at the beginning. Usually, but not invariably, a cycle of events is recurrent.

cycle (*Acous.*). The complete variation of particle-motion or sound-pressure in a sound-wave of a single frequency or of a continuously repeated stable wave-form.

cycle (*Elec. Eng.*). The complete series of changes in a periodically varying quantity, e.g. an alternating current, during one period. Sometimes called a COMPLETE CYCLE.

cycle film (*Cinema.*). A short length of motion-picture, usually of a scientific and diagrammatic character, with the ends joined together so that projection produces a continuous cyclic presentation. Also called BAND FILM.

cycle of erosion (*Geol.*). The definite course of development followed in landscape evolution; it consists of the major stages of youth, maturity, and old age.

cycles per second (*Elec. Comm.*). The number of complete repetitions, in one second, of an alternating voltage or current in an electric circuit; the standard measure of frequency. See **KC.P.S., MC.P.S., hertz.**

cyclic (*Bot.*). Having the parts arranged in whorls, not in spirals.

cyclic compounds (*Chem.*). Closed-chain or ring compounds consisting either of carbon atoms only (carbocyclic compounds), or of carbon atoms linked with one or more other atoms (heterocyclic compounds).

cycli'tis (*Med.*). Inflammation of the ciliary body of the eye.

cy'clo- (Greek *kyklos*, circle). A prefix used in the construction of compound terms; e.g. *cyclocoelic* (q.v.).

cyclo- **(*Chem.*).** Containing a closed carbon chain or ring.

***cyclo*hexane** (*Chem.*). C_6H_{12}, m.p. 2° C., b.p. 81° C., sp. gr. 0·78, a colourless liquid, of mild ethereal odour.

***cyclo*hexanol** (*Chem.*). $C_6H_{11}\cdot OH$, m.p. 15° C., b.p. 160° C., sp. gr. 0·945, an oily, colourless liquid.

***cyclo*hexanone** (*Chem.*). Keto-hexamethylene, b.p. 154°-156° C., sp. gr. 0 945, a colourless liquid, of acetone-like odour, solvent for cellulose lacquers.

***cyclo*paraffins** (*Chem.*). See **cyclanes.**

***cyclo*pentane** (*Chem.*). See **pentamethylene.**

cyclocoe'lic (*Zool.*). Having a spirally coiled intestine.

cyclogram (*Elec. Eng.*). The figure produced on the screen of a cyclograph.

cyclograph (*Elec. Eng*). An instrument in which a beam of light or cathode rays is made to move under the action of two controlling forces at right-angles to each other, thereby producing a closed figure (cyclogram) on the screen.

cyclogyro (*Aero.*). An aircraft depending for its support in the air on the air reaction of rotors power-driven on horizontal axes.

cycloid. The curved path traced out by a point on the circumference of a circle which rolls along a straight line.

cycloid (*Psychiatry*). A periodic state of alternating moods, swinging from depression to exhilaration; accompanied by a social extraverted type of personality. It occurs in the *pyknic* (q.v.) type of individual and is a normal disposition; in its extreme form this state may develop into a manic depressive psychosis, or insanity.

cycloid (*Zool.*). Evenly curved; said of scales which have an evenly curved free border.

cycloidal teeth (*Eng.*). Gear-wheel teeth whose flank profiles consist of cycloidal curves. See **cycloid.**

cyclom'eter. A revolution counter calibrated in miles or kilometres, driven by the wheel of a pedal bicycle to record the distance travelled.

Cyclomya'ria (*Zool.*). See **Doliolida.**

cyclone (*Meteor.*). A depression of small area but considerable pressure gradient, in which the winds attain hurricane force and often do much damage. Cyclones occur, principally towards the end of hot seasons, round the western borders of the great oceans.

cyclone (*Mining*). (1) A conical dry-air classifier for air-sizing finely powdered material.—(2) A dust extractor.

cyclope'an (*Build.*). A name given to ancient dry-masonry works in which the stones are colossal and are irregular in size.

cyclople'gia (*Med.*). Paralysis of the ciliary muscle.

cy'clopoid larva (*Zool.*). A larval type of certain *Hymenoptera* which bears a superficial resemblance to the nauplius larva of *Crustacea.*

cycloram'a (*Cinema.*). The portion of dome, usually plastered white, which is erected at the back of a stage in a theatre, and on which light effects, such as clouds, are projected.

cyclo'sis (*Biol.*). The circulation of protoplasm within a cell.

cyclosper'mous (*Bot.*). Having the embryo coiled round the endosperm.

cyclospon'dylous (*Zool.*). Showing partial calcification of cartilaginous vertebral centra in the form of concentric rings.

cyclothy'mia (*Med.*). See **manic-depressive psychosis.**

cy'clotron (*Thermionics*). An arrangement of two dees in the field of a powerful magnet, in which a beam of electrons is constrained to move in a spiral and is also continuously accelerated by the alternating high-frequency potential applied to the dees.

Cydippid'ea (*Zool.*). An order of *Tentaculata* the members of which are spherical or cylindrical in form, and possess two tentacles, retractile into sheaths.

cye'sis (*Obstet.*). Pregnancy.

cylinder. A solid of uniform cross-section which may be generated by a straight line moving round a closed curve and remaining parallel to a given direction (the *axis*). What is usually understood by the word is a right circular cylinder for which the closed curve is a circle whose plane is perpendicular to the axis of the cylinder.

cylinder (*Eng.*). The tubular chamber in which the piston of an engine or pump reciprocates; the internal diameter is called the *bore,* and the piston-travel the *stroke.*

cylinder barrel (*Eng.*). The wall of an engine cylinder, as distinct from the cylinder itself, which term includes the head or covers.

cylinder bit (*Carp.*). A steel drill with helical cutting edge, used for precise boring.

cylinder bore (*Eng.*). See **cylinder** (*Eng.*).

cylinder caisson (*Civ. Eng.*). A caisson formed of hollow cylindrical cast-iron sections arranged one on top of another, so that there is always one above water-level, while the bottom one is a special cutting section. As excavation proceeds within the cylinder, the loaded sections sink, and when they have reached a sufficient depth, the cylinder is filled with concrete.

cylinder cover (*Eng.*). The end cover of the cylinder of a reciprocating engine or compressor.

cylinder-dried (*Paper*). Paper which has been dried by being passed over heated cylinders.

cylinder escapement (*Horol.*). A frictional-rest escapement in which the balance is mounted on a hollow cylinder, and a tooth of the escape wheel gives impulse to the balance by pressing against the lips of the cylinder, the action being that of a wedge. The escape wheel is locked by the tip of the tooth pressing against the outside or inside of the cylinder. The teeth of the escape wheel are mounted on 'stalks' and stand at right-angles to the plane of the wheel. To admit the entry of the teeth into the cylinder, about one-half of the cylinder is cut away where the teeth enter. Also known as HORIZONTAL ESCAPEMENT.

cylinder head (*Eng.*). The closed end of the cylinder of an internal-combustion engine; it may be either integral with the barrel or detachable, and sometimes carries the valves.

cylinder oils (*Lubricants*). Dark or red oils with high viscosity, suitable for use in steam and internal-combustion engine cylinders. See **machinery oils, lubricants.**

cylinder press (*Typog.*). (1) A proofing press in which pressure is applied by means of a rolling cylinder.—(2) A general term used to distinguish cylinder printing machines from hand presses and rotary machines.

cylinder top (*Furn.*). A semicircular cover to a desk, etc., sliding in a groove.

cylinder wrench (*Plumb.*). See **pipe wrench.**

cylindrical. Elongated, and circular in cross-section.

cylindrical gauge (*Eng.*). A length gauge of cylindrical form whose length and diameter are made to some standard size. See **gauge.**

cylindrical grinding (*Eng.*). The operation of accurately finishing cylindrical work by a high-speed abrasive wheel. The work is rotated by the headstock of the machine and the wheel is automatically traversed along it under a copious flow of coolant.

cylindrical lens (*Photog.*). A lens cut in the shape of a segment of a cylinder, i.e. a shape generated by a straight line moving parallel to itself and tracing an arc of a circle on a normal plane. Used to obtain a line image, as in sound recording on film or in reproducing from a sound track.

cylindrical record (*Acous.*). The Edison-type of gramophone record, in which the reproducing needle traverses a spiral (helical) record on its surface.

cylindrical rotor (*Elec. Eng.*). A rotor of an electric machine in which the windings are placed in slots around the periphery, so that the surface is cylindrical.

cylindrical winding (*Elec. Eng.*). A type of winding used for core-type transformers; it consists of a single coil of one or more layers wound concentrically with the iron core; it is usually long compared with its diameter.

cylin'drite (*Min.*). A complex sulphide of lead, tin, antimony, which has a cylindrical habit. The crystal system is not known for certain.

cylin'droscope (*Photog.*). A cylindrical apparatus for viewing naturally panoramic photographs taken with a rotating camera.

cy'ma (*Arch.*). A much-used moulding showing a reverse curve in profile. Also called an OGEE.

cyma recta (*Arch.*). A cyma which is concave at the top and convex at the bottom.

cyma reversa (or **inversa**) (*Arch.*). A cyma which is convex at the top and concave at the bottom.

cym'biform (*Bot.*). Shaped like a boat.

cymbium (*Zool.*). In some male Spiders, the cup-shaped tarsus of the pedipalpus, containing the palpal organ.

cyme (*Bot.*). An inflorescence in which the main axis ends in a flower, and in which subsequent flowers are produced at the ends of lateral axes or of successive branches from these.—*adj.* **cymose.**

cy'mene (*Chem.*). $CH_3{\cdot}C_6H_4{\cdot}CH(CH_3)_2$, *iso*propyl-*p*-methylbenzene, b.p. 175° C.

cymom'eter (*Radio*). An early form of wavemeter, comprising a helix surrounded by an adjustable tube. Resonance is indicated by the glowing of a neon lamp connected to the helix.

cy'mophane (*Min.*). A variety of the gem-mineral *chrysoberyl* which exhibits chatoyancy; sometimes known as CHRYSOBERYL CAT'S EYE or ORIENTAL CAT'S EYE.

cy'moscope (*Radio*). An obsolete term for any detector of electric oscillations.

cynop'odous (*Zool.*). Having non-retractile claws; as dogs.

cyphel'la (*Bot.*). A small cup-shaped hollow in the under surface of the thallus of some lichens.

cyphonau'tes (*Zool.*). A ciliated pelagic larval form of ectoproct *Polyzoa*, possessing a bivalve shell.

cypress knee (*Bot.*). A vertical upgrowth from the roots of the swamp cypress. It is very loose in structure, and acts as a pneumatophore.

cyp'sela (*Bot.*). A one-seeded fruit, formed from a syncarpous, inferior ovary.

cyst-, cysto- (Greek *kystis*, bladder). A prefix used in the construction of compound terms; e.g. *cysticolous* (q.v.).

cyst (*Zool.*). A non-living membrane enclosing a cell or cells: any bladder-like structure, as the gall-bladder or the urinary bladder of Vertebrates: a sac containing the products of inflammation.—*adjs.* **cystic, cystoid, cystiform.**

cysteine, sis'te-ēn (*Chem.*). $HS{\cdot}H_2C{\cdot}CH(NH_2){\cdot}COOH$, an amino-acid containing sulphur. Cysteine is a thio-serine, the disulphide of which is cystine.

cysten'chyma (*Zool.*). A form of parenchyma occurring in Sponges, characterised by vesicular vacuolate cells, closely packed or embedded in a gelatinous matrix.

cys'tencyte (*Zool.*). One of the cells composing a cystenchyma in Sponges.

cystic (*Zool.*). Pertaining to the gall-bladder: pertaining to the urinary bladder.

cystic adenoma (*Med.*). An adenoma containing numerous cysts.

cysticer'coid (*Zool.*). A bladderworm of which the bladder is but slightly developed and may possess a tail-like appendage.

cysticerco'sis (*Med.*). Infection with cysticerci, a form of larval tapeworm.

cysticer'cus (*Zool.*). A bladderworm possessing a well-developed bladder, with one scolex.

cystic'olous (*Zool.*). Cyst-inhabiting.

cystid'ium (*Bot.*). A swollen, elongated, sterile hypha, occurring among the basidia of the hymenium of some *Hymenomycetae*, and usually projecting beyond the general surface of that hymenium.

cysti'tis (*Med.*). Inflammation of the bladder.

cystoa'rian (*Zool.*). Said of gonads (such as those of most *Neopterygii*) which are enclosed within coelomic sacs. Cf. *gymnoarian.*

cys'tocarp (*Bot.*). The body which forms after fertilisation in the red algae.

cys'tocele (*Med.*). Hernia of the bladder.

cys'tocyte (*Zool.*). See **cystencyte.**

cysto'genous (*Zool.*). Cyst-forming: cyst-secreting.

cysto'lith (*Bot.*). A stalked mass of calcium carbonate and organic material, present in some plant cells.

cyston (*Zool.*). A dactylozooid specialised for excretion.

cys'toscope (*Surg.*). An instrument for inspecting the interior of the bladder.

cystos'copy (*Surg.*). The inspection of the interior of the bladder with a cystoscope.

cystoso'rus (*Bot.*). A group of sporangia formed after the division of a single protoplast.

cys'tospore (*Bot.*). An encysted zoospore.

cystos'tomy (*Surg.*). Surgical formation of an opening in the bladder.

cystot'omy (*Surg.*). Incision into the bladder.

cystova'rian (*Zool.*). Having the ovaries enclosed in coelomic pouches, and therefore in the form of hollow sacs; e.g. in teleostean Fish.

cystozooid, —zō'id (*Zool.*). In *Cestoda*, the bladder or tail portion of a bladderworm. Cf. *acanthozooid.*

cyt-, cyto- (Greek *kytos*, hollow, cell). A prefix used in the construction of compound terms; e.g. *cytolymph* (q.v.).

cy'tarme (*Zool.*). In experimental embryology, flattening of cells against one another.

cy'tase (*Bot., Zool.*). A general term for an enzyme able to break down cellulose.

cytas'ter (*Cyt.*). An *aster* (q.v.) which lies distant from the nucleus in the cytoplasm.

cyt'isine (*Chem.*). $C_{11}H_{14}ON_2$, an alkaloid of unknown constitution, obtained from the seeds of *Cytisus laburnum.* It crystallises in large rhombic prisms, m.p. 153° C., b.p. 218° C. (2 mm.); soluble in water, alcohol, chloroform, insoluble in ether or benzene. Cytisine is extremely poisonous for human beings, causing nausea, convulsions, and death by asphyxiation.

cyto-architecton'ic (*Med.*). Pertaining to the disposition of cells in a tissue.

cytochoris'mus (*Zool.*). In experimental embryology, partial separation of cells after one division and prior to the next division.

cy'tochrome (*Chem.*). A group of *haemochromogens** (q.v.) very widely distributed in living cells and of great importance in cell oxidations, acting as intermediate hydrogen carriers.

cy'tode (*Biol.*). A mass of protoplasm without a nucleus.

cytodiae'resis (*Cyt.*). See **mitosis.**

cytog'amy (*Cyt.*). Conjugation or union of cells. See **conjugation.**

cytogen'esis (*Cyt.*). The formation and development of cells.

cyto'genous (*Biol.*). Cell-forming, cell-producing; as certain kinds of lymphatic tissue.

cytokine'sis (*Cyt.*). Cell-division.

cytolis'thesis (*Zool.*). In experimental embryology, sliding or rotary movement of cells over one another.

cytol'ogy (*Biol.*). The study of the structure, functions, and reproduction of cells.

cy'tolymph (*Cyt.*). The fluid part of cytoplasm; cell-sap.

cytol'ysin (*Cyt.*). Any substance which will cause *cytolysis* (q.v.).

cytol'ysis (*Cyt.*). Dissolution of cells.

cy'tome (*Cyt.*). The whole of the chondriosomes present in a cell.

cytomi'crosomes (*Cyt.*). See **mitochondria.**

cytomorpho'sis (*Cyt.*). The series of changes accompanying the development and specialisation of an individual cell and its subsequent decline, or the comparable series of changes in successive generations of cells in the same line of descent.

cy'ton (*Zool.*). The cell-body of a neurocyte. Cf. *axon.*

cytophar'ynx (*Zool.*). In some *Ciliophora*, an oespohagus-like tube leading from the cytostome into the endoplasm.

cy'toplasm (*Cyt.*). The protoplasm of a cell, apart from that of the nucleus. Cf. *nucleoplasm.*

cytoplas'mic inheritance (*Gen.*). The transmission of hereditary characters by means of the cytoplasm, instead of by the nucleus.

cytoplasmic stain (*Biol.*). A stain which shows up the cytoplasm and cytoplasmic structures of a cell, as opposed to the nucleus.

cy'toproct (*Zool.*). In unicellular or non-cellular animals, an opening or weak spot in the ectoplasm and pellicle, by which indigestible residues are discharged; a potential anus.

cy'topyge, —pīj (*Zool.*). In *Ciliophora*, the potential anus, a pore or weak spot in the cuticle through which indigestible residues are defecated.

cy'tosine (*Chem.*). 2-One-6-aminopyrimidine, obtained by the hydrolysis of certain nucleic acids.

cy'tosome (*Cyt.*). The whole of the cytoplasm of a cell.

cy'tostome (*Zool.*). In some *Ciliophora*, the cell-mouth, an aperture in the ectoplasm which opens into the cytopharynx.

cytotax'is (*Cyt.*). Rearrangement of cells as a result of stimulation.

cytotaxon'omy (*Bot.*). A scheme of classification based on information gained by a study of cell structure.

cytotro'phoblast (*Zool.*). The inner layer of the trophoblast.

cytotro'pism (*Cyt.*). Reaction or response to the stimulus of mutual attraction between two cells.

cytozo'ic (*Zool.*). Intra-cellular, living within a cell.

cyt'ula (*Zool.*). A fertilised ovum.

D, Δ, δ

d- (*Chem.*). Abbrev. for *dextro-rotatory*.

[**d**] (*Light*). A line in the blue of the solar spectrum, having a wavelength of 4378·720 A.; due to iron.

D (*Chem.*). The symbol for *deuterium*, heavy hydrogen, ^{2}H.

[**D**] (*Light*). A group of three Fraunhofer lines in the yellow of the solar spectrum. [D_1] and [D_2], wavelengths 5896·357 and 5890·186 A , are due to sodium, and [D_3], wavelength 5875·618 A , to helium.

D and P (*Photog*) Mass-production development and printing of photographs for amateur photographers.

D-layer (*Radio*). A layer or region of absorbing ionisation considered to exist as a consequence of particle radiation from hydrogen bursts from the sun, bringing about complete inhibition of short-wave communication but some improvement in long-wave communication. See **Dellinger fade-out.**

D lines (*Light*). See [**D**].

D slide-valve (*Eng.*). A simple form of slide-valve, in section like a letter D, sliding on a flat face in which ports are cut. See **slide-valve.**

δ- (*Chem.*). Substituted on the fourth carbon atom of a chain.

Δ- (*Chem.*). A prefixed symbol which signifies a double bond beginning on the carbon atom indicated.

Δ connexion (*Elec. Eng.*). See **delta connexion.**

dabbers, gaggers, prods (*Foundry*). Projections cast into the surface of a *loam plate* (q.v.) to hold and reinforce the mould.

dabbing (*Masonry*). See **daubing.**

dabrey (*Rubber*). A small shallow tray in which latex exuding from the balata tree is collected.

dac'ryo- (Greek *dakryon*, tear). A prefix used in the construction of compound terms; e.g. *dacryo-adenitis* (q.v.).

dacryo-adenitis, dacry-adenitis (*Med.*). Inflammation of the lacrimal gland.

dacryocysti'tis (*Med.*). Inflammation of the lacrimal sac.

dac'ryops (*Med.*). A cystic swelling at the place where the upper lid meets the eyeball, due to blockage of a lacrimal duct.

dactyl (*Zool.*). A digit.—*adj.* **dac'tylar.**—*prefix* **dactylo-.**

dac'tyline, dac'tyloid (*Bot.*). Spreading like outstretched fingers.

dactyli'tis (*Med.*). Inflammation of a finger or of a toe.

dactylop'odite (*Zool.*). In some *Crustacea*, the fifth or distal joint of the endopodite of the walking-legs or maxillipeds.

dac'tylopore (*Zool.*). In *Hydrocorallinae*, an opening in the common skeleton through which a dactylozooid protrudes.

dactylop'terous (*Zool.*). Having the anterior rays of the pectoral fins free and unattached by membrane to the rest of the fin, as in the Gurnards.

dactylozo'oid (*Zool.*). In colonial *Hydrozoa*, a hydroid person specialised for catching prey and for defence of the colony; usually with one or more long tentacles richly provided with stinging-cells, and no mouth. Also called PALPON.

dadding (*Mining*). The utilisation or circulation of the ventilating current so as to dilute and render harmless any inflammable and noxious gases which are found in the mine.

da'do (*Arch.*). One of the faces of the solid block forming the body of a pedestal.—(*Join.*) A border around the lower part of the wall of a room.

dado capping (*Join.*). The name given to the dado rail when the dado occupies as much as two-thirds of the height of the room.

dado rail (*Join*). The moulding capping the dado in a room and separating it from the upper part of the walls. Also called SURBASE.

daeda'leous (*Bot.*). A term applied to an irregularly wrinkled, plaited surface.

dagger (*Typog.*). The second in order of the reference marks (†). Placed before a person's name it signifies 'died' or 'dead.'

daggings or **dags** (*Textiles*). Wool that has formed in clots through adhesion of soil and dung.

daguerreotype, da-ger'o-tip (*Photog.*). The mercury-vapour development of silver iodide and bromide supported on a copper plate, the resulting amalgam being fixable with cyanide or hypo.

D.A.H. (*Med.*). Abbrev. for *disordered action of the heart*. See **effort syndrome.**

dailies. The same as *rushes* (q.v.).

Dailygraph (*Acous.*). A magnetic recording and reproducing machine, for attachment to telephones.

da'is (*Build.*). A raised platform at one end of a room or hall.

Dakota Sandstone (*Geol.*). A widespread continental sandstone, largely of Cenomanian age, which marks the retreat of the sea from parts of the U.S.A. at the end of Comanchean times.

Dalra'dian Series (*Geol.*). A very thick and variable succession of sedimentary and volcanic rocks which have suffered regional metamorphism, occurring in the Scottish Highlands approximately between the Great Glen and the Highland Boundary fault. Referred to the Pre-Cambrian System, and commonly placed between the Moinian below and the Torridonian above, though the evidence of relative age is not entirely convincing.

Dalton's atomic theory (*Chem.*). States that matter consists ultimately of indivisible, discrete particles (atoms), and atoms of the same element are identical; chemical action takes place as a result of attraction between these atoms, which combine in simple proportions. It has since been found that atoms of the same element may have different weights. See **isotopes.**

Dalton's law (*Chem.*). See **law of multiple proportions.**

Dalton's law of partial pressures (*Chem., Phys.*). The pressure of a gas in a mixture is equal to the pressure which it would exert if it occupied the same volume alone at the same temperature.

Daltonism (*Med.*). See **colour blindness.**

dam (*Civ. Eng.*). An embankment or other construction made across the current of a stream.—(*Mining*) (1) A retaining wall or bank for water.—(2) An air-tight barrier to isolate underground workings which are on fire.

dam'ask (*Textiles*). (1) A silken material, of satin and sateen weaves, in which background and figure have a contrasting effect; used mainly for furnishings.—(2) A linen cloth of damask texture, used for tablecloths and towellings; also a cotton cloth of like character, used for tablecloths; both fabrics are reversible.

dam'askeen. Inlay of metal, or ivory and mother-of-pearl, on metal.

dammar (*Chem.*). A copal or gum produced by 'dammar' trees: white dammar by *Vateria Indica*; black dammar by *Dammara officinalis*; kauri gum by *Dammara Australis*. Used, *inter alia*, for making special varnishes in photographic work.

damp (*Mining*). A general term for gases, other than air, found in coal-mines.

See **after—**
black—
choke—
fire—
stink—
white—

damp-proof course (*Build.*). A layer of impervious material, such as slate or bituminous sheeting, built into a wall 6 in. to 9 in. above ground-level, so as to prevent moisture from the foundations rising in the walls by capillary attraction. Vertical damp courses are also used in suitable cases.

damp-proofing (*Build.*). The process of coating a wall with a special preparation to prevent moisture from getting through.

damped oscillation (*Elec. Comm.*). An electrical or mechanical oscillation in which there is an appreciable diminution of oscillation amplitude during successive cycles, e.g. oscillations produced in an oscillatory circuit by a spark discharge.

damped waves (*Radio*). Electromagnetic waves radiated from a damped oscillatory circuit.

damper (*Acous.*). A vibration-absorbing pad for reduction of the transmission of vibrational energy from a disturbing source.

damper (*Elec. Eng.*). A mass of metal, or a short-circuited winding, placed on a machine in such a way as to tend to oppose any changes in the angular velocity, i.e. to prevent hunting. It is also sometimes used on the moving part of an indicating instrument. Also called AMORTISSEUR, DAMPER WINDING, DAMPING GRID, DAMPING WINDING.

damper (*Eng.*). (1) An adjustable iron plate or shutter fitted across a boiler flue to regulate the draught.—(2) A device for damping out torsional vibration in an engine crankshaft, the energy of vibration being dissipated frictionally within the damper. See **vibration dampers.**

damper weight (*Eng.*). A counterweight used to balance the weight of a damper in a boiler flue.

damper winding (*Elec. Eng.*). See **damper.**

damping (*Elec. Comm., etc.*). The extent of reduction of amplitude of oscillation in an oscillatory system, due to energy dissipation; e.g. friction and viscosity in a mechanical system, and resistance in an electrical system. With no supply of energy, the oscillation dies away at a rate depending on the degree of damping. The effect of damping is to increase slightly the period of the vibrations. It also diminishes the sharpness of resonance for frequencies in the neighbourhood of the natural frequency of the vibrator. See **logarithmic decrement.**

See also **critical—**
magnetic—
specific—

damping (*Paper*). Paper is sometimes subjected to *damping* by contact with a wet cylinder to enable it to take a smoother finish.

damping, degree of (*Elec. Comm.*). See **degree of damping.**

damping down (*Eng.*). The retarding of the rate of combustion in a boiler furnace by covering the fire with fine coal sprinkled with water.—(*Met.*) The temporary stopping of a blast-furnace, by closing all apertures by which air could enter.

damping factor (*Elec. Comm., etc.*). Same as *decay factor* (q.v.).

damping grid (*Elec. Eng.*). See **damper.**

damping magnet (*Elec. Eng.*). A permanent magnet used to produce damping by inducing eddy currents in a metal disc or other body; sometimes employed on indicating instruments.

damping-off (*Bot.*). A disease which attacks and kills seedlings growing crowded together under wet conditions, the seedlings falling over and rotting. It is usually caused by species of the oömycetous fungus *Pythium*.

damping-up (*Furs*). The operation of damping skins prior to stretching on shapes.

damping winding (*Elec. Eng.*). See **damper.**

dan (*Mining*). (1) A tub or barrel for conveying water from a dip place (not reached by a pumping arrangement) for discharge into a pump lodge or a pit sump.—(2) A small box or sledge sometimes used in thin seams to convey coals from distant points to the trains or tubs in the roadway.

dan'burite (*Min.*). A rare accessory mineral, occurring in pegmatites as yellow orthorhombic crystals. Chemically, danburite is a calcium borosilicate, $CaB_2Si_2O_8$.

dancing step (*Build.*). A step intermediate between a flier and a winder, having its outer end narrower in plan than its inner end. Also called BALANCED STEP.

dandy roll (*Paper*). A wire-gauze cylinder which comes in contact with paper when in the web stage. It impresses the ribs in laid paper, also any watermark required.

dangerous structure (*Build.*). A structure certified by a local authority to be in a dangerous condition.

Daniell cell (*Elec. Eng.*). A primary cell consisting of a zinc anode dipping into zinc sulphate solution, and a copper cathode dipping into copper sulphate solution. The electrolytes are kept apart by a porous pot. See also **Callaud cell.**

Daniell hygrometer (*Phys., etc.*). A form of dew-point *hygrometer* (q.v.), now obsolete, in which dew is formed on the surface of a bulb containing ether which is cooled by evaporation into another bulb, itself cooled by the evaporation of ether on its outer surface.

dant (*Mining*). Soft sooty coal found in face and back slips or cleats: fine slack coal.

danty (*Mining*). Broken coal.

dapping (*Carp.*). The operation of cutting notches in the construction of timber bridges.

darby (*Plast.*). A *derby float* (q v.).

darg (*Mining*). (1) A specified day's work.—(2) A task, or a fixed quantity of coal, agreed to be produced per shift for a certain price.

Darimont cell (*Elec. Eng.*). A double-fluid primary cell with zinc and carbon electrodes, an electrolyte of calcium carbonate and sodium chloride, and a depolariser of ferric chloride.

dark current (*Photo-electric Cells*). The current which flows in a photo-electric cell when not illuminated.

dark oils (*Lubricants*). The term applied to oils intended for rough lubrication; e.g. colliery tram oils; usually residues of crude oils.

dark resistance (*Photo-electric Cells*). The resistance of a selenium or other photo-resistance cell in the dark.

dark room (*Photog.*). The enclosure for handling photo-sensitive materials so that they may not become fogged. Complete darkness is not usually necessary, provided indirect illumination, not actinic to the emulsions, is used during the time they are exposed.

dark seed (*Bot.*). A seed which will germinate only if kept in the dark at the time when other conditions make germination possible.

dark slide (*Photog.*). The carrier for plates to be exposed in cameras, loaded in the dark room and uncovered, after attachment to the camera, by withdrawing a slide.

darks (*Furs*). The term applied to skins with dark-coloured hair.

Darley Dale stone (*Build.*). A yellowish-brown sandstone containing mica flakes, quarried at Darley Dale in Derbyshire; used for general building work.

D'Arsonval galvanometer (*Elec. Eng.*). A galvanometer having a suspended current-carrying coil in a permanent magnetic field.

dart (*Horol.*). See **safety finger.**

dart (*Zool.*). Any dart-like structure; e.g. in certain Snails, a small pointed calcareous rod which is used as an incentive to copulation: in certain *Nematoda*, a pointed weapon used to obtain entrance to the host.

dart sac (*Zool.*). In some *Gastropoda*, a saccular gland, surrounded by muscles, which opens into the vagina and secretes the *dart* (q.v.).

Dartmoor granite (*Build.*). A grey porphyritic granite used in heavy construction. In the geological sense, *Dartmoor granite* comprehends the Armorican granitic complex of Dartmoor, Devon; only a part is porphyritic.

Dartmouth Slates (*Geol.*). A thick series of purple and green slates, typically developed in S. Devon and referred to the local base of the Devonian System.

Darwinian theory (*Biol.*). See **natural selection.**

dash (*Typog.*). See **em rule.**

dash pot (*Eng.*). A device for damping out vibration; it consists of a piston attached to the part to be damped, fitting loosely in a cylinder of oil. Vibrational energy is absorbed in fluid friction.

dasypae'des (*Zool.*). Birds which when hatched have a complete covering of down. Cf. *altrices.*

dasyphyl'lous (*Bot*). (1) Having crowded leaves.—(2) Having thick leaves.—(3) Having leaves bearing a thick coat of woolly hairs.

date line (*Geog*). An imaginary line on the earth's surface for the purpose of fixing the change of date, without ambiguity, for all travellers; it runs approximately along the meridian of longitude 180° from Greenwich, deviating round certain groups of islands for local convenience.

dative bond (*Chem.*). See **semi-polar bond.**

dat'olite (*Min.*). A hydrated silicate of boron and calcium occurring as a secondary product in amygdales and veins, usually as distinct prismatic monoclinic crystals.

da'tum (*Surv.*). An assumed level surface used as a reference surface for the measurement of reduced levels. See **ordnance datum.**

daubing (*Masonry*). The operation of dressing a stone surface with a special hammer so as to cover it with small holes.—(*Plast.*) A rough-stone finish given to a wall by throwing a rough coating of plaster upon it. See **rough-cast.**

daughter (*Biol.*). Offspring belonging to the first generation, whether male or female; as *daughter-cell, daughter-nucleus, daughter-chromosome.*

D.A.V.C. (*Elec. Comm.*). Abbrev. for *delayed automatic volume control* (q.v.).

davenport (*Furn.*). A pedestal desk with sloping top.

Davis apparatus. A respiratory apparatus specially designed to permit escape from a pressure equalising chamber in a submarine. Oxygen is breathed from a chamber which, embracing the wearer, gives him buoyancy and assists his rise to the surface.

davy (*Mining*). The name of the safety lamp invented by Sir Humphry Davy in 1815.

day (*Astron.*). APPARENT SOLAR DAY, the interval, not constant owing to the earth's elliptic orbit, between two successive transits of the true sun over the meridian.—MEAN SOLAR DAY, the interval, perfectly constant, between two successive transits of the mean sun across the meridian.—SIDEREAL DAY, the interval between two successive transits of the 1st Point of Aries over the meridian; also, neglecting the very small effect of precession, the interval between two successive transits of the same fixed star; the period of the earth's rotation on its axis.

day (*Build.*). The distance between successive mullions in a window.

day (*Mining*). In mining, generally a period of eight hours for work on the three-shift system, or twenty-four hours if referring to the output or to machinery.

day bed (*Furn.*). A low lounge with sloping head rest.

daylight (*Photog.*). The average colour of sky and sun at noon, corresponding to a colour temperature of 6500 K.

daylight, artificial (*Illum.*). See **artificial daylight.**

daylight factor (*Illum.*). The ratio of the illumination measured on a horizontal surface inside a building to that which obtains at the same time outside the building, due to an unobstructed hemisphere of sky. Occasionally called WINDOW EFFICIENCY RATIO.

daylight lamp (*Illum.*). A lamp giving light having a spectral distribution curve similar to that of ordinary daylight.

daylight mantle (*Illum.*). A gas mantle impregnated with special material so that the light emitted approximates to daylight.

day position (*Bot.*). The posture of the leaves during the day in plants which change the position of their leaves as night comes on.

day sleep (*Bot.*). The folding together of the leaflets of a compound leaf when exposed to bright light, bringing together the surfaces which bear most of the stomata, and doubtless imposing a check on the rate of loss of water from the plant.

daywork (*Civ. Eng.*). A method of valuing work on the basis of the time spent by the workmen, the materials used, and the plant employed.

dazzle, acoustic. See **acoustic dazzle.**

DB., db. (*Elec. Comm*). The abbrev. for *decibel* (q v.).

d.c., D.C. (*Elec. Eng.*). A commonly used abbrev. for *direct current.*

d.c. amplifier (*Elec. Comm.*). A thermionic amplifier which amplifies frequencies efficiently, including zero frequency.

d.c. balancer (*Elec. Eng.*). An assembly of one or more direct-current machines, used to equalise the voltages between the sides of a multi-wire d.c. distribution system.

d.c. coupling (*Elec. Comm.*). Intervalve coupling which permits full amplification of direct currents. See **direct (d.c.) coupling.**

d.c. electrolytic condenser (*Elec. Comm.*). An electrolytic condenser which has oxide films formed on both aluminium electrodes, so that it has a large effective capacity for either polarity. So called because it is used in d.c. mains radio-receivers which might have the wrong polarity applied to their supply circuit.

d.c. electromagnetic generator (*Elec. Eng.*). A generator for producing direct currents. Also called a DYNAMO.

d.c. motor (*Elec. Eng.*). An electric motor for operation by direct current.

d.c. resistance (*Elec. Eng.*). The resistance which a circuit offers to the flow of a direct current. Also called TRUE (or OHMIC) RESISTANCE.

d.c. testing of cables (*Cables*). The application of a d.c. voltage of five times the r.m.s. of the working a.c. voltage. Cables which have considerable tracking and are likely to break down in service are broken down by the d.c.; healthy cables are not affected.

d.c. (*Typog.*). An abbrev. for (1) *double column*; (2) *double crown*; (3) *double cap* (i.e. double foolscap).

d.c.c. (*Elec. Eng.*). A commonly used abbrev. for *double-cotton covered.*

D.C.F. (*Carp.*). Abbrev. for *deal-cased frame.*

ddt. (*Civ. Eng., etc.*). Abbrev. for *deduct.*

deactivation (*Chem.*). The return of an activated atom, molecule, or substance to the normal state. See **activation** (*Chem.*).

dead (*Acous.*). An enclosure which has a period of reverberation much smaller than usual for its size and audition requirements. Applied to sets in motion-picture production.

dead (*Build.*). Said of materials which have deteriorated.

dead (*Elec. Eng.*). Said of electric circuits which are not connected to any source of supply.

deads (*Mining*). Valueless broken ground which has to be removed in the course of underground work in a mine.

dead angle (*Eng.*). That period of crank angle of a steam-engine during which the engine will not start when the stop-valve is opened; due to the ports being closed by the slide-valve.

dead axle (*Eng.*). An axle which does not rotate with the wheels carried by it. Cf. *live axle*.

dead bank (*Eng*). A stoker-fired boiler furnace from which the coal feed is shut off, the fire being allowed to burn back as far as possible without going out entirely.

dead-beat (*Elec. Eng.*). A term applied to an instrument or other oscillating system when it is critically damped, i.e. when, after receiving some disturbing impulse, it takes up its final position without any oscillations and in the minimum time.

dead-beat escapement (*Horol.*). An escapement in which there is no 'recoil' to the escape wheel. The dead-beat action is obtained by making the locking faces of the pallets arcs of circles, struck from the pallet staff as centre. This escapement is the one used for regulators, and is capable of giving very accurate results.

dead-centre (*Eng*). (1) Either of the two points in the crankpin path of an engine at which the crank and connecting-rod are in line and the piston exerts no turning effort on the crank. See **inner** (or **top**) **dead-centre, outer** (or **bottom**) **dead-centre.**—(2) A lathe centre. See **tail-stock.**

dead-centre lathe (*Eng.*). A small lathe (used in instrument-making) in which both centres are fixed, the work being revolved by a small pulley mounted on it.

dead coil (*Elec. Eng.*). A coil in the winding of a machine which does not contribute any e.m.f. to the external circuit, because it is short-circuited or disconnected from the rest of the winding. See also **dummy coil.**

dead colouring (*Paint.*). The first coat of colour, on which finishing coats are later to be applied.

dead door (or **window**) (*Build.*). The same as *blank door* (or *window*) (q.v.).

dead earth (*Elec. Eng.*). A connexion between a normally live conductor and earth by means of a path of very low resistance.

dead end (*Plumb.*). The length of pipe between a closed end and the nearest connexion to it, forming a 'dead' pocket in which there is no circulation.

dead end (*Radio*). The unused portion of an inductance coil in an oscillatory circuit.

dead-end effect (*Radio*). The increase in effective resistance of an inductance coil due to currents circulating in the unused end-turns shunted by their self-capacity.

dead-end switch (*Radio*). A multi-point switch arranged to short-circuit the unused end-turns of an inductance coil.

dead-end tower (*Elec. Eng.*). See **terminal tower.**

dead-ended feeder (*Elec. Eng.*). See **independent feeder.**

dead eye (*Naut., etc.*). (1) A sheaveless block used in setting up rigging.—(2) A light type of bearing for supporting a spindle; it may consist merely of a hole in a sheet of metal or other material.

dead finish (*Paint.*). See **flat finish.**

dead floor (or **wall**) (*Build.*). A floor (or wall) which absorbs sound.

dead flue (*Build.*). A flue which is bricked in at the bottom.

deadground (*Mining*). Ground devoid of values: ground not containing veins or lodes of valuable mineral: a barren portion of a coal-seam.

dead head (*Eng*). (1) A projecting shank on a casting, formed by the metal which filled the pouring hole or riser.—(2) The fixed headstock of a machine tool.

dead knot (*Timber*). A knot which is partially or wholly separated from the surrounding wood.

dead level (*Build.*). A strong term for *absolutely level*.

dead load (or **weight**) (*Struct.*). The permanent loading on a structure, imposing definite fixed strains upon it; it consists of the weight of the structure itself and the fixed loading carried by it. Cf. *live load*.

dead-load safety-valve (*Eng., etc.*). See **dead-weight safety-valve.**

dead lock (*Join.*). A lock the bolt of which is key-operated from one side and handle-operated from the other.

dead-man's handle (*Elec. Eng.*). A form of handle commonly used on the controllers of electric vehicles; designed so that if the driver releases his pressure on the handle, owing to sudden illness or other causes, the current is cut off and the brakes applied.

dead matter (*Typog*). Type which has been used and is awaiting distribution.

deadmen (*Civ. Eng*). The concrete, plate, or other anchorage for land ties.

dead points (*Eng.*). See **dead-centre.**

dead roasting (*Met.*). Roasting carried out under conditions designed to reduce the sulphur content to the lowest possible value. Distinguished from *partial roasting* and *sulphating roasting*.

dead segment (*Elec. Eng.*). A commutator segment which is not connected, either for accidental reasons or for a definite purpose, to the armature winding associated with the commutator.

dead shore (*Carp.*). A vertical timber post used to prop up temporarily any part of a building.

dead short (*Elec. Eng.*). A commonly used expression to denote an electrical short-circuit of very low resistance.

dead-smooth file (*Eng.*). The smoothest grade of file ordinarily used, having 70 to 80 teeth to the inch for files of average length; used for finishing surfaces.

dead sounding (*Build.*). *Pugging* (q.v.).

dead spots (*Acous.*). Locations in an enclosure where the sound-wave intensity is relatively low because of interference, or because the sound-waves are focused by curved surfaces at other locations.

dead water (*Eng.*). (In a boiler or other plant) water not in proper circulation.

dead weight (*Ship Constr.*). The difference, in tons, between a ship's displacement at load draught and light draught. It comprises cargo, bunkers, stores, fresh water, etc.

dead weight (*Struct.*). See **dead-load.**

dead-weight pressure-gauge (*Eng.*). A device in which fluid pressure is measured by its application to the bottom of a vertical piston, the resulting upward force being then balanced by applying weights to the upper end; used for calibrating Bourdon gauges.

dead-weight safety-valve (*Eng., etc.*). A safety-valve in which the valve itself is loaded by a heavy metal weight; used for small valves and low pressures. See **safety-valve.**

dead-well (*Civ. Eng.*). An *absorbing well* (q.v.).

deadening (*Build.*). (1) The operation of roughening a surface, so as to give it a dead finish.—(2) *Pugging* (q.v.).

de-aerator (*Eng.*). A vessel in which boiler feed water is heated under reduced pressure in order to remove dissolved air.

deaf aid (*Acous.*). A device used by a deaf person to improve audition of external sounds; either in the form of an acoustic amplifier (collector), such as a small trumpet, or in the form of a microphone-receiver combination, with or without amplifier.

deaf-mute. A person who can neither speak nor hear, the former incapacity usually arising from the latter.

deafening (*Build.*). *Pugging* (q.v.).

deafness (*Acous.*). Lack of sensitivity of hearing in one or both ears, with consequent increase in the threshold of minimum audibility, measurement of which is useful in diagnosis.

deal (*Timber*). A piece of timber of width from 9 to 11 in., and thickness from 2 to 4 in.

deal frame (*Carp.*). A reciprocating sawing machine having several parallel saws moving together in a frame; used for cutting deals into thinner boards.

dealbate, dē-al′bāt (*Bot.*). Whitened, usually by a coating of hairs.

Dean and Stark apparatus (*Chem.*). An apparatus for determining the water content of oils. It consists of a distillation flask, a reflux condenser, and a graduated tube attached to the condenser, in which the water is collected and prevented from running back into the distillation flask.

deassimila′tion, dē-a— (*Bot.*). The utilisation of food by the plant.

death (*Biol.*). In a cell or an organism, complete and permanent cessation of the characteristic activities of living matter.

death point (*Biol.*). The lethal maximum or minimum limit of any particular factor in the external or internal environment beyond which an organism or cell cannot live; as the temperature above which an organism will die.

death ray. A type of radiation which, it is supposed, would kill human beings when projected from a distance.

debacle, débâcle, dā-bak′l′ (*Meteor.*). The breaking up of the surface ice of great rivers in spring.

débridement, dā-brēd-mahn^g (*Surg.*). The removal of foreign matter and excision of infected and lacerated tissue from a wound.

De Broglie waves, —brol′yē (*Phys.*). Waves in the ether associated with moving electrons. Their wavelength is given by the equation $\lambda = \sqrt{\frac{150}{u}} \times 10^{-8}$ cm., where u is the electron velocity expressed in volts. See **electron diffraction.**

debunching (*Thermionics*). The tendency for dispersion in a beam of electrons, or in a velocity-modulated beam of electrons, because of their mutual repulsion. In the gas cathode ray tube the maintenance of focus arises from relatively static positive ions in the path of the beam counteracting debunching. See **buncher** and **bunching.**

Debye and Sherrer method, de-bī′ (*Crystal.*). A method of X-ray crystal analysis applicable to powders of crystalline substances or aggregates of crystals.

Debye-Hückel theory (*Chem.*). A theory of electrolytic conduction which assumes complete ionisation and attributes deviations from ideal behaviour to inter-ionic attraction.

decade. The time period of ten years. Cf. *dekad.*

decahy′dro-naphthalene (*Chem.*). $C_{10}H_{18}$, b.p. 190° C. (770 mm.), product of the complete hydrogenation of naphthalene under pressure and in the presence of a catalyst.

decalage, dek-a-lazh′ (*Aero.*). The angle between the two chords of the upper and lower wings in the plane parallel to that containing the longitudinal and vertical axes of an aeroplane.

decalcification (*Med.*). The process of absorption of lime salts from bone.

decales′cence (*Met.*). The absorption of heat that occurs when iron or steel is heated through the critical points. See **recalescence.**

dec′androus (*Bot.*). Having ten stamens.

dec′aploid (*Cyt.*). Having ten times the haploid number of chromosomes.

Decapo′da (*Zool.*). (1) An order of *Eucarida* in which the first three thoracic appendages are modified as maxillipedes; they show immense variety of external form and structure; nearly all are free-living marine forms, but a few occur on land and in fresh waters. Shrimps, Prawns, Lobsters, Crayfishes, Hermit Crabs, True Crabs.—(2) An order of *Dibranchia* having eight normal arms and two longer partially retractile arms; the suckers are pedunculate, there is a well-developed internal shell, and lateral fins are present; actively swimming forms, usually carnivorous. Squids and Cuttlefish.

decapsulation (*Surg.*). Surgical removal of the capsule or covering of an organ, especially of the kidney.

decarbonising (*I.C. Engs.*). The process of removing the solid carbon deposited on the internal surfaces of the combustion chamber and the piston crown of an internal-combustion engine.

decarburisation (*Met.*). Removal of carbon from the surface of steel by heating in an atmosphere in which the concentration of decarburising gases exceeds a certain value.

dec′astyle (*Arch.*). A portico having ten columns.

decatising (*Textiles*). A process for giving a permanent finish to worsted and woollen fabrics by forcing steam through them while under tension.

decay (*Timber*). A decomposition of timber by fungi and/or other agents.

decay constant (*Phys.*). The ratio of the rate of disintegration of a radioactive substance to the amount of the substance left unchanged. If λ is the decay constant, N_0 the original amount of substance, and N the amount left after time t, then $N = N_0\epsilon^{-\lambda t}$.

decay factor (*Elec. Comm., etc.*). The factor expressing the rate of decay of oscillations in a damped oscillatory system, given by the natural logarithm of the ratio of two successive amplitude maxima divided by the time interval between them. Calculated from the ratio of the resistance coefficient to twice the mass in a mechanical system, and the ratio of the resistance to twice the inductance in an electrical system. Also called DAMPING FACTOR. See **logarithmic decrement.**

decay period (*Phys.*). See **half-life.**

deceleration (*Mech.*). The rate of diminution in the speed of a vehicle or moving part; measured in feet per sec. per sec.

decem- (Latin *decem*, ten). A prefix used in the construction of compound terms; e.g. *decemfid*, cut into ten parts or segments.

decer′ebrate (*Zool.*). Having had the cerebral hemispheres removed: lacking a cerebrum.

decerebrate tonus (*Zool.*). A state of reflex tonic contraction of certain skeletal muscles following upon the separation of the cerebral hemispheres from the lower centres.

dech′enite (*Min.*). A rare mineral usually occurring in nodular aggregates; chemically, vanadate of lead.

deci-ampere balance (*Elec. Eng.*). An ampere-balance having a range from 0·1 to 10 amperes.

decibel (*Elec. Comm.*). The unit of power-level difference, measured by $10 \log_{10} W_2/W_1$, where W_2 is a power controlled by W_1. Used as a measure of response in all types of electrical communication circuits. See **bel.**

decibel meter (*Elec. Comm.*). A meter which has a scale calibrated approximately uniformly in logarithmic steps and labelled with decibel units; used for determining the relative power-levels in communication circuits.

decid'ua (*Zool.*). In Mammals, the modified mucous membrane lining the uterus, at the point of contact with the placenta, which is torn away at parturition and subsequently ejected; the afterbirth; the maternal part of the placenta.

decidua reflexa (*Zool.*). In certain Mammals, as the Hedgehog, a capsule surrounding the embryo formed by the maternal mucous membrane.

decid'uate (*Zool.*). Said of Mammals in which the maternal part of the placenta comes away at birth. Cf. *indeciduate.*

deciduo'ma malig'num (*Med.*). See **chorion-epithelioma.**

decid'uous (*Bot.*). Falling off, usually after a lengthy season of growth and functioning, generally before cold or drought sets in.—(*Med.*) Falling off; said of the teeth of the first dentition.

decimal. The name for a system of units of which each unit is ten times the next smaller one, as in *decimal coinage, decimal weights.*

decimal candle (*Light*). See **bougie décimale.**

decimal fraction. A fraction having a power of ten as denominator. The denominator is not usually written but is indicated by the decimal point, a dot placed between the unit figure and the numerator. The number of figures after the decimal point is equal to the power of 10 of the denominator. Thus 42·017 is equal to $42\frac{17}{1000}$.

decimetre waves (*Radio*). A term sometimes applied to electromagnetic radiation having a wavelength of the order of ten centimetres. See also **centimetre waves, microwaves.**

decimo octavo (*Print.*). See **eighteenmo.**

decimo sexto (*Print.*). A sheet of paper folded into sixteen leaves, usually called 'sixteenmo.'

deci-neper (*Elec. Comm.*). The unit of voltage and current attenuation in lines and amplifiers, of magnitude one-tenth of the *neper* (q.v.).

decinormal calomel electrode (*Chem.*). A calomel electrode containing decinormal potassium chloride solution.

decinormal solution (*Chem.*). A standard solution which is one-tenth as concentrated as a normal solution. See **normal solution.**

deck (*Ship Constr.*). A platform which forms the ceiling of one horizontal division of a ship and the floor of that immediately above.

See **awning—**
boat—
hurricane—
lower—
main—
orlop—
promenade—
shelter—
upper—

deck beam (*Ship Constr.*). A stiffening member of a deck, which may be either transverse or longitudinal. It is supported at extremities by knee connexions to frames or bulkheads or by supporting girders.

deck bridge (*Civ. Eng.*). A bridge in which the track is carried by the upper stringer. Cf. *through bridge.*

deck crane (*Ships*). A crane consisting usually of one of a series of derricks attached to a mast and worked by a winch; used for loading and unloading.

deck forge (*Ships*). A portable forge used by riveters and smiths on board ship.

deck stringer (*Ship Constr.*). The main strength portion of a ship's deck, being that portion, on both sides, adjacent and attached to the shell plating. It comprises the stringer strake of plating and the stringer angle section forming such attachment.

deck watch (*Horol.*). A precision watch for use on board ship. It is carried in a box, or may be worn in the pocket.

decking (*Build.*). The platform supporting the derrick on a derrick tower gantry.

deckle edge (*Paper*). The feathery edge of hand-made paper due to the 'deckle' or mould frame. In machine-made paper it can be formed by artificial means.

deckle straps (*Paper*). Rubber straps, at the sides of a paper-making machine, which form a deckle edge on the paper.

declared efficiency (*Elec. Eng.*). The efficiency which the manufacturers of an electric machine or transformer declare it to have, under certain specified conditions.

dec'linate (*Bot.*). Descending in the form of a curve.

declination (*Astron.*). The angular distance of a heavenly body from the celestial equator measured, positively northwards, as an arc of the great circle perpendicular to the celestial equator and passing through the body and the celestial poles.

declination (*Surv., etc.*). The angular deviation of a magnetic compass, uninfluenced by local causes, from the true north and south. The declination varies at different points on the earth's surface and at different times of the year. Also called MAGNETIC DECLINATION, MAGNETIC VARIATION.

declination circle (*Astron.*). (1) The great circle passing through the celestial poles and through a heavenly body and cutting the celestial equator at right-angles.—(2) The graduated circle of an equatorial telescope on which declinations are read.

declining (*Bot.*). Straight, and pointing downwards.

declinom'eter (*Elec. Eng.*). An instrument for making accurate measurements of the angle between the magnetic and geographic meridians.

decoction (*Med.*). A medicine prepared by boiling.

decohe'rer (*Radio*). A device for restoring a *coherer* (q.v.) to its sensitive, non-conducting condition after the arrival of a signal. Also called ANTI-COHERER. See also **tapper.**

decolla'tion (*Zool.*). The dropping off of the upper whorls of a gastropod shell, when the animal has ceased to occupy them.

décollement, dā-kol-mahn^{g} (*Surg.*). The separation of an organ from tissue to which it adheres.

decolorate, decoloured (*Bot.*). Without colour.

decolorisers (*Glass*). Materials added for the express purpose of improving the appearance of the glass by hiding the yellow-green colour due to iron impurities. Actually they increase the total absorption of light by the glass and cannot be satisfactorily employed if more than a certain amount of iron is present.

decompensation (*Med.*). Failure of a diseased heart which has previously maintained its strength although diseased.

decomposed (*Bot.*). The condition of the cortex of a lichen when composed of gelatinous hyphae.

decomposed (*Zool.*). Not touching; as the barbs of a feather when they are not in contact.

decomposition (*Chem.*). The more or less permanent breaking down of a molecule into simpler molecules or atoms.

decomposition voltage (*Elec. Eng.*). The minimum voltage which will cause continuous electrolysis in an electrolytic cell.

decompound (*Bot.*). A term applied to a compound leaf having leaflets made up of several distinct parts.

decompounding winding (*Elec. Eng.*). A series winding on a compound-wound d.c. generator, connected in such a way that the m.m.f. produced by it is in opposition to that of the shunt winding. Also called a DIFFERENTIAL WINDING.

decompression (*Surg.*). Any procedure for the relief of pressure or of the effects of pressure.

deconjugation (*Cyt.*). The separation of the chromosomes before the end of the prophase of meiosis.

decorative lighting (*Illum.*). Lighting used for decorative effect rather than for providing useful illumination.

decor'ticated (*Bot.*). Deprived of bark: devoid of cortex.

decortication of the lung (*Surg.*). Operative removal from the lung of pleura thickened as a result of chronic inflammation.

de-coupling (*Elec. Comm.*). Reduction of common impedance between the input and output circuits of a source of gain (such as a thermionic valve), so that a tendency for oscillation or a distortion of the response curve of the circuit is obviated. See **stopper.**

dec'rement (*Radio*). Abbrev. for *logarithmic decrement* (q.v.).

decrem'eter (*Radio*). An instrument for measuring decrement. It consists essentially of a resonant circuit whose response to a damped impressed e.m.f. has been previously calibrated in terms of the decrement.

decu'bitus (*Med.*). The posture of a patient lying in bed.

decumbent (*Bot.*). Lying flat, except for the tip, which ascends.

decurrent (*Bot.*). (1) (Of a leaf) having the base prolonged down the stem as two wings.—(2) (Of the gills of an agaric) running for some distance down the stipe.

decurved (*Bot.*). Bent downwards.

decus'sate (*Bot.*). With leaves in pairs, each pair being at right-angles to the pair above and below

decussa'tion (*Zool.*). Crossing over of nerve-tracts with interchange of fibres.

deden'dum (*Eng.*). The radial distance from the pitch circle of a gear-wheel to the bottom of the spaces between teeth.

dedifferentiation (*Biol.*). Retrogressive changes in a differentiated tissue, leading to the reduction of all types of cells to a common indifferent form.

dedol'omitisa'tion (*Geol.*). The recrystallisation of a dolomite rock or dolomitic limestone consequent on contact metamorphism; essentially involving the breaking down of the dolomite into its two components, $CaCO_3$ and $MgCO_3$. The former merely recrystallises into a coarse calcite mosaic; but the latter breaks down further into MgO and CO_2. The magnesium oxide may occur in the rock as periclase, more commonly as brucite, while in the presence of silica magnesium silicates such as forsterite are formed. See **forsterite marble.**

deductive reasoning. The mental process whereby an unobserved fact is inferred from relevant observations of other facts.

dee (*Thermionics*). The half-hollow cylinder employed in the cyclotron, in which a spiral beam of electrons is continuously accelerated, thereby increasing their energy.

deep bead (*Join.*). A piece of timber covering the lower 3 inches or so of movement of the bottom sash in a window, so as to permit of ventilation at the meeting rail while keeping the bottom of the window to all intents and purposes shut.

deep drawing (*Met.*). The process of cold-working or drawing sheet or strip metal by means of dies into shapes involving considerable plastic distortion of the metal; e.g. automobile mud-guards, electrical fittings, etc.

deep-sea deposits (*Geol.*). Those sediments which accumulate out of reach of ordinary land-derived material; they fall into two categories—(1) organic oozes, (2) various muds and clays. In the shallower parts of the oceans the oozes are composed of the hard parts of planktonic organisms embedded in a powder arising from their disintegration. In the deeper parts the remains of siliceous organic remains are dominant. Information regarding the nature and distribution of these oozes and the red clay of the ocean deeps has been obtained during the explorations by the *Challenger* and other vessels. See **red clay, diatom ooze, pteropod ooze, globigerina ooze, radiolarian ooze.**

deep-sea lead (*Surv.*). A lead used for attachment to a lead-line measuring beyond 100 fathoms.

deep well (*Civ. Eng.*). A shaft sunk through an upper impermeable stratum into a lower permeable one, from which a supply of water may be obtained.

deep-well pump (*Eng.*). A centrifugal pump, generally electrical-driven by a submerged motor built integrally with it, placed at the bottom of a deep bore hole for raising water.

Deepkill Shales (*Geol.*). The graptolite-shale facies of the Beekmantown Group in the Hudson River valley, equivalent to the Arenig Series of Britain.

deeps (*Surv.*). The intervening unmarked fathoms on a lead-line carrying *marks* (q.v.) at irregular intervals; e.g. at 2, 3, 5, 7, 10 fathoms, etc.

deer-fly fever (*Vet.*). See **tularaemia.**

defaecation, defecation. The ejection of faeces from the body.

defenders (*Acous.*). See **ear defenders.**

def'erent (*Astron.*). See **epicycle.**

deferves'cence (*Med.*). The fall of temperature during the abatement of a fever: the period when this takes place.

defibrination (*Med.*). Removal of fibrin, e.g. from the blood.

deficiency (*Cyt*). The loss of a portion of a chromosome.

deficiency disease (*Med.*). Any disease resulting from the deprivation of food substances (e.g. vitamins) necessary to good health.

deficient (*Struct.*). See **unstable.**

definite (*Bot.*). (1) Ending in a flower and ceasing to elongate.—(2) Said of an inflorescence with all its branches of limited growth; the same as *cymose*.—(3) Always of the same number in any one species.

definite proportions (*Chem.*). See **law of constant (or definite) proportions.**

definite time-lag (*Elec. Eng.*). A time-lag fitted to relays or circuit-breakers to delay their operation; it is quite independent of the magnitude of the current causing that operation. Also called CONSTANT TIME-LAG, FIXED TIME-LAG, INDEPENDENT TIME-LAG.

definite variation (*Bot.*). A change taking place in a definite direction in the history of a race.

definition (*Acous.*). The clarity of perception of speech sounds, particularly the transient sounds. Acoustic definition depends largely on the ratio of the direct intensity to the reverberant intensity, when an enclosure is considered.

definition (*Photog.*). See **depth of definition.**

definition (*Television*). The extent to which a television or photo-telegraphic system is capable of reproducing the detail of the transmitted image. Generally defined as the number of picture elements, or the number of scanning lines, into which the picture is divided.

definitive (*Zool.*). Final, complete: fully developed: defining or limiting.

def′lagrating spoon (*Chem.*). A small spoon-shaped instrument used in chemical laboratories for handling materials which are liable to take fire when exposed to air.

deflagra′tion (*Chem.*). Sudden combustion, generally accompanied by a flame and a crackling sound.

deflection (*Eng., Struct.*). (1) The amount of bending or twisting of a structure or machine part under load.—(2) The movement of the hand of any recording instrument.

deflection angle (*Surv.*). The angle between one survey line and the prolongation of another survey line which meets it. See also **intersection angle.**

deflectional sensitivity (*Cathode Ray Tubes*). The linear displacement of the fluorescent spot produced by a P.D. of one volt between the deflector plates, or by a current of one ampere in the deflector coils in the case of magnetic deflection.

deflectom′eter (*Eng.*). A device for measuring the amount of bending suffered by a beam during a transverse test.

deflector (*Elec. Eng.*). See **arc deflector.**

deflector coil (*Cathode Ray Tubes*). A coil so arranged that a current passing through it produces a magnetic field which deflects the beam in a cathode ray tube employing magnetic deflection.

deflector plates (*Cathode Ray Tubes*). Electrodes so arranged in a cathode ray tube that the electrostatic field produced by a difference of potential between them deflects the beam. See also **electrostatic deflection.**

deflexed (*Bot.*). Bent outwards and downwards.

defor′meter (*Struct.*). An instrument used, in the mechanical determination of stresses, to impose a known distortion upon a model of a structure.

degassing (*Thermionics*). The final stage in the evacuation process in the manufacture of thermionic valves. The electrodes are raised to a temperature higher than that which they will meet in use, to drive off occluded gases, which are then removed by the pump.

degaussing (*Elec. Eng.*). Neutralisation of the magnetisation of a mass of magnetic material, e.g. a ship, by an encircling current-carrying conductor.

degeneration (*Bot.*). The loss of morphological or physiological characters by a fungus kept in culture for a long time.

degeneration (*Biol.*). Evolutionary retrogression; the process of returning from a higher or more complex state to a lower or simpler state.

degeneration (*Radio*). See **negative feed-back.**

degenerative amplifier (*Elec. Comm.*). A thermionic amplifier for wide frequency bands and minimised amplitude distortion, these results being obtained by reversed or negative retroaction.

deglutit′ion (*Zool.*). The act of swallowing.

deglutition pneumonia (*Med.*). Pneumonia induced as a result of aspiration into the lungs of food or drink, or of matter from the nose or throat.

degradation (*Chem.*). (1) The conversion of a complex alkaloid molecule into simpler, easily recognisable fragments.—(2) The conversion of a saccharose into one with one less carbon atom in the molecule.

degrains (*Gloves*). These are made from the skins of sheep, gazelles, reindeer, or mocha, dressed on the grain side after the grain has been removed.

deg′ras or moellen (*Oils*). (1) A semi-oxidised fat expressed from sheep skins after the oiling process and forming a by-product in the manufacture of chamois leather; from it, when purified, *lanolin* (q.v.) is obtained.—(2) A similar manufactured substance, commonly known as *sod oil.*

degreasing (*Metal Finishing*). Removal of grease, usually by an organic solvent, from the surface of metals before electroplating, enamelling, etc.

degree (*Heat*). The unit of temperature difference. It is usually defined as a certain fraction of the fundamental interval, which for most thermometers is the difference in temperature between the freezing and boiling points of water. See **Centigrade scale, Fahrenheit scale.**

degree of a curve (*Surv.*). The angle subtended at the centre of a curve by a standard chord length of 100 ft.

degree of damping (*Elec. Comm.*). The extent of the damping in an oscillatory system, expressed as a fraction or percentage of that which makes the system critically damped.

degree of dissociation (*Chem.*). The fraction of the total number of molecules which are dissociated.

degrees of freedom (*Chem.*). (1) The number of variables defining the state of a system (e.g. pressure, temperature, composition) which may be fixed at will.—(2) The number of independent capacities of a molecule for holding energy, translational, rotational, and vibrational.

degree of ionisation (*Chem.*). The proportion of the molecules of a dissolved substance which are dissociated into charged particles or ions.

degressive (*Bot.*). A change towards simplification or degeneration.

de-gumming (*Silk*). A term synonymous with *boiling-off.*

dehis′cence (*Bot.*) The spontaneous opening at maturity of a fruit, anther, sporangium, or other reproductive body.

dehiscence (*Zool.*) In general, the act of splitting open: more particularly, in *Porifera,* the splitting of the outer layer of cells of certain types of larva to permit of the passage, to the exterior, of the cells primarily occupying the interior; see also **diapedesis.**—*adj.* **dehiscent.**

dehumid′ified air (*Mining*). Air dried artificially by compression and re-expansion, to increase its cooling power in ventilating hot mines.

dehumidifier (*Air Conditioning*). The washing screen of fine water which cools the air extracted by the air-conditioning plant from an auditorium and, under certain conditions, reduces the water content of the output air while adjusting its dew point.

dehydration (*Chem.*). (1) The splitting off of H_2O from a molecule by the action of heat, often in the presence of a catalyst, or by the action of a dehydrating agent, e.g. concentrated sulphuric acid.—(2) The removal of water from crystals, tars, oils, etc. by heating, distillation, or by chemical action.—(*Med.*) Excessive loss of water from the tissues of the body.

dehy′drogenase, dehy′drase (*Bot.*). A plant enzyme which induces the reduction of substances.

de-icer (*Aero.*). See **anticer.**

deion circuit-breaker, dē-ī-on (*Elec. Eng.*). A circuit-breaker fitted with an arc-control device in which the arc takes place within a slot in a stack of insulated plates. The plates contain iron inserts or a magnet coil, so that the arc is blown magnetically towards the closed end of the slot, thereby coming into contact with cool oil which has a deionising action and extinguishes the arc.

deionisation (*Elec. Eng.*). The process whereby an ionised gas returns to its normal neutral condition.

deionisation time (*Thermionics*). The period necessary for the substantially complete re-combination of the electrons and positive ions in a gas after the removal of the ionising agent.

Deiter's cells, dī′ter (*Zool.*). In Mammals, supporting cells of the sensory epithelium of the organ of Corti.

deka-ampere balance (*Elec. Eng.*). An ampere-balance having a current range from 1 to 100 amperes.

dekad'. The interval of ten days.

delaine (*Textiles*). A light plain-weave dress fabric manufactured from Botany worsted yarn.

delamination (*Zool.*). The division of cells in a tissue, leading to the formation of layers.

De la Rue cell (*Elec. Eng.*). See **chloride of silver cell.**

delay (*Elec. Comm.*). The time taken for a signal to travel from one end of an electrical communication system to the other, or along a part of such system.

See **acoustic—**
envelope—
group—
magnetic—
phase—

delay action (*Photog.*). An arrangement on the shutter of a camera whereby it is released at a definite time later than when actuated.

delay cable (*Elec. Eng.*) A cable used in the investigation of uncontrolled surge phenomena; the surge, after arrival at the point under investigation, travels along the delay cable to delay its arrival at the recording apparatus (cathode ray oscillograph) until the operation of this apparatus has been initiated.

delay network (*Elec. Comm.*) An artificial line of electrical networks, specially designed to provide a specified delay in the transmission of currents over a frequency band represented by speech, in order that time may be allowed for switches or relays to be operated by the speech.

delay period (*Eng.*). The time or crank-angle interval between the passage of the spark and the resulting pressure rise in a petrol or gas engine, or between fuel injection and pressure rise in an oil engine.

delay working (*Teleph.*). In trunk operations, when the lines are in such full operation that subscribers have to wait for connexions, their requirements are noted by a trunk-record operator, who routes this to the relevant trunk operator, who in turn calls back the subscriber when a line is about to be free. See **demand working.**

delayed action (*Elec. Eng.*). Any arrangement which imposes an arbitrary delay in operation; e.g. in a switch or circuit-breaker. See **time-lag device.**

delayed automatic volume control (*Elec. Comm.*). The partial use of automatic gain control, in which the signal applied to the demodulator does not affect the gain of the previous amplifier, unless it exceeds a predetermined value.

dele, dē'le (*Typog.*). *Imperative sing.* of Latin *delere*, to destroy, to 'delete.' See next article.

delete (*Typog.*). Remove, or strike out. In proof-correcting, the unwanted letter or word is crossed through and a *delete mark* (₰) inserted in the margin.

deletion (*Cyt.*). The loss of a portion of a chromosome.

delf (*Mining*). A thin layer or seam of coal or ironstone.

delft (*Pot.*). A close-grained buff earthenware, with opaque stanniferous glaze to receive painting, which is then covered with transparent glaze.

Delhi boil (*Med.*). Tropical sore; Baghdad boil. Oriental sore resulting from infection of the skin with a protozoal parasite.

delignifica'tion (*Bot.*). The destruction of lignin in plant material by the action of a fungus.

deliming (*Leather*). The process of removing lime salts from skins and hides, previous to tanning.

delinquent (*Psychol.*). An individual, generally a child or adolescent, who shows definite lack of moral and social sense, without evidence of impairment of intellect; in particular, one who commits a social or criminal offence.

deliques'cence (*Bot.*). Gelatinisation and liquefaction of cell walls, sporangium membranes, etc, at maturity.

deliquescence (*Chem.*). The change undergone by certain substances which become damp and finally liquefy when exposed to the air, owing to the very low vapour pressure of their saturated solutions.

deliquescent. *Adj.* from *deliquescence.*

delirium (*Med.*). A profound disturbance of consciousness occurring in febrile and toxic states; characterised by restlessness, incoherent speech, excitement, delusions, illusions, and hallucinations.

delirium tre'mens (*Med.*). An acute delirium in chronic alcoholism, characterised by insomnia, restlessness, terrifying hallucinations and illusions, and loss of orientation to time and place.

delivery (*Eng.*). (1) The discharge from a pump or compressor.—(2) The withdrawal of a pattern from a mould.

delivery (*Obstet.*). The birth of a child.

Dellinger fade-out (*Radio*). A complete fade-out and inhibition of short-wave radio-communication because of the formation of a highly absorbing D-layer, lower than the regular E- and F-layers of the ionosphere, on the occasion of a burst of hydrogen particles from an eruption associated with a sun-spot. See **D-layer.**

Delobranchia'ta (*Zool.*). A group of *Arachnida*, possessing gills; of aquatic habit.

Delon rectifier (*Elec. Eng.*). A high-voltage rectifier for dealing with small currents; it consists of a system of condensers in conjunction with a rotating switch.

delph (*Hyd. Eng.*). A drain behind a sea embankment, on the land side.

delphs (*Mining*). A term used in Yorkshire to denote the working places in ironstone quarries.

del'phinin (*Chem.*). An anthocyanin responsible for the colour of the flowers of the delphinium On hydrolysis it decomposes into two molecules of glucose, two of *p*-hydroxybenzoic acid, and one of delphinidin.

del'phinine (*Chem.*). $C_{31}H_{49}O_9N$ or $C_{34}H_{47}O_9N$, an alkaloid of unknown constitution, obtained from the seeds of *Delphinium staphisagria.* It crystallises in rhombs, begins to decompose at 120° C., m p. 192° C., insoluble in water, soluble in most organic solvents. It is intensely toxic, resembling aconitine in its action.

delta (*Geol.*). The more or less triangular area of river-borne sediment deposited at the mouth of rivers heavily charged with detritus. A delta is formed on a low-lying coastline, particularly in areas of relative uplift. By contrast, where the land tends to sink, rivers enter the sea through drowned valleys and estuaries. The Nile Delta is a good example.

delta connexion (*Elec. Eng.*). A method of connexion used for the three windings of a piece of three-phase electrical equipment; the windings are connected in series, the three-phase supply being taken from or supplied to the junctions. The vector diagram of the current or voltage in the windings is in the form of a triangle and the symbol Δ *connexion* is therefore often used.

delta iron (*Met.*). The polymorphic form of iron stable between 1403° C. and the melting point (about 1532° C.). The space lattice is the same as that of α-iron and different from that of γ-iron.

delta metal (*Met.*). Originally a high-strength alpha-beta brass containing iron. Now applied to alloys which also contain manganese and aluminium. See **high-strength brass.**

delta network (*Elec. Comm.*). Network formed from three impedances in series, i.e. the same as a three-sided mesh, or an unbalanced π.

delta voltage (*Elec. Eng.*). Normally synonymous with *mesh voltage*, but the term is also used to denote the voltage between alternate terminals or lines of a symmetrical 6-phase system.

delta'ic deposits (*Geol.*). The accumulations of sand and clay, with remains of brackish water organisms, drifted plant debris, and animal remains, washed in from the land. Current-bedding is characteristic, with well developed fore-set and top-set beds. The Millstone Grit is a good example of a 'fossil delta.'

delthy'rium (*Zool.*). In *Brachiopoda*, the aperture in the ventral valve, or between the beak and the hinge, for the passage of the peduncle.

deltid'ium (*Zool.*). A small calcareous plate covering the delthyrium in certain species of Brachiopods.

deltoid (*Bot., Zool.*). Having the form of an equilateral triangle: any triangular structure, as the deltoid muscle of the shoulder.

delusion (*Psychiatry*). A belief in events for which there is no objective evidence; a false belief peculiar to the believer.

demagnetisation (*Elec. Eng.*). The process whereby a magnetised body has its degree of magnetisation reduced. This may be done by applying a magnetising force which opposes that producing the original magnetising force. With a permanent magnet the process may occur naturally, and may be accelerated by rough treatment, e.g. by dropping or by heating to a red heat.

demagnetising ampere-turns (*Elec. Eng.*). See **back ampere-turns.**

demand (*Elec. Eng.*). See **maximum demand.**

demand factor (*Elec. Eng.*). Ratio of the maximum demand on a supply system to the total connected load.

demand indicator (*Elec. Eng.*). See **maximum-demand indicator.**

demand limiter (*Elec. Eng.*). See **current limiter.**

demand working (*Teleph.*). The operation of trunk circuits in such a way that the subscriber's requirements can be met without his waiting an unreasonable time or having to be recalled. See **delay working.**

deman'toid (*Min.*). Bright-green cubic crystals of the garnet andradite, essentially silicate of lime and iron.

dementia (*Psychol.*). Any form of insanity characterised by the failure or loss of mental powers: the organic deterioration of intelligence, memory, and orientation.

dementia praecox (*Psychol.*). A form of insanity, occurring usually in adolescence, in which introversion and disconnexion between thoughts, feelings, and actions are marked features. Kraepelin originally introduced this term to denote the group of organic mental disorders (psychoses) which he later renamed schizophrenia. The group comprises the paranoid, catatonic, hebephrenic, and the above simple type.

De Meritens alternator (*Elec. Eng.*). An old form of alternator in which the exciting field is produced by a series of rotating permanent magnets. Used until recently in some lighthouse equipments.

demer'sal (*Zool.*). Found in deep water or on the sea bottom; as Fish eggs which sink to the bottom, and 'wet' or midwater and bottom-living Fish as opposed to surface Fish (e.g. Herring) and Shellfish. Cf. *pelagic.*

demi- (Latin *dimidius*, half). A prefix used in the construction of compound terms; e.g. *demiplate.*

demifacet, —fas'et (*Zool.*). One of the two half-facets formed when the articular surface for the reception of the capitular head of the rib is divided between the centra of two adjacent vertebrae.

demi-hunter or **half-hunter** (*Horol.*). A form of watch case in which the glass occupies one-half of its hinged cover.

demilune cells (*Zool.*). See **Gianuzzi's crescents.**

demi-lustre (*Worsted*). A term applied to a class of wools to differentiate them from lustre (the highest quality) and mountain wools.

demisheath (*Zool.*). In some *Insecta*, one of two chitinous sheaths protecting the ovipositor.

demodulation (*Elec. Comm.*). The inverse of modulation. Generally effected by passing the modulated carrier, or the high-frequency signal with an added carrier, through a non-linear system, so that the output currents or voltages contain difference-frequencies between the carrier and side-frequencies which can be extracted and reformed into the original modulating signal. Previously denoted by *detection.* Also previously applied to the reduction of the depth of modulation in a carrier when the latter is partially rectified in a high-frequency amplifier, with or without the presence of a relatively strong alien carrier.

demodulator (*Radio*). See **detector.**

demography. The study of population statistics and the estimation of their variation with time.

Demospongiae, —spun'ji-ē (*Zool.*). A class of *Porifera* usually distinguished by the possession of a skeleton composed of siliceous spicules, or of spongin, or both; triaxial spicules are lacking; the flagellated chambers are small and rounded; the choanocytes are small.

dempy (*Mining*). A pit, or a portion of the workings in a pit, in which there are frequent outbursts and accumulations of noxious gases.

demul'cent (*Med.*). Soothing, allaying irritation.

demulsification number (*Lubricants*). The resistance to emulsification by a lubricant when steam is passed through it; indicated in minutes and half minutes required for the separation of a given volume of oil after emulsification.

demy, dem-ī' (*Paper*). A standard size of (*a*) printing paper, 17½ × 22½ in.; (*b*) writing paper, 15½ × 20 in., U.S. 16 × 21 in.

demy octavo (*Typog.*). A book size, 8¾ × 5⅝ in.

dena'tured alcohol (*Chem.*). Alcohol which according to law has been made unfit for human consumption by the admixture of nauseating or poisonous substances, e.g. methyl alcohol, pyridine, benzene, etc.

dendrite (*Crystal.*). A tree-like crystal formation.—(*Met.*) Metal crystals grow in the first instance by branches developing in certain directions from the nuclei. Secondary branches are later thrown out at periodic intervals by the primary ones and in this way a skeleton crystal, or *dendrite*, is formed. The interstices between the branches are finally filled with solid which in a pure metal is indistinguishable from the skeleton. In many alloys, however, the final structure consists of skeletons of one composition in a matrix of another.

dendrite (*Zool.*). A nerve-cell process which branches almost from the point at which it leaves the cell-body, as opposed to an axon: one of the terminal twigs into which an afferent axon breaks up at a synapse. Cf. *telodendra.*

dendrit'ic (*Bot.*). (1) Bearing markings which are tree-like or moss-like.—(2) Much branched.

dendritic figure (*Zool.*). In experimental embryology, an appearance produced by poisoning an egg under certain conditions; several pseudasters and isolated asters are produced, united by streaks of protoplasm.

dendritic markings (*Geol.*). Tree-like markings, usually quite superficial, occurring on joint-faces and other fractures in rocks, frequently consisting of oxide of manganese or of iron. Less frequently the appearance is due to the inclusion of a mineral of dendritic habit in another mineral or rock; e.g. chlorite in silica as in 'moss agate.' See also **Cotham Marble, landscape marble.**

dendritic ulcer (*Med.*). A branching ulcer of the cornea, due to herpes of the cornea.

Dendrochirota, —ki-rō′ta (*Zool.*). An order of *Holuthuroidea* having long branched buccal tentacles covered with slime and lacking ampullae, but possessing retractor muscles; with respiratory trees; they feed on floating organisms.

den′drograph (*Bot.*). An instrument which is used to measure the periodical swelling and shrinkage of tree trunks.

dendroid (*Bot.*). (1) Tall, with an erect main trunk, as tree-ferns.—(2) Freely branched.

dendron (*Zool.*). See **dendrite.**

dendrophy′sis (*Bot.*). A paraphysis-like structure bearing simple or branched spines.

dener′vated (*Med.*). Deprived of nerve supply.

dengue (*Med.*). A tropical disease in which the infecting agent is transmitted by mosquito to man; characterised by severe pains in the joints and a rash.

denier system, de-nēr′ (*Textiles*). The system used in the 'counting' of silk and rayon yarns; designated by the weight in grams of 9000 metres of yarn, the unit of length.

denig′rate (*Bot.*). Blackened.

den′im (*Textiles*). A strong cotton cloth, chiefly in blue, black, or brown colours, used extensively for overalls. The weave is usually 3-and-1 twill.

denitrification (*Bot.*). The liberation of elementary nitrogen, by denitrifying bacteria, from nitrogenous compounds in the soil, in particular from nitrites and nitrates.

denizen (*Bot*). A species which maintains its footing as a wild plant, though probably introduced by man.

dens (*Zool.*). Any tooth-like process, as the distal arms of the furcula in *Collembola.*—*pl.* **den′tes.**

dens epistrophei, —trŏ′fē-ī (*Zool.*). See **odontoid process.**

densimeter (*Diel.*). See **Gurley densimeter.**

densi-tensim′eter (*Chem*). An apparatus for determining both the pressure and the density of a vapour.

densitom′eter (*Photog.*). An instrument for measuring the densities of exposed and developed film, particularly in photographic sound-recording. The illumination, due to light passing through the film, is attenuated until it matches a standard attenuated illumination.

density (*Elec. Eng.*).

See **current—** **magnetic flux—**
electric flux—

density (*Photog.*). The logarithm of the opacity, which is the reciprocal of the transmission or transparency, that is the ratio of the transmitted intensity to the incident intensity, on a film or plate.

See **diffuse—** **specular—**

density (*Phys., etc.*). The mass of unit volume of a substance, expressed in such units as grams per cubic centimetre or lbs. per cubic foot. See **specific gravity.**

density bottle (*Chem.*). A thin glass bottle, accurately calibrated, used for the determination of the density or specific gravity of a liquid.

density, energy (*Acous.*). See **energy density of sound.**

density function (*Astron.*). A formula expressing the total number of stars per unit volume chosen, say, one million cubic parsecs. In statistical investigations into the structure of the universe this function is found for different regions of space and the results are combined.

dent (*Weaving*). A term applied to one of the wires forming a reed; also to the space between two wires, through which warp threads are drawn.

dental. Pertaining to the teeth.

dental formula (*Zool.*). A formula used in describing the dentition of a Mammal to show the number and distribution of the different kinds of teeth in the jaws; thus a Bear has in the upper jaw three pairs of incisors, one pair of canines, four pairs of premolars, and two pairs of molars; and in the lower jaw three pairs of incisors, one pair of canines, four pairs of premolars, and three pairs of molars. This is expressed by the formula $\frac{3}{3}\frac{1}{1}\frac{4}{4}\frac{2}{3}$.

dental surgery. See **dentistry.**

dental′e (*Zool.*). A bone of the lower jaw in some Fish.

dentary (*Zool.*). In Vertebrates, a membrane bone of the lower jaw which usually bears teeth.

dentate (*Bot.*). Having a toothed margin; if each tooth bears a subsidiary tooth, the margin is *doubly dentate.*

dentation (*Bot.*). (1) A general name for the toothing of a margin, i.e. when it bears small blunt or pointed outgrowths.—(2) The collective name for the ridges of thickened wall material projecting into the lumina of ray tracheides in the wood of pines.

dentelle (*Bind.*). A style of decoration of a tooth-like or lace-like character; used in covers.—(*Textiles*) A lace edging in the form of a series of small teeth.

denticles (*Zool.*). Any small tooth-like structures: the placoid scales of *Selachii.*

dentic′ulate (*Bot.*). Said of a margin bearing small teeth.

denticulated (*Build.*). A term applied to mouldings decorated with dentils.

dentigerous cyst, —tij′er-us (*Vet.*). A cyst containing teeth; usually a teratomatrous cyst on the malar bone of a horse.

dentil (*Build.*). A projecting rectangular block forming one of a row of such blocks under the corona of a cornice.

dentine (*Zool.*). A hard calcareous substance, allied to bone, of which teeth and placoid scales are mainly composed.—*adj.* **den′tinal.**

dentiros′tral (*Zool.*). Having a toothed or notched beak.

dentistry or **dental surgery.** The treatment of diseases and irregularities of the teeth (and often of associated tissues), including conservation, extraction (*exodontia*), and artificial replacement (*dental prosthesis*) of teeth, and rectification of abnormalities in the dentition (*orthodontia*).

dentition (*Zool.*). The kind, arrangement, and number of the teeth: the formation and growth of the teeth: a set of teeth, as the milk dentition.

denu′date, denuded (*Bot.*). Having a worn or stripped appearance.

denudation (*Geol.*). The laying bare (Latin *nudus*, naked) of the rocks by chemical and mechanical disintegration and the transportation of the resulting rock debris by wind or running water. Ultimately denudation results in the degradation of the hills to the existing base-level. The process is complementary to sedimentation, the amount of which in any given period is a measure of the denudation. See also **marine denudation.**

denuded quadrat (*Bot.*). A square piece of ground, marked out permanently and cleared of all its vegetation, so that a study may be made of the manner in which the area is re-occupied by plants.

deob′struent (*Med.*). Removing obstruction by opening natural passages of the body: medicine which removes obstruction in this way.

deo′dorant, deo′doriser (*San. Eng.*). A substance by the use of which bad smells may be eliminated or minimised.

deoper′culate (*Bot.*). (1) Lacking an operculum.—(2) Having an operculum which does not come away spontaneously.

deoxidation (*Met.*). The process of elimination of oxygen from molten metal before casting by adding elements with a high oxygen affinity, which form oxides that tend to rise to the surface.

deoxidised copper (*Met.*). Copper from which the oxygen remaining after poling has been removed by the addition of a *deoxidiser* (q.v.), usually phosphorus. The deoxidiser that remains in solution lowers the conductivity below that of tough-pitch copper, but the product is more suitable for working operations.

deoxidiser (*Met.*). A substance which will remove or eliminate the effect of the presence of oxygen, particularly in metals.

departure (*Surv.*). The projected length of a survey line upon a line at right-angles to the reference meridian.

depaup′erate (*Bot.*). Having a starved, undeveloped appearance.

dependent (*Bot.*). Hanging down.

depersonalisation (*Psycho-path.*). A condition in which an individual experiences a wide range of unreality feelings in relation to the self, to the body, or to other people, even extending to the feeling of being dead.

dep′eter (*Plast.*). Plasterwork finished in imitation of tooled stone, small stones being pressed in with a board before the plaster sets. Also called DEPRETER.

dephleg′mator (*Chem.*). A *fractionating column* (q.v.).

dephlogis′ticated air (*Chem.*). The name given by Priestley to oxygen. The term is of historic interest only.

dephosphorisation (*Met.*). Elimination of phosphorus from steel, in basic steel-making processes. Accomplished by forming a slag rich in lime. See **acid process, basic process, Bessemer process, open-hearth process.**

depickling (*Leather*). A process, prior to tanning, for removing from sheepskins the acid and salt-pickle used to preserve them during transport.

dep′ilate (*Med.*). To remove the hair from.

depilation (*Bot.*). The natural loss of a hairy covering from the parts of plants as they mature.

depil′atories (*Chem.*). Compounds for removing or destroying hair; usually sulphide preparations.

deplan′ate (*Bot.*). Flattened, or expanded in a flat surface.

deplasmol′ysis (*Biol.*). The process of recovery of a cell from a plasmolysed condition by re-acquisition of water.

depolarisation (*Elec. Eng.*). Prevention of the back e.m.f., due to polarisation, which occurs in some primary cells. It is usually effected by providing an oxidising agent, such as manganese dioxide, which acts upon the hydrogen as fast as it is produced at the positive electrode; such an agent is known as a *depolariser*.

See also **electrolytic— mechanical—**

depo′lariser (*Elec. Eng.*). See under **depolarisation.**

depol′ymer′isa′tion (*Chem.*). The change of a large molecule into simpler ones having the same empirical formula.

deposit (*Elec. Eng.*). (1) The coating of metal deposited electrolytically upon any material.—(2) The sediment which is sometimes found at the bottom of an accumulator cell owing to gradual disintegration of the electrode material.

See **burnt— composite— reguline—**

deposit (*Geol.*). See under **deposition.**

deposition (*Geol.*). The laying down or placing into position of sheets of sediment (often referred to as *deposits*) or of mineral veins and lodes. Synonymous with *sedimentation* in the former sense.

deposition, electro- (*Elec. Eng.*). See **electro-deposition.**

depreciation factor (*Illum.*). A term commonly used in the design of floodlighting and similar installations to denote the ratio of the light output when the lighting equipment is clean to that when it is dirty (i.e. after having been in service for some time).

depres′sant (*Mining*). A chemical which causes a finely powdered sulphide mineral to sink through a froth, in froth flotation. The mineral so sunk is said to be *depressed*.

depressant (*Med.*). Lowering functional activity: a medicine which lowers functional activity of the body.

depressed (*Bot.*). (1) Flattened; said especially of the apex of a solid plant member.—(2) Somewhat sunken in a concave form.

depressed conductor-rail (*Elec. Eng.*). A section of conductor-rail depressed below normal level where it is desired that it shall not make contact with the shoes.

depression (*Meteor.*). The name for that distribution of atmospheric pressure in which the pressure decreases to a minimum at the centre. In the northern hemisphere, the winds circulate in a counter-clockwise direction in such a system; in the southern hemisphere, in a clockwise direction. A depression usually brings stormy unsettled weather.

depression (*Psychol.*). A state of dejection, often combined with feelings of sadness, irritability, or anxiety; usually accompanied by a lowering of psycho-physical activity. It can be (1) a normal depression, as a reaction to an unfavourable external event, or (2) pathological, which may be (*a*) endogenous, e.g. melancholia, due to still unknown internal physical changes, or (*b*) reactive, either in relation to external situations or events, or in relation to an internal phantasy-situation. The pathological reaction, in every case, is exaggerated in duration and intensity.

depression (*Zool.*). An unhealthy condition of *Protozoa* which have been prevented from conjugating for many generations; characterised by degeneration of the cell-organs and retardation of division.

depression of freezing-point (*Heat*). A solution freezes at a lower temperature than the pure solvent, the amount of the depression of the freezing-point being proportional to the concentration of the solution, provided this is not too great. The depression produced by a 1% solution is called the *specific depression*, and is inversely proportional to the molecular weight of the solute. Hence the depression is proportional to the number of gram-molecules dissolved in unit weight of the solvent and is independent of the particular solute used.

depression of land (*Geol.*). Depression relative to sea-level may be caused either by the outward migration of deep-seated magma, or by the cooling and contraction of the same. Such changes are believed to follow a cyclic rhythm. Depression of the land leads to marine transgressions. A false impression of such depression may be caused by eustatic changes in sea-level. See **drowned valleys.**

depres′somo′tor (*Zool.*). A depressor nerve.

depressor (*Zool.*). A muscle which by its action lowers a part or organ: a motor nerve which when stimulated checks the activity of the part to which it leads: a reagent which when introduced into a metabolic system slows down the rate of metabolism.

dep′reter (*Plast.*). See **depeter.**

Deprez-D'Arsonval galvanometer, de-prā— (*Elec. Eng.*). A name sometimes used for the D'Arsonval galvanometer.

dep′side (*Bot., Chem.*). A product formed from hydroxy-aromatic acids by the condensation of the carboxyl group of one molecule with the phenol group of a second molecule. Depsides are probably concerned with the oxidation of fats and proteins inside plant cells.

depth (*Horol.*). The amount by which the teeth of a wheel intersect the teeth of the mating wheel or pinion.

depth charge (*Ammunition*). A bomb which can be set to detonate at a given depth below the surface of the sea. Used mainly as an anti-submarine device.

depth gauge (*Eng*) A gauge used for measuring the depth of a hole; it consists of a narrow rule sliding through a cross-piece.

depth localisation (*Acous.*). The same as *auditory perspective*.

depth, moulded (*Ship Constr*). The depth of a ship from the top of keel to the top of beam at side; referred to as *Lloyds D*.

depth of definition (*Photog.*). The same as *depth of focus* (q v.).

depth of focus (*Photog.*). The distance between the nearer and farther planes, in the area photographed, over which the image is in reasonably sharp focus, depending on the type of lens and the stop.

depth of modulation (*Radio*). A factor expressing the extent to which an amplitude-modulated wave is modulated. It is given by the difference between the 'peak' and 'trough' values of the wave, divided by their sum. Expressed as a percentage, this ratio is also called the PERCENTAGE MODULATION.

depth of penetration (*Radio*). In a solid conductor carrying a high-frequency current, the current tends to concentrate near the surface, with consequent increase in resistance. The *depth of penetration* is defined as that thickness of hollow conductor of the same dimensions which, if the current were uniformly distributed throughout its cross-section, would have the same resistance as the solid conductor.

depth psychology (*Psycho-an.*). The psychology of the unconscious.

depthing tool (*Horol.*). An instrument by means of which two wheels, or a wheel and pinion, can be mounted and their depth adjusted until it is correct, after which the distance apart of their centres can be transferred to the plates for the drilling of the pivot holes.

deputy (*Mining*). (1) The local representative of the owner.—(2) In Northumberland and Durham, a man who timbers or props the working places in a coal-mine.—(3) An official who holds a certificate under the Coal Mines Act, and is responsible for the working of a district. See **fireman.**

derailment (*Rail.*). The action of removing a train or part of a train from the rails.

derby float (*Plast.*). A large trowel consisting of a flat board with two handles on the back.

Derby red (*Paint.*). See **Chinese red.**

Derbyshire neck (*Med*). Chronic enlargement of the thyroid gland, without signs of overactivity of the gland.

Derbyshire spar (*Min.*). A popular name for the mineral *fluorspar*.

Dercum's disease (*Med.*). See **adiposis dolorosa.**

Deri motor (*Elec. Eng.*). A modification of the ordinary repulsion motor, in which speed control is effected by moving two sets of brushes in opposite directions round the commutator. The angular brush movement to produce a given speed change is twice as great as for the ordinary motor, so that finer control is possible.

Deri winding (*Elec. Eng.*). A form of compensating winding used to neutralise armature reaction; sometimes employed on d.c. turbo-generators.

derivative hybrid (*Gen.*). A hybrid obtained by crossing two hybrids, or by crossing a hybrid with one of its parents.

derived circuit (*Elec. Eng.*). See **shunt circuit.**

derived fossils (*Geol.*). These are the remains of organisms entombed in a stratum younger than the fossils themselves. The bed lying above a break in the stratigraphical succession (such as an unconformity) frequently contains fragments of durable rocks (and fossils derived from them) which were laid under contribution during its formation. The Cambridge Greensand is a stratum rich in derived fossils.

derived units (*Elec. Eng.*). Units which are derived from the three fundamental units of mass, length, and time,

derm-, derma-, dermo- (Greek *derma*, skin). A prefix used in the construction of compound terms; e.g. *dermatitis* (q.v.).

derm (*Zool.*). See **dermis.**

dermal (*Bot.*). Appertaining to the epidermis or other superficial layer of a plant member.

dermal, dermic (*Zool.*). Pertaining to the skin: more strictly, pertaining to the dermis.

dermal appendage (*Bot.*). Any outgrowth from the epidermis.

dermal branchiae (*Zool.*). See **papulae.**

dermarticular'e (*Zool.*). See **antarticulare.**

dermat-, der'mato-. Prefix derived from *dermatos*, the genitive of the Greek *derma* (see **derm-**).

dermati'tis (*Med.*). Inflammation of the surface of the skin or epidermis. See also **Dühring's disease, Ritter's disease.**

dermat'ogen (*Bot.*). A hollow sheet of meristematic cells, one layer thick, covering an apical growing point and giving rise to the epidermis.

dermatograph'ia, dermograph'ia (*Med.*). A sensitive condition of the skin in which pressure with, for example, a pencil point will produce a reddish weal.

dermatol'ogy (*Med.*). That branch of medical science which deals with the skin and its diseases.

dermatomy'osi'tis (*Med.*). A disease, progressive and usually fatal, which is characterised by acute or subacute inflammation of muscles, dermatitis, oedema over the affected muscles, sweating, and enlargement of the spleen.

dermat'ophyte (*Bot.*). A parasitic fungus which causes a skin disease in animals.

dermatop'sy (*Zool.*). The condition of having a light-sensitive integument.

dermatosclerosis (*Med.*). See **scleredermia.**

dermato'sis (*Med.*). An affection or inflammation of the deeper layers of the skin.

dermat'osome (*Bot.*). One of the minute portions into which a cell wall can be resolved by prolonged treatment with dilute hydrochloric acid, followed by heating for some time at 50°-60° C.

dermentoglos'sum (*Zool*). In some Fish, a skeletal plate of the tongue covering the entoglossum and arising from the fusion of the dentinal bases.

dermeth'moid (*Zool.*). See **suprethmoid.**

dermis or **derm** (*Zool.*). The inner layers of the integument lying below the epidermis.—*adjs.* **dermal, dermic.**

dermocalyp'trogen (*Bot.*). A meristematic layer present in the apex of the root of many Dicotyledons; it gives rise to the root cap and to the dermatogen.

dermoccip'ital (*Zool.*). In lower Vertebrates and embryonic stages of higher Vertebrates, a pair of membrane bones occupying the place of the interparietal.

dermoid (*Med.*). A cyst of congenital origin containing such structures as hair, skin, and teeth; occurs usually in the ovary.

dermopharynge'al (*Zool.*). A plate of membrane bone supporting the upper or lower pharyngeal teeth in some Fish.

dermoskel'eton (*Zool.*). See **exoskeleton.**

dermotrich'ia (*Zool.*). The horny rays supporting the unpaired fins of Fish.

derrick (*Build.*, *Civ. Eng.*). An arrangement for hoisting materials, distinguished by having a boom stayed from a central post, which in turn is usually stayed in position by guys.

derrick barrel (*Eng.*). The winding drum on which the rope used in derricking or luffing operations in a jib crane is wound or paid out.

derrick crane (*Eng.*). See **derricking jib crane.**

derrick tower gantry (*Build.*). A robust form of staging, for the support of a derrick to be used in the construction of large buildings. It consists of three tall timber towers approximately equidistant from one another and carrying a platform on which the derrick is erected. See **anchor tower, king tower.**

derricking jib crane (*Eng.*). A jib crane in which the inclination of the jib, and hence the radius of action, can be varied by shortening or lengthening the tie-ropes between post and jib.

dertrothe'ca (*Zool.*). In Birds, the horny covering of the maxilla.

dertrum (*Zool.*). In Birds, the horny casing of the beak or any modification of it.

desam'inases (*Chem.*). Enzymes which induce the splitting off of the amino group from amino acids.

desaturation (*Photog.*). The amount of grey in a colour; the reverse of *saturation* (q.v.).

De Sauty's method, sō-tē (*Elec. Eng.*). A Wheatstone bridge method of comparing capacities; the two capacities are placed in two arms of a Wheatstone bridge and resistances are placed in the other two arms, the latter being adjusted until no kick on the galvanometer can be observed when the battery key is depressed.

de-scaling (*Eng.*). The process of (1) removing scale or metallic oxide from metallic surfaces by *pickling* (q.v.); (2) removing scale from the inner surfaces of boiler plates and water tubes.

Descemet's membrane, des-mā (*Zool.*). In *Vertebrata*, a homogeneous elastic layer covering the back of the cornea.

descending (*Bot.*). Growing or hanging downwards in a gradual curve.—(*Zool.*) Running from the anterior part of the body to the posterior part, or from the cephalic to the caudal region.

descending aestivation (*Bot.*). Aestivation in which each segment overlaps the one anterior to it.

descending letters (*Typog.*). Letters the lower part of which descends below the general line; e.g. *g*, *j*, *p*, *q*, *y*.

descloizite, dā-kloi'zīt (*Min.*). An uncommon compound of lead, zinc, and vanadium, crystallising in the orthorhombic system; occurs in the oxide zone of lead-zinc deposits.

descriptive astronomy. That branch of astronomy which is concerned with a general enumeration and description of the various kinds of heavenly bodies but omits mathematical or physical theories.

desensitisation (*Med.*). The process of abolishing the sensitivity of a person to a protein by injecting small amounts of the same protein.

desensitisation (*Photog.*). Treatment to inhibit potential development by further exposure. Effected by certain dyes.

desert (*Geol.*, *etc.*). A barren and uninhabited tract of large extent. Deserts are either cold (e.g. the Arctic and Antarctic wastes) or hot (e.g. the Sahara, Kalahari, and Nubian deserts in Africa, those of Chinese Turkestan and Gobi in Asia, and the Great Basin in N. America). Cold deserts are due entirely to the low temperature appropriate to the latitudes in which they occur; hot deserts are due to an excess of evaporation over precipitation, resulting from the physical configuration of the region; in many cases ranges of mountains cut off the moisture-bearing winds.

des'iccants (*Chem.*). Substances of a hygroscopic nature, capable of absorbing moisture and therefore used as drying agents; e.g. anhydrous sodium sulphate, calcined calcium chloride, etc.

desiccation. The process of drying.—(*Geog.*, *Meteor.*) The drying or disappearing of water from land areas. Such desiccation as is observed appears to arise from the over-cultivation of unprotected land, as in the United States and Africa, and is more accurately termed *exsiccation* (q.v.).

desiccation (*Bot.*). The drying up of a plant or of part of a plant.

desiccation (*Timber*). The process of seasoning timber by exposing it in an oven to a current of hot air.

des'iccator (*Chem.*). Laboratory apparatus for drying substances; it consists of a glass bowl with ground-in lid, containing a drying agent, e.g. concentrated sulphuric acid or calcined calcium chloride; a tray for keeping glassware, etc. in position is also provided, and if desired the desiccator can be evacuated.

design (*Textiles*). (1) Another term for the weave which shows the interlacing of the threads in a fabric.—(2) The pattern on a figured fabric.

design paper (*Textiles*). See **point paper.**

desilverisation (*Met.*). The process of removing silver (and gold) from lead after softening. See **Parke's process, Pattinson's process.**

desk switchboard (*Elec. Eng.*). A form of switchboard panel in which the operating switches, pilot lamps, etc. are mounted on panels inclined to the horizontal like the surface of a desk.

Deslandres equation, dā-lahn^{g}dr (*Light*). An empirical expression for the positions of the origins or heads in a band spectrum.

$$\nu = a + bn + cn^2,$$

ν being the wave-number of the head, a, b, and c constants and n taking successive integral values.

des'mergate (*Zool.*). A worker ant intermediate in characters between an ordinary worker and a soldier.

desmine (*Min.*). See **stilbite.**

desmochon'dria (*Zool.*). Cytoplasmic granular projections found on the surface of epithelial cells.

desmog'nathous (*Zool.*). (In Birds) said of a type of palate in which the vomers are small or wanting and the maxillopalatines meet in the middle line; the palatines and pterygoids articulate with the basisphenoid rostrum.

desmot'ropism (*Chem.*). A special case of *tautomerism* (q.v.) which consists in the change of position of a double bond, and in which both series of compounds can exist independently; e.g. keto and enol form of acetoacetic ester, malonic ester, phenyl-nitromethane, etc.

desorption (*Chem.*). The removal of a substance from the surface at which it is adsorbed.

despatcher, load (*Elec. Eng.*). See **load despatcher.**

desquama'tion (*Med.*). The shedding of the surface layer of the skin.

destarched (*Bot.*). Said of a plant which has been placed in the dark and which no longer contains starch in its leaves; the treatment stops photosynthesis, and allows translocation to remove the starch from the leaves.

destination indicator (*Elec. Eng.*). See **train describer.**

destructive distillation (*Chem.*). The distillation of solid substances accompanied by their decomposition. The destructive distillation of coal results in the production of coke, tar products, ammonia, gas, etc.

destructor station (*Elec. Eng.*). An electric generating station in which the fuel used for the boilers consists chiefly of town or other refuse.

desuperheater (*Eng.*). A vessel in which superheated steam is brought into contact with a water spray in order to make saturated or less highly superheated steam. See **superheated steam.**

desynap'sis (*Cyt.*). Abnormally early breaking up of synapsis in meiosis.

detachable-key switch (*Elec. Eng.*). A switch which can be operated only by a special key, which, for safety, is kept under supervisory control.

detached contact (*Auto. Teleph.*). The detached contact system of drawing complicated diagrams, introduced to effect facility in reading by reduction in length of lines. Thus a relay is labelled *A*/3, which means that the relay *A* has three groups of contacts operated by it; these, located elsewhere on the drawing, are labelled *A*1, *A*2, and *A*3.

detached escapement (*Horol.*). An escapement in which there is a minimum of interference with the free vibration of the pendulum or balance. See **escapement.**

detaching hook (*Mining*). A hook for suspending a cage from the end of a hoisting rope in such a way that the cage becomes detached at the top of the shaft if the engine-man omits to stop the hoisting engine in time.

detail drawing (*Build.*). A large-scale working drawing (usually of a part only) giving information which does not appear on small-scale drawings of the whole construction.

detail paper. A form of tracing paper used in the preparation of detail drawings.

detailer (*Civ. Eng.*). A draughtsman who designs the details involved in steelwork construction.

detection (*Radio*). See **demodulation.**

detector (*Elec. Eng.*). A simple form of galvanometer, used for detecting the presence of current in a circuit without giving an accurate indication of its magnitude. Used for testing continuity of circuits. See **demodulation** and **rectification.**

See also **earth—** **magnetic—** **embedded temperature—**

detector (*Radio*). The obsolete name for that part of a radio receiving equipment which is concerned with extracting the signal from the received modulated carrier, or transposing this modulated carrier to a fixed band of frequencies, as in a superheterodyne or infradyne receiver. Correctly described as a *demodulator* or *frequency changer*; these terms imply precision of conversion of the signal, not merely the detection of the presence of a radio carrier.

detector coefficient (*Radio*). In a linear rectifier, that factor by which the peak value of the applied high-frequency voltage must be multiplied to obtain the d.c. output voltage, on open circuit. In a square law rectifier, the corresponding factor multiplies the square of the applied peak voltage.

detent' (*Horol.*). A detainer or checking device. In a chronometer escapement, the detent carries a stone or jewel for locking the escape wheel.

detent escapement (*Horol.*). An escapement using a detent; e.g. chronometer escapement.

detent spring (*Horol.*). The flat spring in a chronometer escapement by means of which the detent blade, carrying the locking pallet, is attached to the detent foot.

deter'gents (*Chem.*). Cleansing agents (solvents, or mixtures thereof, sulphonated oils, abrasives, etc.) for removing dirt, paint, etc.

determinate (*Bot.*). (1) With a well-marked edge.—(2) Said of an inflorescence which ends in a flower.

determinate (*Struct.*). Said of a structure which is a *perfect frame* (q.v.). Cf. *indeterminate.*

detonation (*Eng.*). In a petrol engine, the spontaneous combustion of part of the compressed charge after the passage of the spark; the accompanying knock. It is caused by the heating effect of the advancing flame front, which raises the gas remote from the plug to its *spontaneous ignition temperature* (q.v.).

detonation meter (*Eng.*). An instrument for measuring quantitatively the severity and frequency of detonation in a petrol-engine cylinder. See **bouncing-pin detonation meter.**

det'onator. A substance which initiates an explosion. Specifically, a small copper or aluminium cap, containing fulminate of mercury or azide of lead, fixed to the end of a fuse. Used to set off high explosives such as guncotton, gelignite, and dynamite. The ignition of the charge in the detonator is often carried out electrically.

See **high-tension—** **low-tension—**

detorsion (*Zool.*). In *Gastropoda*, partial or complete reversal of torsion, manifested by the untwisting of the visceral nerve loop and the altered position of the ctenidium and anus.

detri'tal minerals (*Geol.*). Although, literally, any mineral grains resulting from detrition are detrital, in sedimentary petrology the term is restricted to grains of heavy minerals found in sand and other sediments, and separated therefrom by passing through bromoform or other heavy liquid. See **heavy minerals.**

detrition (*Geol.*). The natural process of rubbing or wearing down strata by blown wind or running water. The product of detrition is *detritus.*

detri'tus chamber (or **pit**) (*Sewage*). A tank through which crude sewage is first passed in order to allow the largest and heaviest of suspended matters to fall to the bottom from which they can be removed.

detumes'cence (*Med.*). The reduction of a swelling.

detuner (*Eng.*). See **dynamic damper.**

detuning (*Radio*). The adjustment of a resonant circuit so that its resonant frequency does not coincide with that of the applied e.m.f.

deuce (*Cinema.*). A mobile pair of incandescent lamps for studio work.

deut-, deuto-, deuter-, deutero- (Greek *deuteros*, second). A prefix used in the construction of compound terms; e g. *deutoscolex* (q.v.). See also **deutero-.**

deuterium (*Chem.*). Heavy hydrogen, i.e. hydrogen of atomic mass 2.

deutero-. Prefix. See **deut-.** (*Chem.*) (1) Containing heavy hydrogen (*deuterium*).—(2) Second in order.—(3) Derived from.

deu'terogamy (*Bot.*). Any process which replaces normal fertilisation.

deuterogna'thous (*Zool.*). Having the jaws borne on the second somite of the head.

Deuteromyce'tes (*Bot*). See **Fungi imperfecti.**

deuteron (*Chem.*). A heavy hydrogen nucleus of mass 2 and carrying unit positive charge, $_1^2\mathrm{H}$.

deu'teroplasm (*Biol.*). See **metaplasm.**

deuterosto'ma (*Zool.*). In development, a mouth which arises secondarily, as opposed to a mouth which arises by modification of the blastopore.

deu'terotoky (*Zool.*). Parthenogenesis leading to the production of both males and females.

Deuterozo'ic (*Geol.*). A term, now disused, for the younger Palaeozoic Systems—the Devonian, Carboniferous, and Permian Systems. Cf. *Proterozoic.*

deuterozo'oid (*Zool.*). A secondary zooid, produced from a primary zooid by budding.

deuthyalosome, dūt-hī-al'— (*Zool.*). The nucleus of the ovum after the first polar body has been formed.

deuto-. Prefix. See **deut-.**

deutobroque, dū'tō-brōk (*Cyt.*). In oögenesis, a stage preceding leptotene, during which the chromosomes radiate from the nucleolus, and wind about just under the nuclear membrane.

deutocere'bron, deutocere'brum (*Zool.*). In higher *Arthropoda*, as *Insecta* and *Crustacea*, the fused ganglia of the second somite of the head, forming part of the 'brain.'

deutom'erite (*Zool.*). In some *Gregarinidea*, the part of the body containing the nucleus.

deu'toplasm (*Biol.*). See **metaplasm.**

deutoplasmol'ysis (*Embryol.*). The elimination of the deutoplasm of the Vertebrate ovum which usually occurs between the formation of the second polar body and the first cleavage.

deutosco'lex (*Zool.*). In *Cestoda*, a secondary scolex arising by budding in a bladderworm.

deuto'vum (*Zool.*). In *Acarina*, a stage in the development which may come before or after the egg is laid.

Deval attrition test (*Civ. Eng.*). See **attrition test.**

develop (*Mining*). To traverse a mineralised body horizontally by drives and vertically by shafts or winzes, in order to prove its extent.

developed dyes (*Chem.*). Dyes which are developed on the fibre by the interaction of the constituents which produce them. Dyeing with aniline black provides an example of a *developed dye.*

developer (*Photog.*). Any reducing agent used in photography for reducing the exposed silver salts to metallic silver. Most of these substances are polyhydric phenols

developer, Beach's (*Photog.*). See **Beach's developer.**

development (*Bot.*). The succession of stages in the life of the plant, as distinct from the simple growth of the plant.—(*Zool.*) The processes of growth and differentiation by which a mature animal is formed from an ovum or bud.

development (*Mining*). The amount of ore in a mine developed or exposed on at least three sides.

development (*Photog.*). The reduction of silver nitrate or other silver compound to silver by chemical action, after exposure in a photosensitive emulsion. Also, the production of a relief by water, after exposing a bichromated gelatine.

See **continuous— frame— tank—**
drum— second— water—

deviation (*Ships*). The angle between the direction taken up by the needle of a ship's compass and the true direction of north and south. The deviation is due to non-coincidence of the magnetic and geographic meridians (see **declination**), and may be accentuated by magnetic material on board ship. The term is often restricted to mean such accentuation.

See **semicircular— quadrantal—**

deviation (*Maths.*). The amount by which one of a set of observed values differs from the mean value. See **standard deviation** and **variance.**

devil (*Plumb.*). A portable furnace for heating solder and soldering irons. *

devil (*Meteor.*). A small whirlwind due to strong convection, which, in the tropics, raises dust or sand in a column.

devil float (*Plast.*). A square float having four nails projecting from its working face; used to perform the scoring required in *devilling* (q.v.).

devilling (*Plast.*). The operation of scoring the surface of a plaster coat to provide a key for another coat.

devitrification (*Geol.*). Deferred crystallisation which, in the case of glassy igneous rocks, converts obsidian and pitchstone into dull cryptocrystalline rocks (usually termed *felsites*) consisting of minute grains of quartz and feldspar. Such devitrified glasses give evidence of their originally vitreous nature by traces of perlitic and spherulitic textures.—(*Glass*) A physical process which causes a change from the glassy state to a minutely crystalline state. This has to be avoided during manufacture. If the change is due to lapse of time, the glass becomes turbid and brittle.

Devonian igneous rocks (*Geol.*). During the Devonian Period volcanic phenomena were manifest in two regions in Britain: in the south, marine lavas (pillow lavas) were erupted in Devon and Cornwall; in the neighbourhood of the Midland Valley of Scotland subaerial eruptions resulted in the accumulation of several thousand feet of lavas and ashes, chiefly andesitic. Deep-seated intrusions, now uncovered, occur as great granite bosses in Scotland, while a dyke phase closed the volcanic episode.

Devonian System (*Geol.*). The rocks formed during the Devonian Period, between the Silurian and the Carboniferous Periods. They comprise rocks of two facies: *marine*, occurring typically in Devon and Cornwall; and *continental* (the so-called Old Red Sandstone). The marine Devonian comprises the Dartmouth Slates, Meadfoot Beds, and Staddon Grits in the Lower Devonian; shales and massive limestones in the Middle Devonian; and chiefly shales in the Upper Devonian. Volcanic rocks are developed locally in the Middle and Upper Devonian. See also **Devonic.**

Devonic (*Geol.*). Equivalent to *Devonian.* See **Chautauquan, Erian, Helderbergian, Oriskanian, Senecan,** and **Ulsterian.**

dew (*Meteor.*). The deposit of moisture on exposed surfaces which accumulates during calm, clear nights. The surfaces become cooled by radiation to a temperature below the dew-point, thus causing condensation from the moist air in contact with them.

dew claw (*Zool.*). In Dogs, the useless claw on the inner side of the limb (especially the hind limb) which represents the rudimentary first digit.

dew-point (*Meteor., Phys.*). The temperature at which a given sample of moist air will become saturated and deposit dew.

dew-point hygrometer (*Meteor.*). A type of hygrometer for determining the dew-point, i.e. the temperature of air when completely saturated. The relative humidity of the air can be ascertained by reference to vapour pressure tables.

dew pond. A shallow pond formed by excavating a suitable area on elevated pastures; the surface temperature of the pond is lowered by insulating it, and water collects at night through condensation.

Dewar flask (*Chem.*). A silvered glass flask with double walls, the space between them being evacuated; it is used for the storage of liquid air.

de-watering (*Civ. Eng.*). The process of pumping water from the interior of a caisson.

dexiocardia (*Med.*). See **dextrocardia.**

dexiotro'pic (*Zool.*). Twisting in a spiral from left to right, as in gastropod shells; spiral cleavage.

dextral. See **dextrorse.**

dextrin (*Chem.*). Starch gum. A term for a group of intermediate products obtained in the transformation of starch into maltose and *d*-glucose. Dextrins are obtained by boiling starch alone or with dilute acids. They do not reduce *Fehling's solution* (q.v.). Crystalline dextrins have been obtained by the action of *Bacillus macerans.*

dex'trinase (*Bot.*). A plant enzyme which hydrolyses dextrin.

dextrocar'dia, dexiocar'dia (*Med.*). A developmental anomaly in which the heart lies in the right side of the chest.

dextrorota'tory (*Light*). Said of an optically active substance which rotates the plane of polarisation in a clockwise direction when viewed in the direction of travel of the light.

dextrorse (*Bot.*, *Zool.*). Turning or twisting in a right-handed direction, or in a spiral from left to right; said of gastropod shells. Cf. *sinistrorse.*

dextrose (*Chem.*). *d*-Glucose.

dezincification (*Chem.*). A term used in metallurgical chemistry for a process involving the removal of zinc from metals in the liquid state.

D.H. (*Build.*). Abbrev. for *double-hung.*

dhootie, doo'ti (*Textiles*). A plain cotton fabric with coloured borders; worn as loin-cloths by Indian peoples.

di- (Greek *dis*, twice). A prefix used in the construction of compound terms; e.g. *dibranchiate* (q.v.).—(*Chem.*) A prefix indicating *two* atoms, groups, etc.

Di (*Chem.*). The symbol for *didymium*, a mixture of neodymium and praseodymium.

dia- (Greek *dia*, through, asunder). A prefix used in the construction of compound terms; e g *diatropism* (q v.).

Diabaig Group (*Geol.*). The lowest of the three divisions of the Torridon Sandstone of the N.W. Highlands of Scotland; it consists chiefly of sandstones, together with basal breccias.

di'abase (*Geol.*). A rock-name used in two or three different senses. In Britain it signifies an altered dolerite in which the original pyroxene has been converted into secondary amphiboles, the plagioclase has been more or less albitised, and the ilmenite converted into leucoxene and magnetite. On the Continent *diabase* signifies a pre-Tertiary dolerite. See **dolerite.**

diabe'tes insip'idus (*Med.*). A condition in which there is an abnormal increase in the amount of urine excreted, as a result of disease of, or injury to, the pituitary gland.

diabetes melli'tus (*Med.*). A disorder of metabolism in which excess of sugar appears in the blood and in the urine, associated with loss of weight and excessive thirst.

diabetogen'ic (*Med.*). Giving rise to diabetes.

diace'tic acid (*Chem.*). Acetylacetic or acetoacetic acid, $CH_3CO{\cdot}CH_2{\cdot}COOH$.

diacetone alcohol (*Chem.*). $CH_3{\cdot}CO{\cdot}CH_2{\cdot}C(CH_3)_2{\cdot}OH$, 4-hydroxy-2-keto-4-methylpentane, a colourless or light yellow liquid, m.p. −54° C., b.p. 130°-175° C., sp. gr. 0·915-0·943. Used as a lacquer solvent.

diacetyl, dī-as'— (*Chem.*). α-Diketo-butane, $CH_3{\cdot}CO{\cdot}CO{\cdot}CH_3$, a yellow-green liquid, b.p. 87° C. It is the simplest diketone, and is obtained by the action of nitrous acid on methyl ethyl ketone.

diach'ronism (*Geol.*). The transgression across time planes by a geological formation. A bed of sand, when traced over a wide area, may be found to contain fossils of slightly different ages in different places, as, when deposited during a long-continued marine transgression, the bed becomes younger in the direction in which the sea was advancing.—*adj.* **diachronous.**

diach'ylon (*Med.*). A lead plaster.

di'acoele, —sēl (*Zool.*). In *Craniata*, the third ventricle of the brain.

diacrante'rian, diacranter'ic (*Zool.*). Having the teeth in a discontinuous row; as some Snakes, in which the anterior and posterior teeth are separated by a gap. Cf. *syncranterian.*

diacritical point (*Elec. Eng.*). The point on the magnetising curve of a sample of iron at which the intensity of magnetisation has half its saturation value.

diactin'ic (*Photog.*). Having the property of transmitting rays of light which have actinic action, as camera lenses, infra-red filters.

diadel'phous (*Bot.*). Said of stamens which are arranged in two bundles.

di'adro'mous (*Bot.*). Said of venation resembling the ribs of a fan.

diaer'esis (*Typog.*). A mark (¨) placed over the second of two vowels to indicate that it is pronounced separately from the first.

diage'otro'pism (*Bot.*). The assumption, by a plant member, by means of growth, of a position across a line perpendicular to the surface of the earth.—*adj* **diageotropic.**

diagno'sis (*Bot.*). A formal description of a plant, having special reference to the characters which distinguish it from related species.

diagnosis (*Med.*). The determination of the nature of a disordered state of the body or of the mind: the identification of a diseased state.

diagnostic characters (*Zool.*). Characteristics by which one genus, species, family, or group can be differentiated from another.

diagonal. A straight line drawn between two non-adjacent angles of a polygon.

diagonal (*Bot.*). Said of any member of a flower situated in a position otherwise than median or lateral.

diagonal (*Eng.*). A tie or strut joining opposite corners of a rectangular panel in a framed structure.

diagonal (*Textiles*). The term applied to heavy fabrics which have a prominent twill line, usually at a low angle.

diagonal (*Typog*). The character /, used to divide shillings and pence, etc. Often called a SHILLING-STROKE.

diagonal bond (*Build.*). See **raking bond.**

diagonal eyepiece (*Surv.*). A special type of eyepiece used on surveying telescopes when observing high altitudes and when it is inconvenient or impossible to bring the eye into position for sighting with an ordinary eyepiece. In principle it depends on the reflection of the line of sight through 90° by means of a prism or mirror within the diagonal eyepiece.

diagonal pitch (*Eng*). In zig-zag riveting, the distance between the centres of adjacent rivets.

diagonal winch (*Eng.*). A steam-winch in which, to economise floor space, the engine cylinders are inclined instead of horizontal.

diagonalising (*Radio*). The practice of radiating the same programme at different times, on different wavelengths.

diagram (*Geom.*, *etc.*). (1) An outline figure or scheme of lines, points, and spaces, designed (*a*) to represent an object or area; (*b*) to indicate the relation between parts; (*c*) to show the value of quantities or forces.—(2) A curve which indicates the sequence of operations in a machine.

diagram factor (*Eng.*). The ratio between the actual mean effective pressure developed in a steam-engine cylinder and the ideal pressure deduced from the hypothetical indicator diagram.

diahe'liotrop'ic (*Bot.*). See **diaphototropic,** which is a better term.

diakine'sis (*Cyt.*). The last stage of meiotic prophase, in which the nuclear membrane breaks down and the tetrads pass on to the spindle.

dial. The observable functional part of an indicating instrument, carrying the scale over which the indicating pointer moves. See also **counter.**

dial (*Auto. Teleph.*). The arrangement by which the subscriber may send the necessary number of impulses to secure the exchange and the required number. Also CALLING DIAL.

dial (*Horol.*). The graduated plate immediately behind the hands of a clock or other timekeeper, from which the time is read.

dial (*Mining, Surv.*). A large compass mounted on a tripod, used for surveying or mapping workings in coal-mines.

dial (*Radio*). The mechanism for adjusting, and for indicating the adjustment, of the tuning controls.

dial (*Surv.*). See **dial** (*Mining*), also **Hedley's dial, Lean's dial.**

dial foot (*Horol.*). (1) Circular pins, attached to the back of a dial, which enter corresponding holes in the pillar plate to ensure its correct location.—(2) In some clocks the dial feet are pinned to the pillar plate to hold the dial in position.

dial gauge (*Eng.*). A sensitive measuring instrument in which small displacements of a plunger are indicated in 1/1000 inch units by a pointer moving over a circular scale.

dial impulses (*Auto. Teleph.*). The slightly variable impulses received from a subscriber's dial, as compared with machine impulses generated for use in an automatic exchange.

dial plate (*Horol.*). See **bottom plate.**

dial sight (*Artillery*). A sight by which lateral angles can be measured, when firing from behind cover.

dial switch (*Elec. Eng*). A multi-contact switch in which the contacts are arranged in the arc of a circle, so that contact can be made by a radial moving arm.

dial'dehydes (*Chem.*). Compounds containing two aldehyde groups. The most important one is *glyoxal* (q.v.).

dialectical materialism. See **materialism (dialectical).**

di'allage (*Min.*). A schillerised monoclinic pyroxene, in composition comparable with augite; occurs typically in basic igneous rocks such as gabbro.

dial'lagite (*Geol.*). A coarse-grained, deep-seated ultramafic rock consisting essentially of diallage with small amounts of other minerals in an accessory rôle only; essentially monomineralic, and a differentiation product of gabbroic magma.

dialling (*Auto. Teleph.*). The act of sending trains of impulses by rotating the dial against its control spring and then releasing it, thereby opening the circuit a prescribed number of times.

dialling (*Mining, Surv.*). The process of running an underground traverse with a mining *dial* (q v.).

dialling, duplex (*Teleg.*). See **duplex dialling.**

dialling in, dialling out (*Auto. Teleph.*). The manual operation of dialling into an automatic exchange from a manual exchange, or dialling out of an automatic exchange into a manual exchange.

dialling tone (*Auto. Teleph.*). The audible tone sent to a subscriber by the automatic switching apparatus which has been seized at the exchange, and which is ready to receive the trains of impulses caused by dialling.

dial'ogite (*Min.*). A mineral closely related to rhodochrosite, the trigonal carbonate of manganese.

dialycar'pic (*Bot.*). See **apocarpous.**

dialyneu'ry (*Zool.*). In some *Gastropoda*, the condition of having the pallial nerves from the pleural ganglion anastomosing with the pallial nerves from the supra-intestinal ganglion or the sub-intestinal ganglion, or, if they are absent, from the corresponding parts of the visceral nerve. Cf. *zygoneury*.

dialypet'alous (*Bot.*). See **polypetalous.**

dial'ysis (*Chem.*). The separation of a colloid from a substance in true solution by allowing the latter to diffuse through a parchment membrane.

dialyste'lic (*Bot*). Having several separate steles.

diamagnetic (*Elec. Eng.*). A term applied to substances having a permeability less than that of a vacuum, i.e. less than 1.

diamagnetism (*Elec. Eng.*). The properties exhibited by a diamagnetic substance under the influence of a magnetising force.

diameter (*Geom.*). (1) A straight line passing through the centre of a figure or body and terminated by its boundaries.—(2) A straight line bisecting a system of parallel chords in a curve.

diameter of commutation (*Elec. Eng.*). The diametral plane in which the coils of an armature winding that are undergoing commutation should be situated if the commutation is to be perfect.

diam'etral pitch (*Eng.*). In a gear-wheel, the number of teeth per inch of pitch circle diameter; equal to π/circular pitch.

diametral winding (*Elec. Eng.*). A term occasionally used to denote an armature winding in which the number of slots is a multiple of the number of poles.

diametrical tappings (*Elec. Eng.*). Tappings taken on a closed armature which are diametrically opposite to each other, i.e. displaced from each other by 180 electrical degrees.

diametrical voltage (*Elec. Eng.*). The voltage between opposite lines of a symmetrical 6-phase system, or the voltage between tappings on an armature winding which are diametrically opposite to each other, i.e. displaced from each other by 180 electrical degrees.

diamide, dī'am-īd (*Chem.*). See **hydrazine hydrate.**

diamines, dī-am-ēnz′ (*Chem.*). Compounds containing two amino groups.

diamond (*Min*). One of the crystalline forms of carbon; it crystallises in the cubic system, rarely in cubes, commonly in forms resembling an octahedron, and less commonly in the tetrahedron. Curved faces are characteristic. It is the hardest mineral (10 in Mohs' scale); hence valuable as an abrasive, for arming rock-boring tools, etc, and as a gemstone. Occurs in the blue ground in the Kimberley District, in river gravels above the Vaal, in shore sands in S.W. Africa, also in Brazil, the Congo, British Guiana, and elsewhere. See **black diamond, bort.**

diamond (*Textiles*). The term applied by woolsorters to wool taken from the sides of a Down fleece; the term is also applied to a type of fancy worsted twist yarn, and to designs woven in diamond form.

diamond (*Typog.*). The old name for a type-size, about 4½-point.

diamond antenna (*Radio*). See **rhombic antenna.**

diamond dust (*Abrasives*). The hardest of the substances used for abrasive purposes; used also by lapidaries on the edge of rotating wheels.

diamond frame (*Bicycles*). The name given to the frame of a bicycle of diamond pattern.

diamond mesh (*Build., Civ. Eng.*). A form of *expanded metal* (q.v.) with a diamond-shaped network.

diamond saw (*Tools*). A stone-cutting circular saw used with diamond dust for cutting rock sections.

diamond-skin disease (*Vet.*). See **swine erysipelas.**

diamond-type coil (*Elec. Eng.*). A former-wound armature coil in which the overhang is diamond-shaped, i.e. made up of two straight sides meeting at a point.

diamond-work (*Masonry*). A wall constructed of lozenge-shaped stones laid in courses.

dian'drous (*Bot.*). Having two antheridia or two stamens.

diapede'sis (*Zool.*). In *Porifera*, the passage to the exterior of cells primarily occupying the interior of certain types of larva: in *Vertebrata*, the passage of blood-leucocytes through the walls of blood-vessels into the surrounding tissues.

diaper (*Textiles*). Linen and cotton fabric with a square or diamond pattern of a counter-changing character; used chiefly for table linen.

diaper-work (*Masonry*). Paving constructed in a chequered pattern, composed of stones or tiles of different colours.

diaphone (*Acous.*). In an organ, a resonating Helmholtz pipe in which the frequency is determined by a pallet vibrating on a spring, as contrasted with metal-reed and flue pipes.

diaphore'sis (*Med.*). Perspiration.

diaphoret'ic (*Med.*). Producing perspiration: a medicine which does this.

diaphototrop'ic (*Bot.*). Said of a plant member which grows and comes to a fixed position across the direction of incident light.

diaphragm (*Acous.*). (1) A rigid or stretched plane or cone used for generating sound-waves by virtue of its capacity for displacement of a large volume of air for small movement.—(2) By inversion, the area set in motion by a sound-wave in a microphone; it generates an electrical replica of the wave-form of the sound-wave.

See **closed—** **pleated—**
cone— **stretched—**
open—

diaphragm (*Bot.*). (1) A plate of cells with very small intercellular spaces between them, lying here and there across the large intercellular spaces in stems of some aquatic plants.—(2) A transverse plate of cells across a stem, generally at a node.

diaphragm (*Build.*). A web across a hollow terra-cotta block, forming separate compartments.

diaphragm (*Elec. Eng.*). A sheet of perforated or porous material placed between the positive and negative plates of an accumulator cell.

diaphragm (*Light, Photog.*). See **stop**; also **iris diaphragm.**

diaphragm (*Surv.*). A flanged brass ring which is held in place in a telescope tube by means of four screws, and which receives the *reticule* (q.v.).

diaphragm (*Zool.*). Generally, a transverse partition subdividing a cavity.—In *Mammalia*, the transverse partition of muscle and connective tissue which separates the thoracic cavity from the abdominal cavity: in *Salientia*, a fan-shaped muscle passing from the ilia to the oesophagus and the base of the lungs: in some *Arachnida*, a transverse septum separating the cavity of the cephalothorax from that of the abdomen: in certain *Polychaeta*, a strongly developed transverse partition dividing the body cavity into two regions.

diaphragm plate (*Struct.*). A connecting stiffener between the webs of a box girder.

diaphragm pump (*Eng.*). A pump in which a flexible diaphragm replaces a piston or bucket, being clamped round the edge and attached at the centre to a reciprocating rod of short stroke.

diaphragmless microphone (*Acous.*). The same as *cathodophone* (q.v.).

diaphysec'tomy (*Surg.*). Excision of part of the shaft of a long bone.

diaph'ysis (*Zool.*) The shaft of a long limb bone. Cf. *epiphysis.*

diaphysi'tis (*Med.*). Inflammation of the diaphysis.

diapoph'yses (*Zool.*). A pair of dorsal transverse processes of a vertebra, arising from the neural arch.

diapositive (*Photog.*). The description of a positive transparency on glass or film, in contrast to *kata-positive.*

diap'sid (*Zool.*). Said of skulls in which the supra- and infra-temporal fossae are distinct. Cf. *synapsid.*

diarch, dī'ark (*Bot.*). Having two xylem strands.

diarrhoea, diarrhea (*Med.*). The frequent evacuation of liquid faeces.

diarthro'sis (*Zool.*). A true (as opposed to a fixed) joint between two bones, in which there is great mobility; a cavity, filled with a fluid, generally exists between the two elements.

diaschisis, dī-as'kis-is (*Med.*). A disturbance of function of one part of the brain, consequent upon disease of another more remote part which is functionally connected with it.

diaschis'tic (*Cyt.*). In meiosis, said of tetrads which divide once transversely and once longitudinally.

dī'aspore (*Min.*). A group of minerals comprising diasporite, goethite, and manganite. *Diasporite* is an aluminium hydroxide occurring as platy orthorhombic crystals in clays, notably in some of the bauxites.

dī'astase (*Chem.*). An enzyme, or group of enzymes, capable of converting starch into sugar. Diastase is produced during the germination of barley in the process of malting.

dias'tasis (*Surg.*). The separation, without fracture, of an epiphysis from the bone.

dias'tataxy (*Zool*.). In Birds, absence of the fifth secondary remex or fifth flight feather carried by the ulna.

dias'tema (*Zool.*). (1) An equatorial modification of protoplasm preceding cell-division.—(2) A gap in a jaw where there are no teeth.

dias'ter (*Cyt.*). In cell-division, a stage in which the daughter chromosomes are situated in two groups near the poles of the spindle, ready to form the daughter nuclei.

dī'astole (*Bot., Zool.*). Rhythmical expansion, as of the heart, or of a contractile vacuole; growth and expansion of the nucleus from the end of one mitosis to the commencement of the next. Cf. *systole.*

dī'astolic murmur (*Med.*). A murmur heard over the heart during diastole and indicative of valvular disease.

dias'trophism (*Geol.*). Relatively rapid and intense change in the configuration of the earth's surface alternating periodically with long spells of time during which the normal processes of denudation and sedimentation take place imperceptibly slowly. See **orogenesis.**

diastyle (*Build.*). A colonnade in which the space between the columns is equal to three times the lower diameter of the columns.

diather'manous (*Phys.*). Capable of transmitting radiant heat.

diather'my (*Med.*). The generation of heat in body tissues by passage of an electric current through them.

diath'esis (*Med.*). The constitutional state of the body which renders it liable to certain diseases; e.g. the epileptic diathesis.

dī'atom (*Bot.*). A member of the *Bacillariophyta* (q.v.).

diatom ooze (*Geol.*). A deep-sea deposit consisting essentially of the frustules of diatoms; widely distributed in high latitudes.

diatomite or **diatom earth** (*Min.*). A siliceous deposit occurring as a whitish powder consisting essentially of the frustules of diatoms. It is resistant to heat and chemical action, and is used in fireproof cements, insulating materials, as a backing for more refractory materials for furnace walls, and as an absorbent in the manufacture of explosives. Also known as KIESELGUHR.

diatoni, dī-at'— (*Masonry*). Quoins having two dressed faces projecting from the wall.

diatro'pism (*Biol.*). The tendency of organs or organisms to orientate themselves with their main axis at right-angles to the line of action of a stimulus.

Diatto surface-contact system (*Elec. Eng.*). A surface-contact electric traction system in which the skate under the vehicle is magnetic and lifts iron plungers which close contacts to make the studs in the road alive.

diax'on (*Zool.*). Having two main axes, as some Sponge spicules.

diax'one (*Zool.*). A bipolar nerve-cell.

diazo compounds (*Chem.*). Compounds of the general formula $R{\cdot}N{:}N{\cdot}R'$, obtained by the action of nitrous acid on aromatic amines at low temperatures. They are important intermediates for dyestuffs.

diazoamino compounds (*Chem.*). Pale yellow crystalline substances obtained by the action of a primary or secondary amine on a diazonium salt. Their general formula is $\mathrm{R{\cdot}N\,N{\cdot}NHR'}$. They do not form salts and most of them are easily transformed into the isomeric aminoazo compounds.

diazomethane (*Chem*). CH_2N_2, an aliphatic diazo compound, an odourless, yellow, poisonous gas, very reactive, used for introducing a methyl group into a molecule. It is prepared from nitroso-methyl-urethane by decomposition with alcoholic caustic potash.

diazonium salts (*Chem.*). The acid salts of diazobenzene of the general formula $\mathrm{R\,N(Cl){\cdot}N}$, important intermediates for azo-dyestuffs. They are usually prepared only in aqueous solution, by the action of nitrous acid on an aromatic amine at low temperatures in the presence of excess of acid. The —N:N— group can easily be replaced by hydrogen, hydroxyl, halogen, etc. and the diazonium salts can thus be transformed into other benzene derivatives.

diazotisation (*Chem.*). The process of converting amino into diazo compounds.

diaz'otype (*Photog*). A process for obtaining coloured dye images on paper or fabrics, starting with primuline and sensitising, then exposing and treating with selected dyes.

dibasic acids (*Chem.*). Acids containing two replaceable hydrogen atoms in the molecule.

dibenzyl group (*Chem.*). A synonym for the stilbene group, comprising compounds containing two benzene nuclei linked together by a chain of two or more carbon atoms.

diblas'tula (*Zool*) In certain Invertebrates, an embryonic stage consisting of two layers of cells surrounding a central cavity.

Dibran'chia (*Zool.*). A subclass of *Cephalopoda*, in which the visceral mass is naked, the shell being rudimentary and embedded in the integument; there is one pair of ctenidia, and the eyes possess a crystalline lens.

dibran'chiate (*Zool.*). Having two gills or ctenidia.

dicar'yon, dikar'yon (*Cyt*). A pair of closely associated nuclei which divide at the same time.

dice-pattern (*Textiles*). The term applied to small check patterns of chess-board type.

dicentrine (*Chem.*). $C_{20}H_{21}O_4N$, an alkaloid of the isoquinoline group, obtained from the roots of the *Dicentra* species; it crystallises in prisms, m p. 168° C. It affects the heart and the respiratory centres.

diceph'alus (*Med*). A developmental monstrosity in which a foetus is born with two heads.

dicephalus tetrabra'chius (*Zool.*). In experimental embryology, an abnormal embryo produced by tight constriction in the sagittal plane of the two-celled stage, when the sagittal plane coincides with the first furrow, and characterised by the possession of two pairs of fore-limbs and two heads.

dicha'sial cyme (*Bot.*). See **dichasium.**

dicha'sium, diacha'sium (*Bot.*). A cymose inflorescence in which each branch bears two lateral branches, both of about the same strength of development.—*adj.* **dicha'sial.**

dichlamyd'eous (*Bot.*). Said of a flower having calyx and corolla.

dichlamydeous chimaera (*Bot.*). See **diplochlamydeous chimaera.**

dichoceph'alous (*Zool*). Said of ribs which have two heads, a tuberculum, and a capitulum. Cf. *holocephalous*.

di'chogamy (*Bot.*). The condition in which, in a given flower, the stamens and stigmas are not mature at the same time.—*adj.* **dichogamous.**

dichopo'dium (*Bot.*). A sympodial branch system made up of successive parts of a dichotomising branch system, of which only one part assists in forming the axis.

dichop'tic (*Zool.*). Having the eyes of the two sides distinctly separated.

dichot'omy (*Bot.*). The production of two branches of the same size by the apical cell or apical growing point dividing into two equal parts, each then growing into a branch.—*adj.* **dichotomous.**—FALSE DICHOTOMY is equivalent to *forking* (q.v.).

dichro'ic fog (*Photog.*). Fog which arises from the formation of an organic compound of silver; so-called because of its reddish coloration by transmitted light, and greenish coloration by reflected light.

di'chroism (*Light*). The property possessed by some crystals (tourmaline, for example) of absorbing the ordinary and extraordinary ray to different extents; this has the effect of giving to the crystal different colours according to the direction of the incident light.—(*Min.*) See **pleochroic haloes.**

di'chroite (*Min.*). *Cordierite* (q.v.).

dichromates (*Chem.*). See **chromates.**

dichromatism (*Optics*). Colour blindness in which power of accurate differentiation is retained for only two bands of colour in the spectrum.

dichthadiigyne, —di'i-jin (*Zool.*). A peculiar gynaecoid, found among Driver Ants (*Dorylinae*), which lacks eyes and wings and has exceptionally large gaster and ovaries.

Dick test (*Bacteriol*). A test of susceptibility to scarlet fever; the toxins of streptococci obtained from scarlet fever patients are injected into the skin.

dickite (*Min.*). A form of hydrated silicate of aluminium, of the same chemical composition as kaolinite, with which it is grouped, and from which it differs only in the details of atomic structure and in certain physical properties.

dicli'ny, dicli'nism (*Bot*). Having the sexes separate. The term is applied to the condition where the stamens and carpels are produced in separate flowers, either on the same or on a different plant, as well as to that in lower plants where the antheridial and oögonial branches are not obviously closely related in origin.—*adj.* **diclinous.**

dicosta'lia (*Zool.*). The secondary brachial ossicles in *Crinoidea*.

Dicotyle'dones (*Bot.*). A large group of Angiosperms, containing between 150,000 and 200,000 species. The embryos have two cotyledones, the leaves are commonly net-veined, the parts of the flowers are in twos or fives, or multiples of these, and the vascular bundles in the axes usually contain cambium.—*adj.* **dicotyle'donous.**

dicrot'ic (*Med.*). Having a double beat or wave; said of the pulse.

di'crotism (*Med.*). In the arterial pulse, the occurrence of a double beat or wave to each beat of the heart.

Dictaphone. A machine that records dictation on an electrically driven revolving wax cylinder, which is controlled by a 'button.' The cylinder, when placed on a transcribing dictaphone, reproduces the dictation as speech. (Trade-name.)

dictaphone reception (*Radio*). A system of reception in which the signals are recorded on a dictaphone.

dicty-, dictyo- (Greek *diktyon*, net). A prefix used in the construction of compound terms; e.g. *dictyosporangium* (q.v.).

dic'tyate stage (*Cyt.*). A resting stage succeeding *diplotene* (q.v.) in oögenesis; during it the karyosome and the chromosomes lose their staining capacity and sharp contours, and the nucleus increases in size.

dic'tyokine'sis (*Cyt.*). The division of the Golgi apparatus which accompanies division of the nucleus by karyokinesis.

Dictyone'ma Band (*Geol.*). Thin beds of shale rich in the remains of the Dendroid Graptolite *Dictyonema*, occurring in at least two levels in the Upper Cambrian Tremadoc Slates in N. Wales, Shropshire, the Malvern Hills, Bristol District, etc.

dic'tyosome (*Cyt.*). An element of the Golgi apparatus.

dic'tyosporan'gium (*Bot.*). A sporangium found in some *Oomycetes*, in which the spores encyst in the sporangium, then emit their contents separately, and leave a network of empty spore walls.

dic'tyospore (*Bot.*). A multicellular spore divided into segments by both transverse and longitudinal walls.

dic'tyostele (*Bot.*). A tubular network of vascular tissue, wholly enclosed by an endodermis.

dictyoxy'lic (*Bot*). Having a network of meristeles or of vascular bundles.

dicy'clic (*Zool.*). Said of the calyx of *Crinoidea* when a row of infrabasals is present. Cf. *monocyclic.*

didac'tyl (*Zool.*). Having two digits.

didel'phic (*Med*). Pertaining to a double uterus.

didym'ium (*Chem*) An obsolete term for a supposed element which was later found to be a mixture of neodymium and praseodymium.

did'ymospore (*Bot.*). A spore consisting of two cells.

did'ymous (*Bot*). Said of a fruit composed of two similar parts slightly attached along one edge.

didy'namous (*Bot.*). Having two long and two short stamens.

die (*Eng.*) (1) A metal block used in stamping operations. It is pressed down on to a blank of sheet-metal, on which the pattern or contour of the die surface is reproduced.—(2) An internally threaded steel block provided with cutting edges, for producing screw threads by hand or machine.

die (*Masonry*). (1) The body of a pedestal.—(2) The enlarged part at either end of a baluster, where it comes into the coping or the plinth.

die box or **die head** (*Eng.*). The holder into which screw dies are fitted in a screwing machine.

diecasting (*Met.*). A process by which castings of various alloys and cast-iron are produced in permanent moulds. The moulds are generally of metal, in two halves, which are closed for casting. See **gravity—** **pressure—**

diecasting alloys (*Met.*). Alloys that are suitable for diecasting, and which can be relied on for accuracy and resistance to corrosion when cast. Aluminium-base, copper-base, tin-base, zinc-base, and lead-base alloys are those generally used.

die chuck (*Eng.*). A small two- or three-jaw *independent chuck* (q.v.).

die nut (*Eng.*). See **die** (2).

die square (*Carp.*). A squared timber intermediate in size between a baulk and a quartering.

die-stock (*Eng.*). A hand screw-cutting tool, consisting of a holder in which screwing dies can be secured; it is held and rotated by a pair of handles.

dielectric (*Diel.*). A substance capable of supporting an electric stress.

dielectric absorption (*Diel.*). The phenomenon that the charging or discharging current of a dielectric does not die away exponentially with time, but continues for a much longer time at an appreciable value.

dielectric constant (*Diel.*). K or ϵ. The ratio of the capacitance of a condenser with dielectric between the electrodes to the capacitance when air is between the electrodes. The force between charges Q_1 and Q_2 immersed in the dielectric is $(Q_1 Q_2/Kr^2)$. See also **permittivity.**

dielectric fatigue (*Diel.*). The breakdown of a dielectric subjected to a repeatedly applied stress, which is insufficient to break down the dielectric if applied once or a few times.

dielectric hysteresis (*Diel.*). Owing to dielectric absorptions the charge-potential curve has properties of hysteresis. (Obsolescent.)

dielectric loss (*Diel.*). The dissipation of energy within a dielectric due to a sinusoidal electric stress. It has the value $\omega CV^2\delta$, where ω is $2\pi \times$ frequency, C the capacitance, V the voltage, and δ the power factor.

dielectric strain (*Diel.*). See **displacement.**

dielectric strength (*Diel.*). The stress (volts per cm. or mm.) required to puncture the dielectric. It depends greatly upon the conditions of test, the time of application of the voltage, and the thickness of the sample.

dienceph'alon, di-en— (*Zool.*). In Vertebrates, the posterior part of the fore-brain connecting the cerebral hemispheres with the mid-brain.

Diesel cycle (*I.C. Engs.*). A compression-ignition engine cycle in which air is compressed, heat added at constant pressure by the injection of fuel into the heated charge, expanded (so doing work on the piston), and the products exhausted, the cycle being completed in either two revolutions (4-stroke) or one (2-stroke). See **Diesel engine, four-stroke cycle, two-stroke cycle.**

Diesel-electric locomotive (*Elec. Eng.*). A locomotive in which the motive power from a Diesel engine is used to drive an electric generator (d c.) which supplies electric motors connected to the driving axles.

Diesel engine (*Eng.*). A compression-ignition engine in which the oil fuel is introduced into the heated compressed-air charge by a blast of air; in modern engines this is being superseded by solid-injection. See **compression-ignition engine, air blast.**

Diesel locomotive (*Eng.*). A locomotive powered by a Diesel or compression-ignition engine geared to the driving wheels, as distinct from a *steam locomotive* (q.v.).

Diesel oil (*Fuels*). See **gas oil.**

dietary standards (*Chem.*). Standards for daily food consumption, usually based upon the number of large calories produced from foods. Another standard specifies that a certain amount of proteins, carbohydrates, and fats should be consumed daily.

diethyl ether, di-eth'— (*Chem.*). Ether, $C_2H_5{\cdot}O{\cdot}C_2H_5$, m.p. −118° C., b.p. 35° C., sp. gr. 0·72, a mobile, very volatile liquid of ethereal odour, used as an anaesthetic and as a solvent. It is prepared from ethyl alcohol and sulphuric acid.

Dietl's crisis (*Med.*). Attack of severe pain in the loin and abdomen, with vomiting and other symptoms, in a patient with a movable kidney.

Dieulafoy's aspirator, dyė-la-fwa' (*Surg.*). A glass cylinder, with piston and tubes attached, for removing by suction fluids from cavities of the body.

dievrite (*Min.*). See **ilvaite.**

differdange beam (*Struct.*). A beam of I-section having specially broad flanges to impart greater lateral strength.

difference of departure (*Surv.*). The same as *departure* (q.v.).

difference of latitude (*Surv.*). The same as *latitude* (1; q.v.).

difference of phase (*Phys., etc.*). See **phase difference.**

difference of potential (*Elec. Eng.*). See **magnetic difference of potential, potential difference.**

difference tone (*Acous.*). One of the combination tones produced subjectively when two or more pure tones are applied to the ear; most easily observed when the difference is sufficiently low to be recognisable as *beats* (q.v.).

differential anode conductance (*Thermionics*). The reciprocal of the differential anode resistance.

differential anode resistance (*Thermionics*). The slope of the anode voltage versus anode current curve of a multi-electrode valve, when taken with all other electrodes maintained at constant potentials with respect to the cathode. Also called A.C. RESISTANCE, INCREMENTAL RESISTANCE, SLOPE RESISTANCE.

differential booster (*Elec. Eng.*). A booster in which a series winding on the field is connected in opposition to the shunt winding.

differential calculus (*Maths.*). A branch of mathematics dealing with continuously varying quantities; based on the differential coefficient, or derivative, of one quantity with respect to another of which it is a function.

differential car axle (*Automobiles*). The driving (usually rear) axle of a motor vehicle, in which a differential gear, driven by bevel or worm gear from the propeller shaft, permits relative rotation of the two separate half-axle shafts which drive the road wheels.

differential condenser (*Radio*). A condenser consisting of one set of moving plates and two sets of fixed plates so arranged that, as the capacity of the moving plates to one set of fixed plates is increased, that to the other set is decreased. Used for balancing purposes and for the control of regeneration.

differential duplex (*Teleg.*). A duplex or two-way system of telegraphy, using differentially wound relays and galvanometers, each taking marking currents to line and to a line balance, in such directions that their resultant magnetic effect is reduced to zero.

differential flotation (*Met.*). A process of flotation which permits different metallic sulphides to be separated from each other as well as from the gangue of the ore. See **flotation.**

differential galvanometer (*Teleg.*). A pivoted needle galvanometer operated by two identical coils, so that equal and opposite currents in them neutralise each other in their magnetic effect, and therefore no deflection of the needle results.

differential gear (*Eng.*). A gear permitting relative rotation of two shafts driven by a third. The driving shaft rotates a cage carrying planetary bevel wheels meshing with two bevel wheels on the driven shafts. The latter are independent, but the sum of their rotation rates is constant.

differential hardening (*Photog.*). Hardening in an emulsion depending on the silver density in the image, or due to the action of light on some special chemical, e.g. bichromate, in the gelatine.

differential iron tester (*Elec. Eng.*). An apparatus for iron testing consisting of two magnetic squares, one of the sample to be tested and the other of a standard material. The windings on the squares are connected to a differential wattmeter, so that there will be no deflection when the quality of the two specimens is the same.

differential leakage flux (*Elec. Eng.*). A general term given to the leakage flux occurring in and around the air-gap of an induction motor. See **belt leakage, zig-zag leakage.**

differential milliammeter (*Teleg.*). A moving-coil milliammeter with two equal windings on its deflecting coil, so that equal and opposite currents in them do not deflect the indicating needle from its central position.

differential motion (*Eng.*). A mechanical movement in which the velocity of a driven part is equal to the difference of the velocities of two parts connected to it.

differential permeability (*Elec. Eng.*). The ratio of a small change in the magnetic flux density in a magnetic material to the change in the magnetising force producing it, i.e. the slope of the magnetisation loop at the point in question.

differential pressure gauge (*Eng.*). A gauge, commonly of U-tube form, which measures the difference between two fluid pressures applied to it.

differential protective system (*Elec. Eng.*). See **balanced protective system.**

differential pulley block (*Eng.*). A lifting tackle in which a two-diameter chain wheel carries a continuous chain. Rotation of the chain wheel by a hanging loop shortens a second loop supporting the load pulley in such a way as to give a large mechanical advantage.

differential relay (*Elec. Eng.*). A relay whose action depends on the difference in the forces produced by two operating coils. See **percentage differential relay.**

differential relay (*Teleg.*). A relay provided with two identical windings, so that equal and opposite currents in them do not operate the relay, their magnetic effects neutralising each other.

differential resistance (*Elec. Eng.*). The ratio of a small change in the voltage drop across a resistance which does not obey Ohm's law to the change in current producing the drop, i.e. the slope of the volts-current characteristic for the material.

differential stain (*Zool.*). A stain which picks out details of structure by giving to them different colours or different shades of the same colour.

differential susceptibility (*Elec. Eng.*). The ratio of a small change in intensity of magnetisation of a magnetic material to the change of magnetisation force producing it, i.e. the slope of the intensity-magnetising force loop.

differential winding (*Elec. Eng.*). A winding on a machine, instrument, or relay, in which two sections are connected in opposition, so that the flux produced depends on the difference between the m.m.f.'s of the two windings. In a machine it may be called a DECOMPOUNDING WINDING.

differentially compound-wound machine (*Elec. Eng.*). A compound-wound d.c. machine in which the magneto-motive-forces of the two windings oppose one another.

differentially-wound motor (*Elec. Eng.*). A d.c. motor with series and shunt windings on the field connected so that the series winding opposes the shunt winding and therefore causes the speed of the motor to rise as load is put on the machine.

differentiation (*Bot.*). The organisation of mature tissues or mature members from generalised rudiments.

differentiation (*Geol.*). A complex process, still little understood, by which a homogeneous magma in solidifying and cooling gives rise to a series of rocks of different compositions. (See **gravitational differentiation.**) Liquid immiscibility is another possible factor, while differentiation is aided by contamination and hybridisation.

differentiation (*Zool.*). (1) The process of removing the excess stain from certain organs in the preparation of specimens for microscopical examination, in order to show up the structure of the whole specimen more clearly.—(2) The development of modifications in the structure of tissues or organs owing to the development of division of labour.

dif'fluent (*Bot.*). Readily becoming fluid.

difform, difformed (*Bot.*). Of unusual or irregular form.

diffract (*Bot.*). Said of a surface divided into areolae.

diffraction (*Acous.*). The alteration in direction of the propagation of a sound-wave due to change in velocity over its wave-front, either owing to stratification of density or to varying velocity of wind with height.

diffraction (*Light*). A small-scale spreading of light beyond the limits of the geometrical shadow, which is observable when the source of light is small. At the edge of the shadow and parallel to it, a few alternately light and dark bands are seen which are called *diffraction fringes*. Diffraction observations established the wave theory of light.

diffraction (*Radio*). The property, exhibited by all electromagnetic waves, of curvature around the edges of an obstruction in their path. It is one of the factors which account for the propagation of radio waves around the curved surface of the earth.

diffraction fringes (*Light*). See **diffraction.**

diffraction grating (*Light*). One of the most useful optical devices for producing spectra. In one of its forms the diffraction grating consists of a flat glass plate on the surface of which have been ruled, with a diamond, equidistant parallel straight lines, which may be as close as 20,000 to the inch. If a narrow source of light is viewed through such a grating it is seen to be accompanied on each side by one or more spectra, produced by diffraction. See **concave grating.**

Diff'ulume (*Build.*). A trade-name for special lenses designed to scatter light in pavement lights.

diffuse (*Bot.*). (1) Said of a prostrate stem which is freely and loosely branched, and spreads widely over the ground.—(2) Said of parenchymatous cells scattered throughout the xylem.

diffuse density (*Photog.*). The density of a photographic image as measured with diffuse light instead of with a beam of parallel light. Cf. *specular density*.

diffuse growth (*Bot.*). The growth of the thallus of an alga by the division of any of its cells.

diffuse nebulae (*Astron.*). See **irregular nebulae.**

diffuse nucleus (*Cyt.*). The chromidia sometimes present in non-nucleated cells.

diffuse placentation (*Zool.*). Having the villi scattered, as Lemurs, most Ungulates, and Cetacea.

diffuse porous (*Bot.*). The condition of xylem when the vessels are scattered uniformly throughout, or when there is little difference between the vessels formed at different parts of the growing season.

diffuse reflection (*Illum.*). Reflection from a surface such that an incident beam of light is reflected from the surface in all directions.

diffuse-reflection factor (*Illum.*). The ratio of the luminous flux diffusely reflected from a surface to the total luminous flux incident upon the surface.

diffuse series (*Light*). A name first applied, on account of the diffuse character of the lines, to certain series of lines in the arc spectra of the alkalis and alkaline earth metals, but afterwards applied to corresponding series in other spectra even if the lines were well defined.

diffuse sound (*Acous.*). The sound in a reverberant enclosure, the energy density being considered uniform, and the component wave-trains having random directions.

diffuse stimulus (*Bot.*). A stimulus which does not affect the plant from any fixed position.

diffuse tissue (*Bot.*). A tissue consisting of cells which occur in the plant body singly or in small groups intermingled with tissues of distinct type.

diffuse transmission (*Illum.*). Transmission of a beam of light through a screen in such a way that the transmitted light travels in all directions from the surface of the screen.

diffuse-transmission factor (*Illum.*). The ratio of the luminous flux transmitted through a screen to the total incident flux.

diffused lighting (*Illum.*). Lighting in which all the light reaches the area to be illuminated by diffuse reflection or through diffuse transmission, thus avoiding any glare effects and giving an even light distribution.

diffuser (*Acous.*). A wedge or cone placed in front of an open-diaphragm loudspeaking sound-radiator, to obviate the focusing effect obtained at high frequencies, and so obtain a more uniform polar distribution of radiated sound with frequency.

diffuser (*Eng.*). A chamber surrounding the impeller of a centrifugal pump or compressor, in which part of the kinetic energy of the fluid is converted to pressure energy by a gradual increase in the cross-sectional area of flow.

diffuser (*Photog.*). A frame carrying lightly-ground glass, or fine silk, for *softening* (q.v.) the lighting in photographic work; placed over the lens aperture.

diffusion, circle of (*Photog.*). See **circle of confusion** (or **diffusion**).

diffusion law (*Chem.*). See **Graham's law.**

diffusion layer (*Chem.*). The layer of liquid surrounding an electrode across which the electrolyte concentration changes.

diffusivity (*Phys.*). A quantity which determines the rate of rise of temperature of a point in a bar which is being heated at some other point. It is equal to the thermal conductivity divided by the product of the specific heat and the density.

difluorophosphor'ic acid (*Chem.*). HPO_2F_2. Formed by partial hydrolysis of phosphoryl fluoride, POF_3, with cold dilute alkali, or preferably by heating phosphoric acid with ammonium fluoride.

digame'tic (*Zool.*). Having gametes of two different kinds.

digastric (*Zool.*). (Of muscles) having fleshy terminal portions joined by a tendinous portion.

digen'esis (*Zool.*). (1) *Alternation of generations* (q.v.).—(2) The condition of having two hosts; said of parasites.—*adj.* **digenet'ic.**

digenetic reproduction (*Bot.*). See **sexual reproduction.**

digester (*Paper*). A receptacle in which raw materials are boiled, in the first stages of paper-making.

digestion (*Zool.*). The process by which food material ingested by an organism is rendered soluble and assimilable by the action of enzymes. —*adj.* **digestive.**

digestive cell (*Bot.*). One of the cells of the cortex of a root, in which the hyphae of an endophytic fungus are killed and digested.

digestive gland (*Bot.*). A glandular hair characteristic of carnivorous plants, producing enzymes by means of which the prey is digested.

digestive pouch (*Bot.*). A layer of cells on the apex of a lateral root; these cells secrete enzymes which help to bring about the breakdown of the cortical cells of the parent root as the lateral grows through it.

digger (*Civ. Eng.*). A general term for a mechanical excavator.

digger plough (*Agric. Mach.*). A type of mouldboard plough that leaves the soil over which it has travelled flat and broken, and not in an unbroken furrow slice. See **disc plough, mouldboard plough.**

digit-, dij'it- (Latin *digitus*, finger). A prefix used in the construction of compound terms; e.g. *digitigrade* (q.v.).

digit (*Zool.*). A finger or toe: one of the free distal segments of a pentadactyl limb.

digit-absorbing selector (*Auto. Teleph.*). A special selector which is required to waste dialled codes or digits which, though redundant, are included in some automatic telephone areas to afford consistency in the numbering scheme.

digit key strip (*Auto. Teleph.*). The strip of plunger keys used by an operator as a *key sender* (q.v.).

digits, compensating (*Auto. Teleph.*). See **compensating digits.**

digital (*Zool.*). In Spiders, the distal joint of the pedipalp: pertaining to, or resembling, a digit.

digital formula (*Zool.*). A figure expressing the number of phalanges in each digit of the metapodium of a pentadactyl limb.

digita'liform (*Bot.*). Shaped like the finger of a glove.

digita'lin (*Chem.*). A glucoside which, together with digitonin, digitalein, and digitoxin, is present in commercial digitalis.

digitalisa'tion (*Med.*). Administration of digitalis to a patient with heart disease, in amounts sufficient to produce full therapeutic effect.

digitate (*Bot.*). Said of a compound leaf in which the leaflets arise from the top of the petiole and spread like the fingers of a hand.

digit'igrade (*Zool.*). Walking on the digits, as Dogs.

digitule, dij'—(*Zool*). Any small finger-like process.

digoneu'tic (*Zool*). Producing offspring twice a year.

digonop'orous (*Zool*). Having two genital pores.

digue, dēg (*Hyd. Eng*) An artificial sea-wall, or breakwater, constructed to prevent the encroachment of the water on the land behind.

digy'nous (*Bot*). Having two carpels.

dihedral angle (*Maths., Aero.*). Angle between two planes, as measured in the plane normal to their line of intersection. Especially applied to the angle of tilt of the wings of an aircraft with respect to the plane containing the lateral axis and the longitudinal axis.

dihy'brid (*Gen.*). The product of a cross between parents differing in two heritable characters.

dihy'drol (*Chem.*). The supposed compound H_4O_2, present in liquid water.

dikaryon (*Cyt.*). See **dicaryon.**

dikar'yophase (*Bot.*). That part of the life-history of many *Basidiomycetae* in which the hyphae are made up of segments, each containing two nuclei.

dike (*Hyd. Eng.*). See **dyke.**—(*Masonry*) A Scottish term for a stone fence.

dike'tones (*Chem.*). A group of compounds containing $-CO-$ groups, which, according to their position in the molecule, are termed α-diketones $-CO{\cdot}CO-$, or β-diketones $-CO{\cdot}CH_2{\cdot}CO-$, etc.

dikon'tan (*Bot*). Having two flagella.

dilac'erate, dī-las'—(*Bot.*). As if torn into strips.

dilapidations (*Build*). A term applied to the damage done to premises during a period of tenancy.

dilated (*Bot.*). Expanded and flattened.

dilatom'eter (*Chem.*). An apparatus for the determination of transition points of solids. It consists of a large bulb joined to a graduated capillary tube, and is filled with an inert liquid. The powdered solid is introduced, and the temperature at which there is a considerable change in volume on slow heating or cooling may be noted; alternatively, the temperature at which the volume shows no tendency to change with time may be found.

dilatom'etry (*Chem.*). The determination of transition points by the observation of volume changes.

dila'tor (*Zool.*). A muscle which by its contraction opens or widens an orifice. Cf. *sphincter.*

dilly (*Mining*). A short self-acting incline where light loads are run.

dilsh (*Mining*). A band of inferior coal.

dil'uent (*Paint.*). Any substance, such as turpentine, used for thinning out paints or varnishes.

diluted (*Bot.*). Pale and faint-coloured.

dilution (*Chem.*). (1) Decrease of concentration.—(2) The volume of a solution (generally in litres) which contains one gram-molecule of dissolved substance.

dilution law (*Chem.*). See **Ostwald's dilution law.**

dilu'vium (*Geol.*). An obsolete term for those accumulations of sand, gravel, etc. which, it was thought, could not be accounted for by normal stream and marine action. In this sense the deposits resulting from the Deluge of Noah would be *diluvial.*

dimeg'aly (*Zool*) The condition of having spermatozoa of two different sizes.

dimension lumber (*Timber*). Lumber which is sawn to special (as opposed to stock) sizes.

dimension stone (*Masonry*). A term sometimes used for an *ashlar* (q.v.).

dimensions paper (*Build., Civ. Eng.*). The sheets on which dimensions are entered in the process of *taking-off* (q.v.).

dimer'ic (*Chem.*). Having the same empirical formula but double the molecular formula.

di'merous (*Bot*). Having two members in a whorl.

Dimetian (*Geol*). A name applied (by Dr Hicks), owing to a misconception of its true nature, to the granite intruded into the **Pre-Cambrian** rocks of the St David's district in Pembrokeshire.

dimet'ric system (*Crystal.*). See **tetragonal system.**

dimid'iate (*Bot.*) (1) Said of an anther which is lop-sided because one lobe is absent or abortive.—(2) Said of a pileus when one side is larger than the other.—(3) Said of the perithecium of a lichen when the upper part only is enclosed in a wall.—(4) In general, lop-sided.

diminished stile (*Join*). A door-stile which is narrowed down for a part of its length, as, e.g., in the glazed portion of a sash door. Also called GUNSTOCK STILE.

diminishing courses (*Build.*). *Graduated courses* (q.v.).

diminishing pipe (*Plumb., San. Eng., etc.*). A tapered pipe length used to connect pipes of different diameters.

dimity (*Textiles*). (1) A strong cotton fabric resembling diaper and damask but with a stripe pattern; used chiefly for bed upholstery.—(2) A light plain cotton cloth with cord stripes.

dimmer (*Cinema*). The mechanical arrangement for hand or automatic regulation of the current in lamps, so that they are switched on and off gradually.—(*Elec. Eng.*) A variable resistance connected in series with electric lights, for controlling their intensity; used chiefly in stage lighting. Also called DIMMING RESISTANCE. See **liquid dimmer.**

dimmer wheel (*Elec. Eng.*). A handwheel for operating one or more dimmers; commonly used in stage-lighting equipments.

dimming resistance (*Elec. Eng.*). See **dimmer.**

dimonoecious, —ē'si-us (*Bot.*). Having perfect flowers, as well as staminate, pistillate, and neuter flowers.

dimor'phic, dimor'phous (*Bot., Zool.*). Existing in two forms.—(*Chem.*) Capable of crystallising in two different forms.

dimorphic heterostyly (*Bot.*). The condition when flowers of the same species of plant have styles of two different lengths.

dimor'phism (*Zool.*). The condition of having two different forms; as animals which show marked differences between male and female, animals which have two different kinds of offspring, and colonial animals, in which the members of the colony are of two different kinds.

dimple (*Eng.*). A slight conical depression produced by a twist drill after a small initial feed into the work; used as a guide for further drilling.

Dimya'ria (*Zool.*). A class of *Nemertinea* in which there are two muscle layers in the body wall, an external circular and an internal longitudinal layer, in addition to diagonal muscles.

dimya'rian (*Zool.*). Having two muscular layers, as certain *Nemertinea*.

D.I.N. (*Photog.*). Abbrev. for *Deutsche Industrie Normal*, referring to the German method of stating the speed of emulsions. The D.I.N. figure is found by exposing and developing the emulsion under standard conditions, and matching its density on a standard scale. See **S.M.P.E.**

Dinantian Series (*Geol.*). The Lower Carboniferous rocks of N.W. Europe, comprising Tournasian and Viscan Stages. Succeeded by the Namurian Stage. Synonymous with AVONIAN.

Dinas bricks, dē'nas (*Build.*). Firebricks made almost entirely of sand with a small amount of lime.

Dinas rock (*Met.*). A natural rock or sand of high silica content, used as an acid refractory.

diner'gate (*Zool.*). A worker ant having a very large head and powerful mandibles; a soldier ant

Dines hygrometer (*Meteor.*). A form of hygrometer in which the dew-point is determined by cooling a glass plate by a flow of iced water until dew forms on it, the temperature of the plate being indicated by a thermometer.

dinging (*Build.*). Rough plastering for walls, a single coat being put on with a trowel and brush.

Di'noflagella'ta (*Zool.*). An order of *Phytomastigina*; forms having two flagella, one directed backwards, the other transverse and lying in a spiral groove, the annulus; yellow, brown, green, or colourless; sometimes of amoeboid form, but usually covered by cellulose plates; usually without a gullet, having food-reserves of starch or oil or both.

dinting (*Mining*). The operation of taking up the floor of a road or level in a coal-mine to increase its height.

diocoel, dī'ō-sēl (*Zool.*). The lumen of the diencephalon.

Dioc'tophymoi'dea (*Zool.*). A class of *Nematoda* in which the body is sometimes spiny; the mouth is hexagonal and surrounded by from one to three circles, each of six papillae; the gut is suspended by four well-developed longitudinal muscles inserted in the middle-line of the muscle tracts of the body wall; in the female there is a single ovary, in the male a caudal bursa without rays and a single copulatory spicule.

diode valve or **diode** (*Thermionics*). A two-electrode thermionic tube. See **Fleming valve.**

dioecious, dī-ē'shus (*Bot.*). Having the male and female organs on separate plants of the same species, each plant being unisexual.—(*Zool.*) Having the sexes separate.—*n.* **dioecism.**

dioestrus, dī-ēs'trus (*Zool.*). In female Mammals, the growth period following metoestrus.

dionic water tester. An instrument for gauging the purity of water by measurement of its electrical resistance, which is reduced by dissolved salts.

diop'side (*Min.*). A monoclinic pyroxene, ideally consisting of silicate of calcium and magnesium, $CaMgSi_2O_6$, but commonly containing a variable content of $FeSi_2O_6$ in addition, and then strictly known as *ferriferous diopside*.

diop'tase or **emerald copper** (*Min.*). A rare hydrated silicate of copper, crystallising in the trigonal system and found occasionally, as rich emerald-green crystals, in association with other copper ores. When first found it was used as a gemstone.

diop'trate (*Zool.*). Having the compound eye transversely divided into an upper and a lower organ, as in *Gyrinidae* (Whirligig Beetles).

dioptre, dī-op'ter (*Light*). The unit of power of a lens. A convergent lens of 1 metre focal length is said to have a power of +1 dioptre. Generally, the power of a lens is the reciprocal of its focal length in metres, the power of a divergent lens being given a negative sign.

dioptric mechanism (*Zool.*). A mechanism by which the images of external objects may be focused on the retina of the eye.

di'orite (*Geol.*). A coarse-grained deep-seated (plutonic) igneous rock of intermediate composition, consisting essentially of plagioclase feldspar (typically near andesine in composition) and hornblende, with or without biotite in addition. Differs from granodiorite in the absence of quartz. See also **tonalite.**

Dio'tocar'dia (*Zool.*). See **Aspidobranchia.**

dip (*Elec. Eng.*). (1) The angle between the earth's magnetic field at any point and the horizontal; also called INCLINATION or MAGNETIC DIP.—(2) A liquid used for chemically cleaning or colouring metals.—(3) The sag of an overhead transmission line conductor.

dip (*Geol.*). A term implying inclination of strata, measured to the horizontal. The *angle of dip* is measured in the direction of maximum slope of the strata. Indicated on geological maps by a small arrow (the *dip arrow*), with a figure alongside giving the inclination in degrees.

dip (*Hyd. Eng.*). Any departure from the regular slope at which a pipe is laid, when the slope is increased locally.

dip arrow (*Geol.*). See **dip.**

dip circle (*Elec. Eng.*). An instrument consisting of a magnetic needle pivoted on a horizontal axis; by it accurate measurements of magnetic dip can be obtained.

dip fault (*Geol.*). A fracture in the rocks of the earth's crust which coincides in direction with the dip of the strata and is therefore at right-angles to their strike.

dip of the horizon (*Astron., etc.*). The angular difference between the true mathematical and the visible horizon; the difference is due to the curvature of the earth, and its amount depends upon the height of the observer above sea-level. Also called APPARENT DEPRESSION OF THE HORIZON.

dip slope (*Geol.*). A land form developed in regions of gently inclined strata, particularly where hard and soft strata are interbedded. A long gentle sloping surface which coincides with the inclination of the strata below ground.

dip stick (*Eng.*). A rod inserted in a tank or sump to measure the depth of oil or other liquid present.

dipstone trap (*Masonry*). A form of trap in which a stone slab on edge dips below the water surface.

di'phase (*Elec. Eng.*). A term sometimes used in place of *two-phase.*

dipha'sic (*Zool.*). (Of certain Trypanosomes) having a life-cycle which includes a free active stage. Cf. *monophasic*.

di'phe'nyl (*Chem.*). Phenylbenzene, $C_6H_5{\cdot}C_6H_5$; colourless, monoclinic crystals; m.p. 71° C.; b.p. 254-5° C.; soluble in alcohol and ether. It occurs in coal-tar, and is prepared by heating iodobenzene to 220° C. with finely divided copper.

diphenyl ether (*Chem.*). $C_6H_5{\cdot}O{\cdot}C_6H_5$, diphenyl oxide, a liquid of pleasant odour, m.p. 28° C., b.p. 253° C., obtained from phenol by heating with $ZnCl_2$ or $AlCl_3$.

diphenylmethane (*Chem.*). $(C_6H_5)_2CH_2$, colourless needles, m.p. 26° C., b.p. 262° C., obtained by the action of benzyl chloride on benzene in the presence of aluminium chloride.

diphenylmethane dyes (*Chem.*). Dyestuffs derived from diphenylmethane. The only important dyestuff of this class is Auramine O, the ketoneimide of diphenylmethane.

diphenylmethane group (*Chem.*). Compounds containing two benzene nuclei attached to a single carbon atom, derivatives of *diphenylmethane* (q.v.).

diphtheria (*Med.*). An acute infectious disease caused by the Klebs-Löffler bacillus, *Corynebacterium diphtheriae*; characterised by the formation of false membranes on the mucous membranes, especially of the throat.

diphtheria, avian (*Vet.*). See **fowl pox.**

diphtheria, calf (*Vet.*). An infectious disease of calves, due to *Fusiformis necrophorus.*

diph'theroid (*Bacteriol.*). A common term for describing many bacilli similar morphologically to the diphtheria bacillus, belonging to the genus *Corynebacterium*, but harmless to man.

diphthongs (*Typog.*). The characters æ, œ. They are more properly termed vowel-ligatures. In modern usage the tendency is to revert to separate letters in words of Greek and Latin origin, keeping the diphthong, however, in words from the French (e.g. manœuvre).

diphycercal, dī-fi-ser'kal (*Zool.*). Said of a type of tail-fin (found in Lung-fish, adult Lampreys, the young of all Fish, and many aquatic Urodeles) in which the vertebral column runs horizontally, the fin being equally developed above and below it.

diphyge'nic (*Zool.*). Having two different modes of development.

diphylet'ic (*Biol.*). Of dual origin: descended from two distinct ancestral groups.

diph'yodont (*Zool.*). Having two sets of teeth—a deciduous or milk dentition and a permanent dentition.

dipl- (Greek *diploos*, double). A prefix used in the construction of compound terms; e.g. *diploneural.*

diplan'etary (*Zool.*). (Of *Protozoa*) having two different kinds of zoospores.

diplanet'ic (*Bot.*). Swimming for a short time, encysting, and leaving the cyst for a second period of swimming, and with the second swimming phase differing in morphology from the first.

dip'leco'lobous (*Bot.*). Said of an embryo with an incumbent radicle and with the cotyledons folded twice or more.

diple'gia (*Med.*). Bilateral paralysis of like parts of the body.

dipleu'rula (*Zool.*). A free-swimming ciliated larval stage of eleutherozoan *Echinodermata* which is bilaterally symmetrical and possesses three pairs of coelomic sacs.

diplex (*Teleg.*). The possible system of telegraphy in which two messages can be sent independently, in the same direction, over a telegraph circuit. *

diplobi'ont (*Bot.*). A plant which includes in its life-cycle at least two kinds of different individuals; if the species is dioecious, there are three kinds of individuals.—*adj.* **diplobion'tic.**

diploblas'tic (*Zool.*). Having two primary germinal layers, namely, ectoderm and endoderm.

diplocaules'cent (*Bot.*). Having a main axis with branches upon it.

diplochlamyd'eous chimaera (*Bot.*). A periclinal chimaera consisting of an outer skin, two layers of cells thick, representing one constituent, and surrounding a core representing the other constituent.

diplodal (*Zool.*). (Of *Porifera*) having a prosodus as well as an aphodus.

diplodes'mic (*Bot.*). Having two parallel vascular systems.

diplodisation, diploidisation (*Bot.*). The conversion of a mycelium composed of uninucleate segments into one composed of binucleate segments.

diploe, dip-lō'ē (*Zool.*). In certain bones of the skull, cancellous tissue between outer and inner layers of compact bone.—*adj.* **diploic.**

diplogan'gliate (*Zool.*). Having paired ganglia.

diplohap'lont (*Bot.*). A plant having a sexual process, and having a morphological alternation between a haploid generation and a diploid generation.

diploid (*Cyt.*). Having the somatic number of chromosomes characteristic of the species. Cf. *haploid.*

diploid apogamety (*Bot.*). See **euapogamy**

diploid apogamy (*Bot.*). The development of a sporophyte containing diploid nuclei, without any preliminary fusion of gametes, from one or more cells of the gametophyte.

dip'lokaryot'ic (*Cyt.*). Having twice the normal diploid number of chromosomes.

diplone'ma (*Cyt.*). A stage in the meiotic division at which the chromosomes are clearly double.

diplont (*Bot.*). A plant body containing diploid nuclei.

dip'lophase (*Biol.*). The period in the life-cycle of any organism when the nuclei are diploid. Cf. *haplophase.*

diplo'pia (*Med.*). Double vision of objects.

diploplac'ula (*Zool.*). In the life-history of some Invertebrates, a larval stage resembling a flattened blastula.

Diplop'oda (*Zool.*). See **Chilognatha.**

diplo'sis (*Cyt.*). The doubling of the chromosome number.

dip'losome (*Cyt.*). A paired heterochromosome: a double centrosome lying in the cytoplasm.

dip'lospon'dyly (*Zool.*). The condition of having two vertebral centra, or a centrum and an intercentrum, corresponding to a single myotome.—*adjs.* **diplospondylic, diplospondylous.**

dip'lostem'onous (*Bot.*). Having twice as many stamens as there are petals, with the stamens in two whorls, the members of the outer whorl alternating with the petals.

dip'lotene (*Cyt.*). The fourth stage of meiotic prophase, intervening between pachytene and diakinesis, in which homologous chromosomes come together and there is condensation into tetrads.

diplozo'ic (*Zool.*). Bilaterally symmetrical.

Dipnoi or **Dipneusti** (*Zool.*). The only living order of *Crossopterygii*, in which the air-bladder is adapted to function as a lung, and the dentition consists of large crushing plates. Lung-fish.

di'pole (*Chem.*). A molecule in which the effective centres of the positive and negative charges are separated.

dipole (*Diel.*). A positive and a negative charge at a fixed distance. Tends to set itself along the line of electric force and thus gives a contribution to the dielectric constant and the dielectric losses.

dipole antenna (*Radio*). An antenna comprising a straight conductor, of overall length one half-wavelength or less, connexions to which are made at the centre. It responds to waves polarised along the axis of the conductor, and is used at short wavelengths for discriminating between waves of different polarisations. See also **doublet antenna.**

dipole moment (*Chem.*). The product of the magnitude of the charges of a dipole and the distance between them.

dipole radiator (*Radio*). See **dipole antenna.**

Dippel's oil (*Chem.*). Bone-oil. A product obtained by the dry distillation of bones from which the fat has not been extracted; contains a mixture of pyridine bases and their homologues.

dipper (or **dipper-bucket**) **dredger** (*Eng.*). A dredger consisting of a single large bucket at the end of a long arm, swung in a vertical plane by gearing. The bucket capacity may be up to about 12 cubic yards.

dipping (*Eng.*). The immersion of pieces of material in a liquid bath for surface treatment such as pickling or galvanising.

dipping (*Paint.*). A process of painting or varnishing by dipping into tanks filled with paint or varnish.

dipping (*Pot.*). The immersing of pottery in slip (as in the *jasper dip*) or in liquid glaze.

dipping (*Vet.*). The process of immersing animals in a medicated bath, for the destruction of ectoparasites.

dipping needle (*Elec. Eng., Surv.*). A magnetic needle pivoted on a horizontal axis, used for obtaining approximately the magnetic dip, i.e. a rough form of dip circle. Occasionally called an INCLINATORIUM. See **miner's dip needle.**

dipping refractometer (*Chem.*). A type of refractometer which is dipped into the liquid under examination.

dipro'sopus (*Med.*). A foetal monster which has two faces.

diprosopus triophthal'amus (*Zool.*). In experimental embryology, an abnormal embryo produced by constriction of the two-celled stage in the sagittal plane; characterised by the duplication of the anterior part of the head and the fusion of the median pair of eyes.

diprosthom'erous (*Zool.*). Having two somites in front of the mouth.

dipro'todont (*Zool.*). Having the first pair of upper and lower incisor teeth large and adapted for cutting, the remaining incisor teeth being reduced or absent: pertaining to the *Diprotodontia*. Cf. *polyprotodont.*

dipsoma'nia (*Med.*). The condition in which there is a recurring, temporary, and uncontrollable impulse to drink excessively.

Dip'tera (*Zool.*). An order of *Endopterygota*, having one pair of transparent wings, the hinder pair being represented by a pair of club-shaped balancing organs or halteres; the mouth-parts are suctorial; the larva is legless and sluggish. Flies, Gnats, and Midges.

dipy'gus (*Med.*). A foetal monster with a double pelvis.

dipyre, dipyrite (*Min.*). See **mizzonite.**

direct-acting pump (*Eng.*). A steam-driven reciprocating pump in which the steam and water pistons are carried on opposite ends of a common rod.

direct adaptation (*Bot.*). Any adaptation which does not appear to stand in relation to natural selection.

direct arc furnace (*Elec. Eng.*). An electric arc furnace in which the arc is drawn between an electrode and the charge in the furnace. See **Heroult furnace.**

direct call (*Teleph.*). In international telephony, a call which involves a single international telephone circuit, i.e. one between two trunk centres and over one frontier.

direct circuit (*Teleg.*). A telegraphic circuit going from one station to another without the use of relays at intermediate stations.

direct-coupled exciter (*Elec. Eng.*). An exciter for a synchronous or other electric machine, which is mounted on the same shaft as the machine that it is exciting.

direct-coupled generator (*Elec. Eng.*). A generator which is mechanically coupled to the machine which is driving it, i.e. not driven through gearing, a belt, etc.

direct coupling (**d.c.**) (*Elec. Comm.*). The omission of the series condenser in resistance capacity intervalve coupling so that zero-frequency currents are amplified to the same extent as higher frequency currents. The correct grid-bias for the succeeding valve is obtained either by a potentiometer or by a reversed polarity battery.—(*Radio*) Coupling between two circuits effected without an intervening amplifier; e.g. by mutual inductance or capacity.

direct current (*Elec. Eng.*). A current which flows in one direction only, and which does not have any appreciable pulsations in its magnitude. Abbrev. **d.c.** or **D.C.**

direct-current amplifier, —balancer, etc. See **d.c. amplifier,** etc.

direct drive (*Radio*). A transmitting system in which the antenna circuit is directly coupled to the oscillator circuit.

direct germination (*Bot.*). The germination of a spore of any kind by means of a hypha or a filament.

direct haulage (*Mining*). The system in which an engine with a single drum and rope draws loaded trucks up an incline. The empties run downhill dragging the rope after them.

direct heating (*Build.*). A system of heating by radiation. Cf. *indirect heating.*

direct labour (*Civ. Eng.*). A method of carrying out engineering works in which the engineer who prepares the scheme also undertakes the duty of carrying it out, for which purpose he hires labour and plant.

direct laying (*Cables*). Cables are laid in a trench and covered with soil; planks, bricks, tiles, or concrete slabs are put over the cable as protection. Cables used to be armoured, but modern practice is merely to put a serving of bituminised paper or hessian over the lead sheath.

direct lighting (*Illum.*). A system of lighting in which not less than 90% of the total light emitted is directed downwards, i.e. in the lower hemisphere.

direct line (*Teleph.*). The line connecting the subscriber's main telephone instrument to the exchange, as contrasted with an extension line from this instrument.

direct mixing (*Textiles*). The usual method of blending cotton of different types at the bale opener or the hopper feeder in order to obtain material suitable for spinning the desired yarn. See **stack mixing.**

direct nuclear division (*Cyt.*). See **amitosis.**

direct oxidation (*Met.*). The reaction of metals with dry gases, leading to the formation of oxide or other compounds on the surface; it does not occur to a pronounced extent except at elevated temperature.

direct petrol injection (*I.C. Engs.*). A method of operating a petrol engine by injecting liquid petrol directly into the induction pipe or cylinder during the suction-stroke, thus dispensing with a carburettor; in aero engines it avoids carburettor freezing troubles.

direct pickup (*Television*). The transmission of television images directly, without intermediate photographic recording.

direct process (*Met.*). The method originally used for obtaining from ore a form of iron similar to wrought-iron in one operation, i.e. without first making pig-iron.

direct ray (*Radio*). That portion of the wave from a transmitter which proceeds directly to the receiver, without reflection from the Heaviside layer. Also called GROUND RAY, GROUND WAVE.

direct-reading instrument (*Elec. Eng.*). An instrument in which the scale is calibrated in the actual quantity measured by the instrument, and which therefore does not require the use of a multiplying constant.

direct-reading tacheometer (*Surv.*). A tacheometer with which the horizontal and vertical components of a sloping sight may be read directly, without the necessity for measuring the vertical angle.

direct reductive analysis (*Psychol.*). A method of analysis, introduced by Hadfield, which stresses the environmental factor, particularly any specially traumatic or *nuclear* incidents in the life-history of the individual, in the causation of neurosis. He relates the existing emotional attitudes of the patient back to the people for whom they were first felt, thus lessening the phenomenon of transference to the person of the analyst.

direct sound (*Acous.*). The sound intensity arising from the direct radiation from a source to a listener, as contrasted with the reverberant sound which has experienced a large number of reflections between the source and the listener.

direct stroke (*Elec. Eng.*). When a transmission line or other apparatus is struck by a lightning stroke, it is said to receive a *direct stroke*. Cf. *induced stroke*.

direct-suspension construction (*Elec. Eng.*) A form of construction used for the overhead contact wire on electric traction systems; the contact wire is connected directly to the supports without catenary or messenger wires.

direct-switching starter (*Elec. Eng.*). An electric motor starter arranged to switch the motor directly across the supply, without the insertion of any resistance or the performing of any other current-limiting operation.

direct-trip (*Elec. Eng.*). A term used in connexion with circuit-breakers, starters, or other similar devices, to indicate that the current which flows in the tripping coil is the main current in the circuit, not an auxiliary current obtained from a battery or other source.

direct vernier (*Surv.*) A vernier in which n divisions on the vernier plate correspond in length to $(n-1)$ divisions on the main scale.

direct viewing (*Television*). Television reception in which the received image is viewed directly on the screen of a cathode ray tube, without intermediate amplifying or reflecting devices.

direct-vision prism (*Light*). A compound prism with component prisms of two glasses having different dispersive powers and cemented together so that, in passing through the combination, light suffers dispersion but no deviation.

direct-vision spectroscope (*Light*). A spectroscope employing a *direct-vision prism* (q v). Such an instrument is usually in the form of a short straight tube with a slit at one end and an eyepiece at the other; it is used for rough qualitative examination of spectra.

direct-vision view-finder (*Photog.*). A view-finder using a lens and sighting pin or hole with axis parallel to that of the camera lens, or slightly tilted to compensate for distance.

direction-finder (*Radio*). A directional receiver in which the directions of maximum and minimum signal response can be varied, so as to determine the direction of arrival of incoming waves.

See **Adcock—**
automatic—
Bellini-Tosi—
cathode ray—
loop (or frame)—
Robinson—
Robinson-Adcock—
spaced-loop—

direction-finding (*Radio*). The principle and practice of determining a bearing by radio means, using a discriminating antenna system and a radio receiver, so that the direction of an arriving wave, ostensibly the direction or bearing of a distant transmitter, can be determined.

direction switch (*Elec. Eng.*). A switch which determines the direction of travel; used on electric lifts or similar equipments.

directions image (*Min.*). See **interference figure.**

directional antenna (*Radio*). An antenna in which the transmitting and receiving properties are concentrated along certain directions. See also **beam antenna.**

directional baffle (*Acous.*). A baffle taking the form of a widely flared horn with the reproducing diaphragm located at its throat.

directional circuit-breaker (*Elec. Eng.*). A circuit-breaker which operates when the current flowing through it is in the direction opposite to normal.

directional filter (*Elec. Comm.*). An electric wave filter used in carrier telephone systems to separate the bands of frequencies of the outgoing currents from those of the incoming currents.

directional lighting fittings (*Illum.*). Lighting fittings (often used in street lighting installations) which direct a high proportion of their light output towards a point on the roadway, mid-way between adjacent lamp standards.

directional loudspeaker (*Acous.*). A loudspeaker in which the normal directivity of a moving diaphragm is increased by a horn with a large flare, so that the radiated sound-power is mostly directed in a beam.

directional microphone (*Acous.*). A microphone which is directional in its response, either inherently (as in the ribbon microphone) or with the assistance of a parabolic reflector of adequate dimensions.

directional radio (*Radio*). A radio system using directional antennae at the transmitting and/or receiving ends.

directional receiver (*Radio*). A receiving system using a directional antenna.

directional relay (*Elec. Eng.*). A relay whose operation depends on the direction of the current flowing through it.

directional transmitter (*Radio*). A transmitting system using a directional antenna.

directive efficiency (*Radio*). The ratio of maximum to average radiation or response of a directional antenna.

directive force (*Elec. Eng.*). A term used to denote the couple which causes a pivoted magnetic needle to turn into a north and south direction.

directive mesenteries (*Zool.*). In *Anthozoa*, a pair of mesenteries, opposite the siphonoglyph, which have the longitudinal muscle bands facing away from each other.

directive movement (*Bot.*). Movement of orientation.

directives (*Zool.*). In *Zoantharia*, two pairs of mesenteries in which the muscles are on opposite sides, instead of facing each other.

directivity (*Acous.*) The enhancement of response of microphones and loudspeaking receivers in particular directions, usually along an axis, a phenomenon which determines the definition of transmission of sounds during conversion by these electro-acoustic transducers.

directivity (*Radio*). A term loosely employed to express the extent to which a directional antenna concentrates the radiation or response in certain directions.

directly heated cathode (*Thermionics*). See **filament.**

director (*Artillery*). An optical instrument used for measuring horizontal and vertical angles, when calculating the line of fire and angle of sight.

director (*Auto. Teleph.*). The apparatus which obtains a channel, through exchange junctions, to the required exchange. During dialling the trains of impulses are registered, and when the required exchange is found the numerical trains are passed to the required exchange, and operate the selectors, to get the required subscriber.

director (*Surg.*). A grooved instrument for guiding a surgical knife.

director meter (*Auto. Teleph.*). In an automatic switching exchange, a meter which is attached to a director to total the number of times it is taken into operation.

director system (*Auto. Teleph.*). An automatic switching system for routing calls between exchanges. It uses a storage mechanism for the numerical impulse trains, while the code impulses are being translated and used to find a route over junctions to the required exchange, which, when found, receives the numerical trains and hence, by step-by-step mechanism, connects to the wanted subscriber.

dirt (*Mining*). Broken valueless mineral, even if clean.

dirt beds (*Geol.*). A general name applied to old fossil soils, particularly to those in the Purbeck Series. The 'Fossil Forest' of the Lulworth District lies immediately upon such a dirt bed.

dis (*Elec. Eng.*). See **discontinuity.**

disaccharoses (*Chem.*). A group of carbohydrates considered to be derived from two molecules of a monosaccharose by elimination of one molecule of H_2O.

disappearing-filament pyrometer. An instrument used for estimating the temperature of a furnace by observing a glowing electric-lamp filament against an image of the interior of the furnace formed in a small telescope. The current in the filament is varied until it is no longer visible against the glowing background. From a previous calibration the required temperature is derived from the value of the current.

disarticulation (*Surg.*). Amputation of a bone through a joint.

disa'zo dyes (*Chem.*). Dyestuffs containing two azo groups of the type: $C_6H_5{\cdot}N{:}N{\cdot}C_6H_4{\cdot}N{:}N{\cdot}C_6H_4$ OH. These dyes are obtained by diazotising an amino-derivative of azobenzene and then coupling it with a tertiary amine or with a phenol, or by coupling a diamine or dihydric phenol with two molecules of a diazonium salt.

disc or **disk** (*Bot.*). (1) An outgrowth from the receptacle of the flower, arising beneath the carpels or stamens, and often secreting honey.—(2) The central part of a capitulum.—(3) The portion of an apothecium that bears the asci and paraphyses.

disc (*Zool.*). Any flattened, circular, disc-like structure.

disc-and-drum turbine (*Eng.*). A steam-turbine comprising a high-pressure impulse wheel, followed by intermediate and low-pressure reaction blading, mounted on a drum-shaped rotor. Also called COMBINATION TURBINE or IMPULSE-REACTION TURBINE.

disc anode (*Cathode Ray Tubes*). The final anode in an electrostatically focused cathode ray tube, usually a circular plate containing a central aperture through which the beam passes.

disc (or plate) clutch (*Eng.*). A friction clutch in which the driving and driven members have flat circular or annular friction surfaces, and consist of either one or a number of discs, running either dry or lubricated. See **single-plate clutch, multiple-disc clutch.**

disc, colour (*Photog.*). See **colour disc.**

disc condenser (*Elec.*). A variable condenser in which the variation in capacity is effected by the relative axial motion of discs.

disc coulter (*Agric. Mach.*). A saucer-shaped steel disc; used on a drill to make a shallow trench for the seed.

disc discharger (*Elec. Eng.*). A spark gap in which the sparks take place between a fixed contact and studs on a rotating disc. Also called a ROTARY SPARK GAP.

disc filter (*Photog.*). The synchronously rotating disc, containing sectors with appropriate filters, used in taking or projecting colour films.

disc floret (*Bot.*). One of the regular tubular flowers occupying the central part of a capitulum when this contains two kinds of flowers.

disc harrow (*Agric. Mach.*). A harrow consisting of saucer-shaped steel discs mounted on two axles. See **harrow.**

disc pile (*Civ. Eng.*). A hollow pile having a wide flange at the foot with projecting radial ribs on it; used for piling in sand.

disc plough (or plow) (*Agric. Mach.*). A plough which cuts a furrow slice by means of a sharp-edged steel disc, of saucer-like shape, set obliquely to the ground surface. See **mould-board plough.**

disc prism (*Television*). A disc scanner consisting of a glass disc ground in such a way that its periphery forms a series of prisms, so that a ray of light passing through it is deflected through an angle dependent on the position of the disc.

disc, Rayleigh (*Acous.*). See **Rayleigh disc.**

disc record (*Acous.*). The normal type of gramophone shellac record, in which the reproducing needle follows a spiral groove, while the record is rotated at constant speed; devised by Berliner.

disc recording (*Acous.*). The system of recording on circular slabs of wax for subsequent disc pressing, as contrasted with recording on cylindrical waxes, as in the dictaphone.

disc scanner (*Television*). A rotating disc carrying the apertures, lenses, prisms, or other picture-scanning elements used in mechanical scanning systems. See also **apertured disc, disc prism, Nipkow disc.**

disc separator (*Eng.*). A machine for separating grain or seeds of different sizes; used in flour-milling. The grain passes between revolving iron discs on a horizontal shaft, their faces carrying numerous small indents which remove the unwanted seed and discharge it at a higher level.

disc valve (*Eng.*). A form of suction and delivery valve used in pumps and compressors; it consists of a light steel or fabric disc resting on a ported flat seating; steel valve discs are usually spring-loaded.

disc wheel (*Eng.*). A wheel in which hub and rim are connected by a solid disc of metal instead of by separate spokes.

disc winding (*Elec. Eng.*). A type of winding, used for medium and large transformers, in which the turns are made up into a number of annular discs.

discal (*Zool.*) Pertaining to or resembling a disc or disc-like structure: a wing-cell of various Insects.

discard (*Met.*). The portion of an ingot cropped off to remove the pipe and other defects. Also called CROP.

discharge (*Elec. Eng.*). The process of taking energy from a charged accumulator. See also **electric discharge.**

discharge (*Hyd.*). The rate of flow through a pipe or channel, expressed in units such as cubic feet per second, pounds per second, gallons per hour.

discharge bridge (*Diel.*). A method of measuring the ionisation, or discharge, in dielectrics or cables, depending on the selection and amplification of the high-frequency components of the discharge.

discharge coefficient (*Hyd.*). See **coefficient of discharge.**

discharge electrode (*Elec. Eng.*). See **active electrode.**

discharge lamp (*Illum.*). See **electric discharge lamp.**

discharge rate (*Elec. Eng.*). A term used in connexion with the discharge of accumulators. An accumulator has a certain capacity at, say, a one-hour discharge rate when that capacity can be obtained if the accumulator is completely discharged in one hour. If the discharge rate is lower, i.e. more than one hour, the capacity obtainable will be higher.

discharge resistance (*Elec. Eng.*). A non-inductive resistance placed in parallel with a circuit of high inductance (e.g. the field winding of an electric machine) in order to prevent a high voltage appearing across the circuit when the current in it is switched off.

discharge tube (*Thermionics*). A general term for any device in which an electric discharge takes place in a vacuum or a gas at low pressure; it includes thermionic valves, thyratrons, and cathode ray tubes.

discharge valve (*Eng.*). A valve for controlling the rate of discharge of fluid from a pipe or centrifugal pump.

discharger (*Elec. Eng.*). (1) A device, such as a spark gap, which provides a path whereby a piece of electrical apparatus may be discharged.—(2) An apparatus containing an electrically heated wire for firing explosives in blasting.

See **disc—** **multigap—**
Lepel— **rotary—**

discharging arch (*Build.*). An arch built in a wall to protect a space beneath from the weight above.

discharging pallet (*Horol.*). The pallet mounted in the discharging roller of the chronometer escapement, which brings about the unlocking of the escape wheel by removing the locking pallet from a tooth of the escape wheel.

discharging roller (*Horol.*). The circular disc carrying the discharging pallet mounted on the balance staff in the chronometer escapement.

discharging tongs (*Elec. Eng.*). A pair of metal tongs used for discharging condensers before they are touched by hand.

Disciflo'rae, dis-ki— (*Bot.*). A group of dicotyledonous families with polypetalous corollas, usually with a disc in the flower bearing the stamens, and with a superior ovary.

discission (*Surg.*). An incision into a part; especially, needling of a cataract.

discoblas'tula (*Zool.*). The type of blastula formed by the cleavage of a megalecithal egg consisting of a disc-like blastoderm.—*adj.* **discoblastic.**

dis'cocarp (*Bot.*). See **apothecium.**

Discoceph'ali (*Zool.*). An order of *Neopterygii*, characterised by the presence of a large flat complex sucker situated on the dorsal surface of the head. Remoras or Sucking-fish.

discodac'tylous (*Zool.*). Having the ends of the digits flattened out to form circular sucking discs.

discoid (*Bot.*). (1) Round and flat.—(2) Said of a capitulum which has no ray florets.—(3) Said of an open rounded fructification of a lichen.—(4) Said of the form of an algal thallus which is closely applied to a substratum, and is one layer of cells in thickness.

discoi'dal segmentation (*Zool.*). Cleavage of an ovum, leading to the formation of a disc-like germinal area, as in the Chick.

Discolichenes, —li-kē'nēz (*Bot.*). A group of lichens in which the fungus is a Discomycete.

discolor, discolorous, —kul'ur(-us) (*Bot.*). Not of the same colour throughout.

discolouring (*Paint.*). A defect in painted work, characterised by change of colour.

Discomedu'sae (*Zool.*). An order of *Scyphozoa*, comprising active marine forms with eight or more tentaculocysts; regular alternation of generations occurs.

Discomyce'tes (*Bot.*). A group of *Ascomycetes* characterised by the possession of an apothecium as the fructification.

disconformity (*Geol.*). That type of break in the rock sequence in which there is no angular discordance of dip between the two sets of strata involved. Cf. *unconformity*.

disconnecting link (*Elec. Eng.*). See **isolating link.**

disconnection (*Elec. Eng.*). See **discontinuity.**

disconnector (*San. Eng.*). See **interceptor.**

discontinuity or **disconnection** (*Elec. Eng.*). A break, whether intentional or accidental, in the conductivity of an electrical circuit; colloquially called a *dis*. See also **magnetic discontinuity.**

discontinuous distribution (*Biol.*). Isolated distribution of a species, as the Tapir, which is found in the Malay Peninsula and Sumatra and again in Central and South America.

discontinuous variation (*Biol.*). A rare variation: sport: saltation.

discon'ula (*Zool.*). A larval type of certain *Siphonophora*, having eight rays, and producing buds on the ventral side of its umbrella.

discoplacen'ta (*Zool.*). A type of placenta having the villi arranged on a flat disc-shaped area.

discoplank'ton (*Bot.*). Plankton with cells in the form of thin discs.

discrete (*Bot.*). Remaining separate; said especially of paraphyses of lichens.

discriminating circuit-breakers (*Elec. Eng.*). A term sometimes used to denote circuit-breakers which operate only when the current is in a given direction.

discriminating protective system (*Elec. Eng*). An excess-current protective system which causes to be disconnected only that portion of a power system upon which a fault has actually occurred.

discriminating satellite exchange (*Auto. Teleph.*). A small automatic exchange which can decide, without engaging its main exchange, whether or not it can complete a call arising from one of its subscribers.

discriminating selector (*Auto. Teleph.*). A selector which discriminates between calls which are to be completed locally and those which are to be completed through other exchanges, the mode of operation being by the absorption of a train of impulses.

discriminator (*Elec. Eng.*). A device occasionally used in connexion with the metering of an electrical supply; when the demand exceeds a certain predetermined figure, it automatically switches one meter out of circuit and inserts another.

discus (*Bot.*). The hymenium of an apothecium.

discus prolig'erus (*Zool.*). In a Graafian follicle, the layer of cells immediately surrounding the ovum.

dish (*Photog.*). A flat receptacle for chemical solutions; made of neutral chemical material (e.g. porcelain, vulcanite, etc.), it is of standard shape for processing plates and films.

disharmony (*Zool.*). See **hypertely.**

dished (*Furn.*). A term indicating that the seat or back of a chair or couch is curved to shape of the body.

dished-out (*Build.*). Said of the wooden framework or bracketing on which the laths and plastering are fixed in vaults, domes, coved ceilings, and the like.

dished plate (*Eng.*). A plate forged or pressed into a dish-like shape, in order to increase its stiffness when subjected to pressure on the convex side.

dishing (*Carp.*). A hollowed-out recess in a piece of wood.

disincrustant (*Eng.*). See **anti-incrustator.**

disinfectant (*Chem.*). Any compound for destroying microbes and germs. The most powerful disinfectants are potassium permanganate, hydrogen peroxide, and phenol derivatives.

disinfection (*Med.*). The destruction of pathogenic bacteria, usually with an antiseptic chemical or *disinfectant* (q.v.).

disinfestation (*Med.*). The destruction of insects, especially lice.

disintegration (*Masonry*). The gradual crumbling away of building-stone.

disintegration of filament (*Illum.*). The gradual breaking up of the filament of an electric filament lamp, owing to projection of particles from the filament; the particles adhere to the inner surface of the bulb, causing blackening.

disintegrator or **disintegrating mill** (*Eng.*). A mill for reducing lump material to a granular product. It consists of fixed and rotating bars in close proximity, crushing being partly by direct impact and partly by inter-particulate attrition.

disintegrator (*Mining*). A comminuting appliance which produces a fine dry powder by impact, i.e. by a succession of blows by steel hammers, slings, or pegs.

disjunct (*Zool.*). Having deep constrictions between the different tagmata of the body.

disjunction (*Cyt.*). The separation during meiosis of the two members of each pair of homologous chromosomes.

disjunctive symbiosis (*Zool.*). A mutually beneficial partnership between two animals, in which there is no direct connexion between the partners.

disjunctor (*Bot.*). A portion of wall material forming a link between the successive conidia in a chain, and serving as a weak place where separation may occur.

disk. A variant spelling of *disc* (q.v.).

dislocation (*Surg.*). The displacement of one part from another; especially, an abnormal separation of two bones at a joint.

dislocation of meromes (*Zool.*). The passage of a merome from its proper somite to another somite; as the forward movement of the pelvic fins in some Fish.

diso'mic, di— (*Cyt.*). Relating to two homologous chromosomes or genes.

disorientation (*Psychol.*). A mental state in which there is inability to judge the proper relations between events in time and space.

dispensable circuit (*Elec. Eng.*). A separate circuit used in a wiring system to which is connected apparatus that can be cut out of circuit at times of heavy load.

dispensary (*Med.*). A place where drugs, etc. are dispensed (i.e. prepared for administration): a clinic, often charitable, for the treatment of out-patients.

disper'my, di— (*Zool.*). Penetration of an ovum by two spermatozoa.

dispersal (*Biol.*). The establishment of individuals in a new area: the process of reaching such a new area.

dispersed phase (*Chem.*). A substance in the colloidal state.

dispersion (*Light*). The variation of the refractive index of a substance with wavelength (or colour) of the light. It is on account of its dispersion that a prism is able to form a spectrum. For most media the refractive index increases as the wavelength decreases. See **Cornu-Hartmann formula, Cauchy formula, anomalous dispersion, rotatory dispersion.**

dispersion coefficient (*Elec. Eng.*). A term often used to denote the leakage factor of an induction motor.

dispersion curve (*Light*). A curve obtained by plotting the deviation of light produced by a prism against the wavelength of the light.

dispersion hardening (*Met.*). See **precipitation hardening.**

dispersion medium (*Chem.*) A substance in which another is colloidally dispersed.

dispersion photometer (*Illum.*). A photometer for measuring the luminous intensity of strong sources of light. The light from the source is reduced in intensity by means of lenses before being compared with the standard.

dispersive power (*Light*). The ratio of the difference in the refractive indices of a medium for the red and violet to the mean refractive index diminished by unity. This may be written

$$\nu = \frac{\mu_V - \mu_R}{\mu - 1}.$$

dispi'reme, di— (*Cyt.*). The stage of telophase in which the spireme thread of each daughter nucleus has been formed.

displacement (*Aero.*). The mass of the air displaced by the volume of gas in any lighter-than-air craft.

displacement (*Diel.*). The electric displacement in a dielectric is the charge displaced over unit area. It is represented by D and is given by $D=(K/4\pi)E$, where K is the dielectric constant and E the electric stress.

displacement (*Eng.*). (1) The volume of fluid displaced by a pump plunger per stroke or per unit time.—(2) The swept volume of a working cylinder.

displacement (*Hyd. Eng.*). The weight of water displaced by a vessel. It is equal to the total weight of the vessel and contents. See **Archimedes' principle.**

displacement (*Psychol.*). A mechanism commonly observed in dreams, whereby a hidden element may be replaced by something more remote; or the accent may be shifted from an important to an unimportant element, the affect also being transferred from one idea to another. See also **distortion.**

displacement current (*Radio*). The current postulated in a dielectric when the electric stress or potential gradient is varied. It is distinguished from a normal or conduction current in that it is not accompanied by motion of charges in the dielectric. Term introduced by Maxwell.

displacement law (*Phys.*). (1) The law of Soddy and Fajans which states that the emission of an α-particle causes a displacement of two places to the left in the periodic table, and the emission of a β-particle a displacement of one place to the right.—(2) The law of Kossel and Sommerfeld according to which the arc spectrum of an element resembles the singly ionised spectrum of the element one place to the right in the periodic table.—(3) *Wien's displacement law* (q.v.).

displacement series (*Chem.*). See **electromotive series.**

display panel (*Teleph.*). The panel, with illuminated numbers, in front of a manual operator, who completes connexions arising in an automatic system. The displayed numbers are selected by marginal currents translated from impulse trains by a coder.

display work (*Typog.*). Displayed type-setting (such as title pages, jobbing work, advertisements), distinguished from solid text composition.

disposition (*Psychol.*). The mental constitution of an individual, as formed by his reactions to experience and environment.

disruptive discharge (*Elec. Eng.*). The sudden passage of electricity which occurs as a result of a breakdown of insulating material under the influence of electric stress.

disruptive strength (*Elec. Eng.*). See **electric strength.**

disruptive voltage (*Elec. Eng.*). The minimum voltage required to produce a disruptive discharge in an insulating medium.

dissected (*Bot.*). Cut deeply into many narrow lobes or leaflets.

dissecting (*Typog.*). The removal of type matter which is to be printed in a second colour in order to impose it in another chase, position and spacing being carefully regulated.

dissector multiplier (*Television*). See **image dissector multiplier.**

dissector tube (*Television*). See **image dissector.**

disseminate (*Bot.*). Scattered.

disseminated sclerosis (*Med.*). A chronic progressive disease in which patches of thickening appear throughout the central nervous system, resulting in various forms of paralysis.

dissemination (*Bot., Zool.*). The spread or migration of species in plants, usually by means of spores or seeds.

dissem'inule (*Bot.*). Any part of a plant which serves for the dissemination of the plant.

dissep'iment (*Bot.*). (1) A wall dividing the loculi of a syncarpous ovary.—(2) See **trama.**

dissepiment (*Zool.*). In *Hydrocorallinae* and certain Corals, an imperfect horizontal calcareous partition stretching between the septa and partially shutting off the lower part of the polyp cup. Cf. *tabula*.

dissimilation (*Bot.*). See **respiration.**

dissipation (*Elec. Comm.*). The power losses in condensers and inductances, which make the assumption of pure reactances invalid, and make indefinite the nominal cut-off frequencies in filters.

dis'sipative network (*Elec. Comm.*). A network designed to absorb power, as contrasted with networks which attenuate power by impedance reflection. All networks dissipate to some slight extent, because neither inductances nor condensers can be made entirely loss-free.

dissociation (*Chem.*). The reversible or temporary breaking-down of a molecule into simpler molecules or atoms.

dissociation (*Psycho-path.*). A state of temporary loosening of control over consciousness, in which unconscious complexes take control of the personality. In extreme cases this amounts to a splitting of the personality.

dissociation constant (*Chem.*). The ratio of the product of the active masses of the molecules resulting from dissociation to the active mass of the undissociated molecules, when equilibrium is reached.

dissociation of ideas (*Psychol.*). A term used by Janet to denote the splitting off from consciousness of certain ideas with their accompanying emotions; similar to the term *repression* as used by Freud.

dissoconch, dis'ō-konk (*Zool.*). The shell of a veliger larva.

dissogeny, —soj'en-i (*Zool.*). The condition of having two periods of sexual maturity, one during the larval stage and one during the adult stage.

dissolution (*Chem.*). The taking up of a substance by a liquid, with the formation of a homogeneous solution.

dissolve (*Cinema.*). The intermingling during the transition from one shot to another. Effected by overlapping an end fade with a start fade in printing, either by actual overlapping of the negatives or by successive printings in an optical printer.

dist. (*Build.*). Abbrev. for (1) *distemper*, (2) *distributed*.

distal (*Biol.*). Far apart, widely spaced: pertaining to or situated at the outer end: farthest from the point of attachment. Cf. *proximal*.

distance block, distance piece (*Build., Civ. Eng.*). A wooden or other block serving to separate two pieces by a desired distance.

distance control (*Elec. Eng.*). See **remote control.**

distance piece (*Civ. Eng.*). See **distance block.**

distance protection (*Elec. Eng.*). See **impedance protective system.**

distance receptors (*Zool.*). Exteroceptors which can perceive objects at a distance.

distance relay (*Elec. Eng.*). See **impedance relay.**

distant (*Bot.*). Widely spaced.

distant-reading instrument (*Eng.*). A recording or indicating instrument (such as a thermometer or pressure gauge) in which the reading is shown on a scale at some distance from the point of measurement. See **remote control.**

distemper (*Paint.*). A mixture of a dry pigment with size and water; used as a paint for internal walls and ceilings.

distemper, canine (*Vet.*). A contagious infection of dogs and ferrets, due to a filterable virus.

distemper, feline (*Vet.*). A contagious infection of the *Felidae*, due to a filterable virus.

disthene (*Min.*). A less commonly used name for the mineral *kyanite* (q.v.). The name is applied on account of the striking differences in hardness, even on the same crystal face, when tested in different directions.

distichalia, —kā'li-a (*Zool.*). See **dicostalia.**

distichi'asis, distich'ia (*Med.*). A condition in which there are two complete rows of eyelashes in one or both eyelids.

disti'chous (*Bot.*). Arranged in two opposite vertical rows.

distillation (*Chem.*). A process of evaporation and re-condensation used for separating liquids into various fractions according to their boiling points or boiling ranges. See also **molecular—*.**

distillation flask (*Chem.*). A laboratory apparatus, usually made of glass; it consists of a bulb with a neck for the insertion of a thermometer and a side tube attached to the neck, through which the vapours pass into a condenser.

distinct (*Bot.*). (1) Said of a species which has strongly marked characters.—(2) Said of plant members which are quite free from one another.

distomi'asis or **distomato'sis** (*Vet.*). Infection of the bile ducts by flukes or trematode worms.

distorted wave (*Elec. Eng.*). A term often used in electrical engineering to denote a non-sinusoidal wave-form of voltage or current.

distorting network (*Elec. Comm.*). An electrical network altering the response of a part of a system, and anticipating the correction of response required to restore a signal wave-form before actual distortion has occurred, e.g. owing to the inevitable frequency-distortion in a line.

distortion (*Elec. Comm.*). Any departure from the initial wave-form of a signal during transmission.

See **acoustic—**
amplitude—
envelope—
harmonic—
intermodulation—
line—
linear—
non-linear—
modulation—
phase—
phase delay—
phase intercept—
pre—

distortion (*Photog.*). Any departure from the criteria for the perfect formation of an image by a lens.

See **barrel—**
colour—
pillow—
pincushion—

distortion (*Psycho-an.*). A feature of dream-life whereby, mainly, elements are distorted in order to make the real meaning of the dream unrecognisable. A mechanism brought about by the censor to exclude painful elements from the dream.

distortion correction (*Teleg.*). An arrangement for restoring accurate shapes to telegraph signals after their distortion in passing through a circuit.

distortion of field (*Elec. Eng.*). A term commonly used in connexion with electric machines to denote the change in the distribution of flux in the air gap when the machine is put on load.

distortion set (*Elec. Comm.*). A measuring instrument which measures the extent of a specified type of distortion in a communication system. See **telegraph distortion set.**

distortionless line (*Elec. Comm.*). A transmission line with constants such that there is no frequency or delay distortion, the characteristic resistance impedance being constant with frequency and resistive. The condition is $L.G.=R.C.$

distribute (*Typog.*). To put individual letters and spaces back into their proper compartments in the case after use. Machine-set matter is usually melted down to be used again in the caster.

distributed constant (*Elec. Comm.*). The resistance, capacity, inductance, and leakage resistance of a line are distributed along the line, and are expressed in terms of unit-length (e.g. the mile) on the assumption that the electrical properties of the line are uniform with length. Cf. *lumped constant*.

distributed inductance (*Elec. Eng.*). Said of a circuit which has an inductance distributed uniformly along it; e.g. a power transmission line, or a loaded telephone circuit.

distributed load (*Eng.*, *Struct.*). A load spread out over the length of a girder, or part of the length, expressed in lbs. or tons per foot.

distributed winding (*Elec. Eng.*). The winding of an electric machine which is spread uniformly over the stator or rotor surface.

distributing-board, distributing-box (*Elec. Eng.*). See **distribution board.**

distributing centre (*Elec. Eng.*). In an electric power system, a point at which an incoming supply from a feeder is split up amongst a number of other feeders or distributors.

distributing main (*Elec. Eng.*). See **distributor** (1).

distributing-point (*Elec. Eng.*). See **feeding-point.**

distribution (*Bot.*, *Zool.*). (1) The occurrence of species considered from a geographical point of view.—(2) See **dissemination** (*Bot.*).

distribution (*I.C. Engs.*). The provision of the same quantity and quality of petrol-air mixture to each of the cylinders of a multi-cylinder engine by the carburettor and induction manifold.

distribution board (*Elec. Comm.*). An insulating panel carrying terminals and/or fuses, for the distribution of power supplies to repeaters or telegraph circuits.—(*Elec. Eng.*) A box or panel containing bus-bars, switches, fuses, etc. for connecting, controlling, or protecting a number of branch circuits fed from one main circuit of a wiring installation. Also called DISTRIBUTING-BOARD, DISTRIBUTING-BOX.

distribution-board wiring system (*Elec. Eng.*). The system of wiring usually adopted in electric installations; all the various branch circuits are taken from one or more distribution boards.

distribution coefficient (*Chem.*). See **partition coefficient.**

distribution factor (*Elec. Eng.*). A factor used in the calculation of the e.m.f. generated in the winding of an a.c. machine, in order to allow for the fact that the e.m.f.'s in each of the individual coils are not in phase with one another. Also called BREADTH FACTOR.

distribution frame (*Teleph.*). A structure with large numbers of terminals, for arranging circuits in specified orders.

See **combined—** **main—**
intermediate—

distribution fuse-board (*Elec. Eng.*). A distribution board having fuses in each of the separate circuits.

distribution pillar (*Elec. Eng.*). A structure, in the form of a pillar, containing switches, fuses, etc. for interconnecting the distributing mains of an electric power system.

distribution reservoir (*Hyd. Eng.*). See **service reservoir.**

distribution switchboard (*Elec. Eng.*). A distribution-board having a switch in each of the branch circuits.

distributor (*Elec. Eng.*). (1) The cable or overhead line forming that part of an electric distribution system to which the consumers' circuits are connected. Also called a DISTRIBUTING MAIN.—(2) The device used on the ignition system of an internal-combustion engine to ensure that the voltage is applied to the sparking-plugs of the various cylinders in the correct sequence.

distributor (*Teleg.*). An arrangement, generally by a rotating arm with a number of brush contacts, for allocating the line to a number of channels of telegraphic communication so that they each have it for transmitting a signal during a specified fraction of time.

distributor rollers (*Typog.*). In a cylinder printing press, the rollers which distribute ink on the inking table. They are often set at an oblique angle.

district (*Mining*). An underground section of a coal-mine served by its own roads and ventilation ways: a section of a coal-mine.

distrix (*Med.*). Splitting of the ends of hairs.

distuning (*Radio*). *Detuning* (q.v.).

disturbance (*Radio*). Any signal originating from a source other than the wanted transmitter, e.g. atmospherics, unwanted stations, valve noise in the receiver.

disulphide of carbon (*Chem.*). See **carbon disulphide.**

disuse atrophy (*Med.*). Wasting of a part as a result of diminution or cessation of functional activity.

ditch (*Civ. Eng.*). A channel cut in the surface of the ground for drainage purposes.

ditch canal (*Hyd. Eng.*). See **level canal.**

dithal'lic, dī— (*Bot.*). Said of a mycelium formed by the union of material from two distinct strains.

dithe'cal, dī— (*Bot.*). Said of an anther with two lobes, the usual number.

dithionic acid (*Chem.*). *Hyposulphuric acid* (q.v.).

ditre'matous, dī— (*Zool.*). (Of hermaphrodite animals) having the male and female openings separate: (of unisexual forms) having the genital opening separate from the anus.

ditro'chous, dī— (*Zool.*). Having the trochanter divided.

dit'róite (*Geol.*). A coarse-grained deep-seated rock, falling in the alkali-syenite subdivision; named from the type locality of Ditró, Transylvania. Consists essentially of alkali-feldspar, together with nepheline (elaeolite), sodalite, and a (usually) small content of soda-amphiboles and/or pyroxenes.

Dittrich's plugs (*Med.*). Small, yellow, foetid plugs of secretion present in the sputum and in the bronchi, in chronic suppurative bronchitis.

diuresis, dī-ūr-ē'sis (*Med.*). The excretion of urine, especially in excess.

diuret'ic (*Med.*). Producing diuresis: a drug which does this.

diurnal. During a day. The term is used in astronomy and meteorology to indicate the variations of an element during an average day.

diurnal parallax (*Astron.*). See **geocentric (or diurnal) parallax.**

diurnal range (*Meteor.*). The extent of the changes which occur during a day in a meteorological element such as atmospheric pressure or temperature.

diurnal variation (*Surv.*). The regular oscillation of a compass needle from its mean position during the day, amounting in some places to as much as 12 minutes of arc.

diva'lent, dī— (*Chem.*). Capable of combining with two atoms of hydrogen or their equivalent.

divan (*Furn.*). An armless and backless couch, furnished with cushions.

divar'icate, di— (*Bot., Zool.*). Spreading widely apart, forked, divergent.

divar'icators (*Zool.*). In *Brachiopoda,* muscles passing from the cardinal process to the ventral valve.

dive (*Aero.*). A steep descent, the nose of the aircraft being down. Cf. *spin.*

dive, terminal nose (*Aero.*). A nose dive at the greatest obtainable velocity of the machine in that altitude. Also called POWER DIVE.

divergence (*Elec. Eng.*). The limiting value of the *flux* (q.v.) which emanates from a closed surface, divided by the volume of the closed surface when this becomes vanishingly small.

divergence (*Meteor.*). The opposite of *convergence* (q.v.). Divergence is usually accompanied by fine dry weather.

divergent, diverging (*Bot.*). Said of two or more organs which gradually spread so that they are farther apart at their tips than at their bases.

divergent lens (*Light*). A lens which increases the divergence, or diminishes the convergence, of a beam of light passing through it. Such a lens will be double concave, plano-concave, or convexo-concave, the concave surface having the smaller radius of curvature.

divergent nozzle (*Eng.*). A nozzle whose cross-section increases continuously from entry to exit; generally used in compound impulse turbines.

divergent strabismus (*Med.*). Squint in which the eyes diverge from each other.

divers' paralysis (*Med.*). See **caisson disease.**

diversion cut (*Civ. Eng.*). See **bye channel.**

diversity antenna (*Radio*). The antenna system of a diversity receiver.

diversity factor (*Elec. Eng.*). The ratio of the arithmetical sum of the individual maximum demands of a number of consumers connected to an electric supply system to the simultaneous maximum demand of the group.

diversity ratio (*Illum.*). The ratio of the maximum illumination on a given plane to the minimum illumination on that plane.

diversity reception (*Radio*). A system of reception designed to reduce fading; several antennae, each connected to its own receiver, are spaced several wavelengths apart from one another. The demodulated outputs of the receivers are combined.

diverter (*Elec. Eng.*). A low resistance connected in parallel with the series winding or the compole winding of a d.c. machine in order to divert some of the current from it, thereby varying the m m f. produced by the winding.

diverter relay (*Elec. Eng.*). A relay employed with certain excess-current protective systems; it increases the stability of the protective system by putting resistance in parallel with the tripping relay in the case of a heavy fault.

diverticuli'tis (*Med.*). Inflammation of diverticula in the colon.

diverticulo'sis (*Med.*). The presence of diverticula in the colon.

divertic'ulum (*Anat., Zool.*). (1) Saccular dilatation of a cavity or channel of the body.—(2) Lateral outgrowth of the lumen of an organ.—(3) Pouch-like protrusion of the mucous membrane of the colon through the weakened muscular wall.—*pl.* **diverticula.** See also **Meckel's diverticulum.**

divided (*Bot.*). See **dissected.**

divided bearing (*Eng.*). See **split bearing.**

divided circuit (*Teleg.*). A telegraph circuit extending to more than one receiving station, each receiving the transmitted signals.

divided lens (*Photog.*). An incomplete lens, i.e. one which is sawn off along a chord; used in colour photography.

divided pitch (*Eng.*). The axial distance between corresponding points on successive threads of a multiple-threaded screw.

divided touch (*Elec. Eng.*). The magnetising of a steel bar by stroking it with the opposite poles of two permanent magnets, these being drawn apart from the centre of the bar to the ends.

divided winding (*Elec. Eng.*). A term proposed for that class of windings (for d.c. machines) usually called multiple or multiplex, in which there are two or more separate windings on the armature joined in parallel by the brushes.

divider (*Elec. Eng.*). See **potential divider.**

dividers (*Instruments*). Compasses used only for measuring or transferring distances, and not for describing arcs.

dividers (*Mining*). The cross-timbers in a rectangular timbered shaft, other than the end timbers or end plates.

dividing box (*Elec. Eng.*). A box for bringing out separately the cores of a multi-core cable. The insulation of the cable is hermetically sealed and the cores may be brought out either as bare or insulated conductors. See **bifurcating box, trifurcating box.**

dividing engine (*Eng.*). An instrument for marking or engraving accurate subdivisions on scales; it consists of a carriage adjusted by a micrometer screw and holding a marking tool.

dividing fillet (*Elec. Eng.*). See **barrier.**

dividing head (*Eng.*). See **indexing head.**

dividing lines (*Furs*). Lines on a fur, marking changes of colour or length of hair.

diving-bell (*Civ. Eng.*). A water-tight working chamber, open at the bottom, which is lowered into water beneath which excavation or other works are to proceed. The interior is supplied with compressed air to maintain the water-level inside at a reasonable height, and thus leave free a space within which men may work.

divinity calf (*Bind.*). The name given to bindings in dark brown calfskin, with blind tooling; used chiefly for theological works.

division plate (*Eng.*). A plate used for positioning the plunger of an indexing head; provided with several concentric rings of holes accurately dividing the circumference into various equal subdivisions.

division wall (*Build.*). A wall within a building, or serving two houses.

divisu'ral line, di— (*Bot.*). The line along which the peristome teeth of a moss split.

dizo'ic, di— (*Zool.*). (Of spores) containing two sporozoites.

dl- (*Chem*). Containing equimolecular amounts of the dextro-rotatory and the laevo-rotatory forms of a compound; racemic.

D.M. (*San. Eng.*). Abbrev. for *disconnecting manhole.* See **interceptor.**

DN (*Elec. Comm.*). Abbrev. for *deci-neper* (q.v.).

dobbie or **dobby** (*Weaving*). A shedding mechanism used on a loom for the production of fabrics of complicated structure. Very useful also for weaving fancy-striped textures.

Dobie's line (*Zool.*). A dark line which subdivides transversely each of the light areas of a striated muscle fibre; believed to represent a membrane. See **Krause's membrane.**

dock (*Civ. Eng.*). An enclosed basin for the accommodation of shipping.

See **dry— self-docking—**
floating dry— wet—

doctor (*Elec. Eng.*). A device used in electroplating for depositing metal on imperfectly plated parts; it consists of an anode of the metal to be deposited, covered with a spongy material saturated with the plating solution.

doctor (*Paper*). In the paper-making machine, a device consisting of metal blades which scrape off pulp, etc.

doctor (*Plumb.*). A playful name for a soldering iron.

doctor (*Typog.*). On a photogravure or intaglio machine, a blade which scrapes superfluous ink from the plate.

doctor test (*Chem.*). A test for sulphur in petroleum with a sodium plumbite solution.

doctoring (*Elec. Eng.*). See **doctor.**

documentary (*Cinema.*). A style of motion-picture production which uses natural characters and objects for cultural use, as contrasted with the normal basis of films, which uses artificial characters and scenes for pleasure or entertainment.

documentary film (*Cinema.*). Motion picture which aims at the presentation of reality as contrasted with artificiality.

dodecahe'dron, rhombic (*Crystal.*). A crystal form of the cubic system, consisting of twelve exactly similar faces, each of which is a regular rhombus. Does not occur in the orthorhombic system, in spite of its name. See **pyritohedron.**

doeskin (*Textiles*). A woollen overcoating fabric of fine quality, with a soft dress face; made from fine yarns spun from Merino wool.

doffer (*Textiles*). (1) A young operative whose duty it is to remove full cops or bobbins from a machine.—(2) A wire-covered cylinder of the carding engine used to remove fibres from the wire-covered surface of the main cylinder.

doffing (*Textiles*). The process of removing from a machine full cops or bobbins.

doffing comb (*Woollen*). A steel oscillating blade extending across the doffer of a carding engine, from which it strips the carded material in the form of a sheet or web.

dog (*Build., Eng., etc.*). A steel securing-piece used for fastening together two timbers, as in the process of shoring, for which purpose it is hooked at each end at right-angles to the length, so that the hooked ends may be driven into the timbers. The term is also applied to a great variety of gripping implements, viz.—a clutching attachment for withdrawing well-boring tools; a pawl; an adjustable stop used in machine tools; a spike for securing rails to sleepers; a lathe carrier.

dog clutch (*Eng.*). A clutch consisting of opposed flanges, or male and female members, provided with two or more projections and slots, one member being slidable axially for engaging and disengaging the drive. See **clutch.**

dog down (*Ship Constr.*). To secure in position by pieces of bent-round iron, driven through holes in a cast-iron slab in such a manner as to be jammed.

dog-eared fold (*Plumb.*). See **dog's ear.**

dog-ill (*Vet.*). See **distemper (canine).**

dog-leg chisel (*Carp.*). A chisel with a bent shank adapting it to the smoothing of the beds of grooves.

dog-legged stair (*Build.*). A stair having successive flights rising in opposite directions, and arranged without a well-hole.

dog-nail (*Carp.*). A large nail having a head projecting over one side.

dog nose (*Med.*). See **goundou.**

dog-tooth spar (*Min.*). A form of calcite in which the scalenohedron is dominant, giving a sharply pointed crystal like a canine tooth.

dog's ear (*Plumb.*). The corner of a sheet-lead tray, formed with a folding joint.

dog's ear (*Furn.*). A projecting corner on chair backs, etc.

dog's tooth (*Build.*). A string course in which bricks are so laid as to have one corner projecting.

doggers (*Geol.*). Flattened ovoid concretions, often of very large size, in some cases calcareous, in others ferrugineous, occurring in sands or clays. They may be a yard or more in diameter.

dolab'riform (*Bot.*). Shaped like a pick-axe.

doldrums (*Meteor.*). Regions of calm in equatorial oceans. Towards the solstices, these regions move about 5° from their mean positions, towards the north in June and towards the south in December.

dol'erite (*Geol.*). The general name for basic igneous rocks of medium grain-size, occurring as minor intrusions or in the central parts of thick lava flows; much quarried for road metal. Typical dolerite consists of plagioclase near labradorite in composition, pyroxene, usually augite, and iron ore, usually ilmenite, together with their alteration products. See note at **alkali-granite,** also **minverite, teschenite.**

Dolezal'ek electrometer (*Elec. Eng.*). A modified form of a quadrant electrometer designed to give greater sensitivity.

Dolgelley Beds (*Geol.*). The highest of the three divisions of the Lingula Flags (Upper Cambrian) of N. Wales, consisting of blue shales below and sooty black shales and mudstones above, to the maximum thickness of about 600 ft.

Dolgelley Gold Belt (*Geol.*). A belt of land lying north of Dolgelley in Merionethshire, N. Wales, traversed by quartz lodes which, where they cut the Middle Cambrian especially, carry gold in rich pockets.

dol'ichocephal'ic (*Anat.*). Long-headed; said of a skull the breadth of which is less than four-fifths the length.

dol'ichoco'lon (*Anat.*). An excessively long colon.

doli'iform, do'lioform. Barrel-shaped.

Doliol'ida (*Zool.*). An order of *Thaliacea,* having a free tailed larval stage, a free well-formed oözoid, a thin test, two rows of stigmata on the posterior wall of the pharynx; the muscular rings of the body wall are complete.

dollar spots (*Vet.*). The skin lesions of dourine.

dolly (*Cinema.*). A small mobile platform for carrying cameras, directors, etc.; sometimes running on portable rails, for tracking in motion-picture production.

dolly (*Civ. Eng.*). An object interposed between the monkey of a pile-driver and the head of a pile in order to prevent damage to the latter by blows from the former.

dolly (*Elec. Eng.*). The operating member of a tumbler switch; it consists of a small pivoted lever projecting through the outer cover.

dolly (*Eng.*). A heavy tool, shaped like a hammer, for supporting the head of a rivet during the forming of a head on the other end.

dolly (*Mining*). A counterbalance weight sometimes used in a hoisting shaft.

dolly tub or **kieve** (*Mining*). A large wooden tub used for the final washing of valuable minerals separated by water concentration in ore dressing. See **tossing.**

dolly wagon (*Mining*). A wagon for the conveyance of dirt from a mine.

dolmen (*Archaeology*). A term applied to the stone framework of prehistoric sepulchral structures, formerly called *cromlechs.* On the Continent the term is expanded so as to include also the mound of earth which in some cases covers such structures.

Doloment (*Build.*). The name of a composition used in making jointless flooring.

dol'omite (*Min.*). The double carbonate of calcium and magnesium, crystallising in the rhombohedral class of the trigonal system, occurring as cream-coloured crystals or masses with a distinctive pearly lustre, hence the synonym PEARL SPAR. An important gangue mineral.—(*Met.*) Calcined dolomite is used as a basic refractory for withstanding high temperatures and attack by basic slags in metallurgical furnaces. The name is also used to describe refractories made from magnesian limestone, which does not necessarily contain the mineral dolomite.

dolomite rock (*Geol.*). A limestone consisting entirely of the mineral dolomite and therefore containing the $CaCO_3$ and $MgCO_3$ in equal molecular proportions. See also **dolomitic limestone.**

dolomitic conglomerate (*Geol.*). The local basal bed of the Rhaetic Series or of the Lias where banked up against the old limestone ridges of the Mendip Hills and S. Wales. Actually the rock is a limestone-conglomerate, often stained red by infiltration of iron salts from the overlying Trias.

dolomitic limestone (*Geol.*). A calcareous sedimentary rock containing calcite or aragonite in addition to the mineral dolomite. Cf. *dolomite rock.*

dolomitisation (*Geol.*). The process of replacement of calcium carbonate in a limestone or ooze by the double carbonate of calcium and magnesium (dolomite). In *contemporaneous dolomitisation* the replacement is effected at the same time as the formation of the sediment; in *subsequent dolomitisation* the replacement takes place at any time after the deposition of the sediment, and is effected by solutions working their way along fractures, joints, and bedding planes.

Dolo'res Beds (*Geol.*). Continental strata comprising a lower group, equivalent to the Leroux, and an upper group, equivalent to the Lower Painted Desert Beds, occurring in the Trias of S.W. Colorado.

Dolter surface-contact system (*Elec. Eng.*). A form of surface-contact system for electric traction in which the magnetised skate on the car operates switches within the studs, so making these alive when the car passes over them.

doma'tium (*Bot.*). A cavity or other form of shelter formed by a plant which harbours mites or insects with which it appears to live in symbiosis.

dome (*Bot.*). The growing point of the receptacle of a flower.

dome (*Build.*). A vault springing from a circular, or nearly circular, base.

dome (*Crystal.*). A crystal form consisting of two similar inclined faces meeting in a horizontal edge, thus resembling the roof of a house. The term is frequently incorrectly applied to a four-faced form which is really a prism lying on an edge.

dome (*Eng.*). A domed cylinder attached to a locomotive boiler to act as a steam space and to house the regulator valve.

dome (*Geol.*). A form of igneous intrusion the roof of which has a dome-like shape, that is, the roof-rocks dip gently outwards from a central point. Ideally, the roof of a batholith has this form, so has a laccolith; but these two terms can be applied only when the walls and floor can be examined. See also **bathylith.**

domestic (*Textiles*). A plain cotton cloth; it may be grey, coloured, or with a check pattern.

domical vault (*Build.*). A vault in which the centre is higher than the sides.

dominance (*Bot.*). (1) The prevalence of one or of a few species in a plant community, determining the physiognomy and influencing the rest of the plant population.—(2) See **dominant character.**

dominance (*Crysta..*). See under **habit.**

dominant (*Bot.*). Said of a species or group of species in a plant community; see **dominance.**

dominant character (*Gen.*). Of a pair of allelomorphic characters, the one which will be manifested if both are present, i.e. a character that appears in the hybrid resulting from the cross-breeding of parents unlike with respect to that character.

dominant wavelength (*Photog.*). In colorimetry, the hue in a colour which determines the match.

Do'molac (*Diel.*). A plastic insulating material made from cellulose acetate and glycerine.

Dongola leather (*Leather*). Upper leather produced by a combination of vegetable and mineral tannages, together with alum and oil.

donkey boiler (*Eng.*). A small vertical auxiliary boiler for supplying steam-winches and other deck machinery on board ship when the main boilers are not in use.

donkey pump (*Eng.*). A small steam reciprocating pump independent of the main propelling machinery of a ship; used for general duty.

donor (*Chem.*). (1) That reactant in an induced reaction which reacts rapidly with the inductor.—(2) That atom which supplies the two electrons of a semi-polar bond.

donor (*Med.*). One who gives his blood for transfusion to another.

donskoi (*Textiles*). Wool from the Don districts in Russia; the fibre is coarse.

dook (*Join.*). A wooden plug or block fixed in a wall to provide a substance to which joinery may be nailed. (Scottish.)

door (*Build.*). A hinged or sliding barrier closing an opening in a wall.

door by-pass switch (*Elec. Eng.*). See **gate by-pass switch.**

door case (*Join.*). The frame into which a door fits to shut an opening.

door check (*Build.*). A device fitted to a door to prevent it from being slammed, and yet to ensure that it closes.

door cheeks (*Join.*). The jambs of a door frame. Also called DOOR POSTS.

door closer (*Elec. Eng.*). See **gate closer.**

door contact (*Elec. Eng.*). A contact attached to a door or gate, so arranged that it closes a circuit when the door is opened or closed, and rings an alarm bell or gives some other signal.

door frame (*Join.*). The framework of stiles, rails, and muntings into which the panels are fitted.

door interlock (*Elec. Eng.*). See **gate interlock.**

door lock, automatic (*Elec. Eng.*). See **automatic gate lock.**

door operator (*Elec. Eng.*). See **gate operator.**

door posts (*Join.*). See **door cheeks.**

door stop (*Build.*). A device fitted to a door, or to the floor near to a door, to hold it open as far as may be required, or to prevent the door from being opened beyond a certain amount.

door strip (*Join.*). A strip, often of flexible material, attached to a door to cover the space between the bottom of the door and the threshold. Also called a WEATHER STRIP.

door switch (*Elec. Eng.*). A switch mounted on a door so that the opening or closing of the door operates the switch. Also called a GATE SWITCH when used on electric lifts.

doorway (*Build.*). An opening constructed to serve as a means of entrance to, or exit from, a building or room.

dope (*Aero., etc.*). A chemical treatment applied to the fabric coverings of aircraft surfaces, for the purposes of tautening, strengthening, rendering airtight, and weatherproofing.

dope (*Build.*). A preparation serving as a retarder.

dope (*Photog.*). Oil, paste, or wax used for regulating the printed image on photographic paper.

doping. Any process involving treatment with *dope* (see above).

Doppler's principle (*Phys.*). When a vibrating source of waves and an observer are approaching each other, the frequency observed is higher than the emitted frequency. If the source and observer are receding from each other, the observed frequency is lower than that emitted. Doppler's principle is widely used in astronomy for measuring the line-of-sight velocity of heavenly bodies by observing the shift in the position of lines in their spectra.

doré silver (*Met.*). Silver bullion, i.e. ingots or bars, containing gold.

doria stripes (*Textiles*). Light cotton cloth of plain weave, with crammed stripes or cords lengthways with the piece.

doric (*Typog.*). A type face. The same as sans-serif or gothic.

dormancy (*Bot.*). In seeds and other resting structures, a condition of inactivity caused by some structural or physiological condition.

dormant bolt (*Join*). A hidden bolt sliding in a mortise in a door; operated by turning a knob or by means of a key.

dormant bud (*Bot.*). A bud which remains inactive for an indefinite period.

dormer (*Build.*). A small window projecting from a roof slope.

dormitory (*Build.*). A large sleeping apartment, sometimes divided into cubicles for the separate beds.

dors-, dorsi-, dorso- (Latin *dorsum*, back). A prefix used in the construction of compound terms; e.g *dorsoventral*, *dorsiventral*.

dorsal (*Anat.*). Said of the back of any part.

dorsal or **dorse** (*Arch.*). A canopy.

dorsal (*Bot.*). (1) The side or part of a plant member turned away from the axis.—(2) Attached to, or on the back of, a plant member.

dorsal (*Furn*). (1) A carpet or hanging on a wall at the back of a divan or couch.—(2) The tall back of a chair. Also called DORSE, DORSEL, DOSSAL, DOSSEL, DOSSER.

dorsal (*Zool.*). Pertaining to that aspect of a bilaterally symmetrical animal which is normally turned away from the ground.

dorsal suture (*Bot.*). The midrib of the carpel in cases where dehiscence occurs along it.

dorsal trace (*Bot.*). The median vascular supply to a carpel.

dorsal'gia (*Med.*). Pain in the back.

dorsa'lis (*Zool.*). An artery supplying the dorsal surface of an organ.

dorse. See **dorsal** (*Arch.*), **dorsal** (*Furn.*).

dorsel (*Furn.*). See **dorsal.**

Dorset Down (*Textiles*). One of the Down breed sheep with fine close wool which is used largely for Cheviot quality woollens and for hosiery yarns.

dorsif'erous (*Zool.*). Said of animals which bear their young on their back.

dor'sifixed (*Bot.*). Said of an anther when the filament is attached firmly to one point on the dorsal surface: (by some authorities) adnate.

dorsiflexion (*Anat.*). The bending towards the back of a part; e.g. flexion of the toes towards the shin.

dor'sigrade (*Zool.*). Walking with the backs of the digits on the ground, as Sloths.

dorsiven'tral (*Bot.*). Said of a flattened plant member with structural differences between its dorsal and ventral sides.

dorsiventral symmetry (*Bot.*). See **zygomorphy.**

dorsodyn'ia (*Med.*). Painful fibrositis of the muscles and the ligaments of the back.

dor'sulum (*Zool.*). See **mesonotum.**

dorsum (*Zool.*). In *Anthozoa*, the sulcular surface: in *Arthropoda*, the tergum or notum: in *Vertebrata*, the dorsal surface of the body or back.

Dortmund tank (*Sewage*). A deep tank, with conical bottom, to which liquid sewage is supplied by a pipe reaching down nearly to the bottom. The resulting upward flow assists sedimentation of the sludge.

doryla'ner (*Zool.*). An abnormally large male ant, with a long cylindrical abdomen and large peculiar jaws, which is the typical male form in the subfamily *Dorylinae* (Driver Ants).

dose (*Med*). The prescribed quantity of a medicine or of a remedial agent.

dossal, dossel, dosser (*Furn.*). See **dorsal.**

dot (*Teleg.*). The unit telegraphic impulse, the basis of telegraphic codes. See **baud.**

dots (*Plast.*). Nails partially driven into a wall, so that the projecting lengths may serve as guides to thickness in laying on a coat of plaster.

dot frequency (*Teleg.*). The number of dots per second in a continuous train of dots. A measure of speed of telegraphic transmission. See **baud.**

dot, lead (*Build.*). See **lead dot.**

dot, soldered (*Plumb.*). See **soldered dot.**

dotting-on (*Build.*). The process of adding together similar items when *taking off* (q.v.).

double (*Build.*). A slate size, 13 × 6 in.

double-acting engine (*Eng.*). Any reciprocating engine in which the working fluid acts on each side of the piston alternately; most steam-engines and a few internal-combustion engines are so designed.

double-acting pump (*Eng.*). A reciprocating pump in which both sides of the piston act alternately, thus giving two delivery strokes per cycle.

double-acting relay (*Auto. Teleg*). A relay which operates in two steps, each time making changes in circuits.

double amplitude (*Elec. Eng.*). The sum of the maximum values of the positive and negative half waves of an alternating quantity. Usually assumed to refer only to those waves in which the maximum values of the positive and negative half waves are equal. Occasionally called the AMPLITUDE, but such use is incorrect and ambiguous.

double bar and yoke method (*Elec. Eng*). A ballistic method of magnetic testing, in which two test specimens are arranged parallel to each other and clamped to yokes at the ends to form a closed magnetic circuit. A correction for the effect of the yokes is made by altering their position on the bars, and repeating the test.

double-bead (*Join.*). Two side-by-side beads, separated by a quirk.

double-beat valve (*Eng.*). A hollow cylindrical valve for controlling high-pressure fluids. The seatings at the two ends exposed to pressure are of only slightly different area, so that the valve is nearly balanced and easily operated.

double-bellied (*Build.*). A term applied to a baluster which has had both ends turned alike.

double belting (*Eng.*). Belting of double thickness, formed by sewing or cementing together two layers; used for very heavy duty.

double block (*Teleg.*). Large blocking condensers used at both ends of a submarine cable to improve the definition of the variations in the signal wave-form. See **single block.**

double bond (*Chem.*). An indication of a state of unsaturation between two polyvalent atoms, showing that two monovalent atoms or radicals may become attached to such a linkage before saturation is reached.

double book (*Photog.*). A pair of dark slides hinged together.

double-break (*Elec. Eng.*). Said of switches or circuit-breakers in which the circuit is made or broken at two points in each pole or phase.

double bridge (*Elec. Eng.*). A special form of bridge network in which there are two sets of ratio coils; it is used for the measurement of very low resistances. Also called the KELVIN DOUBLE BRIDGE.

double bridging (*Carp.*). Bridging in which two pairs of diagonal braces are used to connect adjacent floor joists at points dividing their length into equal parts.

double-broad (*Typog.*). Spacing material, or 'furniture,' 96 points or 8 picas broad.

double-cant brick (*Build.*). A purpose-made brick which has a splay on two sides. See **splay brick.**

double-carbon arc lamp (*Illum.*). See **twin-carbon arc lamp.**

double case (*Typog.*). A case comprising half an upper case and a complete lower case. Erroneously called a HALF-CASE.

double casting (*Cinema.*). The use of one artist for two rôles; they may or may not appear together in the finished motion-picture, the former instance requiring special trick photography.

double-catenary construction (*Elec. Eng.*). A method of supporting the overhead contact wire of an electric traction system; the contact wire is suspended from two parallel catenary wires so that the three wires are in a triangular formation.

double cathode ray tube (*Cathode Ray Tubes*). A cathode ray tube containing two complete sets of beam-forming and beam-deflecting electrodes operated from the same cathode, thus allowing two separate waveforms to appear on the screen simultaneously.

double cloth (*Textiles*). Two distinct cloths woven and bound together at the same time to obtain greater thickness without affecting the face texture.

double-coated film (*Photog.*). A film base with emulsions on both sides, generally of differing colour sensitivities (except for X-ray photography).

double contraction (*Pattern-making*). The total shrinkage allowance necessary to add to the dimensions of a finished casting when making a wood pattern from which a metal pattern is to be cast.

double course (*Build.*). See **doubling course.**

double-cover butt joint (*Eng.*). A butt joint with a cover plate on both sides of the main plates.

double crown (*Paper*). A standard size of printing paper, 20 × 30 in.

double-current (*Teleg.*). The term applied to the use of current reversals in changing from mark to space, when transmitting telegraphic signals.

double-current furnace (*Elec. Eng.*). A special form of electric furnace in which direct current is used for an electrolytic process and alternating current for heating, on the principle of the induction furnace.

double-current generator (*Elec. Eng.*). An electric generator which can supply both alternating and direct current.

double dagger (*Typog.*). The third of the reference marks (‡), following the dagger.

double decomposition (*Chem.*). A bimolecular reaction in which the atoms are redistributed into different molecules, the number of molecules remaining constant before and after the reaction.

double-delta connexion (*Elec. Eng.*). A method of connecting the windings of a 6-phase transformer, or other piece of electrical equipment, so that they may be represented diagrammatically by two triangles.

double demy (*Paper*). A standard size of printing paper, 22½ × 35 in.

double detection receiver (*Radio*). See **supersonic heterodyne receiver.**

double-diode (*Thermionics*). See **binode.**

double-disc winding (*Elec. Eng.*). A form of winding used for transformers, in which two disc coils are wound in such a way that, when placed side by side to form a single coil, the beginning and end of the complete coil are at the outside periphery.

double dovetail key (*Join.*). A piece of wood used to connect together two members lengthwise; shaped and fitted like a *slate cramp* (q.v.).

double driver plate (*Eng.*). A lathe *driver plate* (q.v.) provided with two pins for engaging the carrier on the revolving work.

double earth fault (*Elec. Eng.*). A fault on an electric power transmission system, caused by two of the phases going to earth simultaneously, either at the same point on the system or at different points.

double-edged (*Carp.*). An arrangement of two parallel circular saws, one fixed in position and the other movable towards or away from the first; used for cutting away wane left on the edges of boards of various widths.

double elephant (*Paper*). A standard size of writing and drawing paper, 26¾ × 40 in.

double-ended boiler (*Eng.*). A marine boiler of the shell type provided with a furnace at both ends, each with its independent tubes and uptake.

double-ended bolt (*Eng.*). A bar screwed at each end for the reception of a nut.

double ends (*Textiles*). Two warp threads passing through the same heald eye and functioning as one thread.

double exposure (*Photog.*). The re-exposure of a film in a camera, after winding back, to obtain two superimposed potential images on the negative before development.

double-faced (*Join.*). Said of an architrave, skirting board, or other moulding which is formed of two separate parts, with faces in different planes.

double-faced hammer (*Eng.*). A hammer provided with a flat face at each end of the head

double-faggoted iron (*Met.*). See **faggoted iron.**

double fertilisation (*Bot.*). The union, in the embryo sac of an angiosperm, of one male nucleus with the egg nucleus, and of the other male nucleus with the two polar nuclei, before or after they have themselves fused.

double Flemish bond (*Build.*). A bond in which both exposed faces of a wall are laid in Flemish bond.

double floor (*Carp.*). A floor in which the bridging joists are supported at intervals by binding joists. Cf. *single floor, framed floor.*

double-flow turbine (*Eng.*). A turbine in which the working fluid enters at the middle of the length of the casing and flows axially towards each end.

double flower (*Bot.*). A flower which has more than the normal number of petals.

double flowering (*Bot.*). An abnormal condition exhibited by a plant which flowers in the spring and again in the autumn.

double fluid cell (*Elec. Eng.*). A primary cell in which two different solutions are used, one surrounding the anode and the other surrounding the cathode, the two being separated by a porous vessel or diaphragm. See **Daniell cell.**

double fluid theory (*Elec. Eng.*). See **two-fluid theory.**

double foolscap (*Paper*). A standard size of printing paper, 17 × 27 in.

double four-pound (*Paper*). A standard size of brown paper, 21 × 31 in.

double frame (*Typog.*). A frame holding two pairs of type cases, with a rack for ten pairs of cases, and room for trays.

double-frequency oscillator (*Radio*). An oscillator in which two sets of oscillations, having different frequencies, are simultaneously generated.

double gulley (*San. Eng.*). A gulley used in cowshed and stable drainage, for which purpose it is fitted with inlet and outlet in duplicate, so as to permit segregation of the drainage of urine and washing water.

double-headed rail (*Rail.*). A rail section similar to the *bull-headed rail* (q.v.) but having equal heads top and bottom, so that a reversal may be effected to increase the life of the rail, when one of the heads has become worn.

double-helical gearing (*Eng.*). *Helical gearing* (q.v.) in which two sets of teeth having opposite inclinations are cut on the same wheel, thus eliminating axial thrust.

double-hump effect (*Radio*). The property of two resonant circuits, coupled by mutual reactance and each separately resonant to the same frequency, of showing maximum response to two frequencies disposed about the common resonance frequency.

double-hung window (*Build.*). A window having top and bottom sashes, each balanced by sash cord and weights so as to be capable of vertical movement in its own grooves.

double image (*Television*). A second image, displaced from and generally weaker than the main image, formed on the screen of a television or photo-telegraph receiver, usually as the result of the presence of echo signals from the transmitter. Also called GHOST IMAGE.

double-image prism (*Photog.*). A prism which divides the rays from a lens in a *beam-splitter camera* (q.v.).

double-image tacheometer (*Surv.*). A type of tacheometer, used with a horizontal subtense bar, which gives two images of the bar in the field of view, one above the other and displaced relatively in the direction of their length by an amount proportional to the distance of the sight.

double imperial (*Paper*). A brown-paper size, 29 × 45 in.

double-jointed compasses (*Instruments*). A pair of compasses in which the limbs of the instrument are jointed, so that the parts carrying the marking points may be arranged, when in use, to be always normal, or nearly so, to the plane of the paper.

double junction (*Build.*). A drainage or water-pipe fitting made with a branch on each side.

double large (*Paper*). A standard size of cut card, 4½ × 6 in.

double large post (*Paper*). A standard size of printing paper, 21 × 33 in.

double laths (*Build.*). *Wood laths* (q.v.) 1 in. by ⅜ in. to ½ in. thick in section.

double-layer winding (*Elec. Eng.*). An armature winding, always employed for d.c. machines and frequently for a.c. machines, in which the coils are arranged in two layers, one above the other, in the slots.

double letters (*Typog.*). Ligatures and old-face letters, e.g. æ, œ, ct, st.

double lock (*Hyd. Eng.*). A construction consisting of two side-by-side lock-chambers, across the same canal. They are interconnected through a sluice so that the amount of water lost in lockage is only half that which is lost by a single lock.

double magazine (*Cinema.*). A magazine holding two reels of film for feeding into a camera; one (e.g. a finished positive) is used as a mask for the other (an unexposed negative). Also used for double films in colour photography. See **bipack.**

double-margined door (*Join.*). A door hinged as one leaf but having the appearance of a pair of folding doors.

double measure (*Join.*). Joinery work which is moulded on both sides.

double-narrow (*Typog.*). Spacing material one inch, or 72 points, broad.

double oblique crystals (*Crystal.*). See **triclinic system.**

double parting (*Mining*). A double line of rails in a haulage way to allow trams to pass one another.

double partition (*Build.*). A partition having a cavity in which sliding doors may move.

double phantom circuit (*Teleph.*). A telephone circuit which uses two phantom circuits in parallel for both the go and return speech channels.

double pica (*Typog.*). The old name for a type size, about 22-point; now superseded by 24-point.

double-pitch skylight (*Build.*). A skylight having two differently sloped glazed surfaces.

double plains (*Textiles*). Compound fabrics formed from two plain cloths stitched together. The two cloths are often of different colours, and interchange to form a pattern.

double plane-iron (*Carp.*). A plane-iron consisting of two connected parts—the cutting iron and the break iron.

double-pole (*Elec. Eng.*). Said of switches, circuit-breakers, etc. which can make or break a circuit on two poles simultaneously.

double post (*Paper*). A paper size, 18½ × 29 in. Sometimes the old size, 19 × 30½ in., is used.

double printing (*Cinema.*). The process of exposing a positive emulsion in a printing machine successively with more than one negative, resulting in a superposition of two positive images after development.

double purpose valve (*Radio*). Any valve used for two separate functions simultaneously; e.g. radio and audio-frequency amplification.

double quad (*Paper*). See under **quad.**

double quirk-bead (*Join.*). A bead sunk into a surface so as to leave a quirk on each side.

double quotes (*Typog.*). Inverted commas.

double reaction (*Radio*). Reaction obtained by a combination of electromagnetic (inductive) and electrostatic (capacity) coupling.

double-reading theodolite (*Surv.*). A theodolite with which it is possible to observe, from one position, the readings of the diametrically opposite points of both horizontal and vertical circles.

double reception (*Radio*). Simultaneous reception of two signals on different wavelengths by two receivers connected to the same antenna.

double refraction (*Phys.*). A property possessed by most crystalline substances whereby a ray of light, on entering the crystal, is split into two rays which pursue different paths and are plane-polarised in directions at right-angles. Only one of these rays obeys Snell's law; it is known as the *ordinary ray*, the other being the *extraordinary ray.*

double-roller safety action (*Horol.*). The safety action of a lever escapement in which two rollers are employed, one carrying the impulse pin, the other being used for the guard finger.

double roof (*Build.*). A roof truss in which the characteristic features of more than one type appear.

double-row radial engine (*Eng.*). A *radial engine* (q.v.) in which the cylinders are arranged in two planes, and operate on two crank pins at 180° apart.

double royal (*Paper*). A standard size of printing paper, 25 × 40 in.; U.S., 24 × 38 in.

double salts (*Chem.*). Compounds of two normal salts.

double shrinkage (*Pattern-making*). See **double contraction.**

double silk-covered wire (*Elec. Eng.*). Wire insulated with two layers of silk covering; commonly used for the fine wire coils of delicate instruments, etc. Abbrev. **d.s.c.**

doublesize (*Paint*). A trade name for size of extra strength.

double-small (*Paper*). A standard size of cut card, 3⅝ × 4¾ in.; U.S., 3½ × 5 in.

double-spun (*Cotton Spinning*). Said of mule yarns of superior quality in which the twist is imparted in two stages.

double squirrel-cage motor (*Elec. Eng.*). A squirrel-cage motor with two cage windings on its rotor, one of high resistance and low reactance, and the other of high reactance and low resistance. The former carries most of the current at starting and therefore gives a high starting torque, while the latter carries most of the current when running and results in a high efficiency.

double stars (*Astron.*). A system in which two stars are gravitationally related so that they revolve about their common centre of mass under mutual gravitational attraction.

double super royal (*Paper*). A standard size of printing paper, 27½ × 41 in.

double switch call (*Teleph.*). In international telephony, a transit call which includes three international circuits.

double-tariff meter (*Elec. Eng.*). See **two-rate meter.**

double tenons (*Carp., Join.*). Tenons cut at both ends of a member so as to be co-axial.

double-threaded screw (*Eng.*). A screw having two threads, whose distance apart is half the true pitch; also called a TWO-START THREAD. See **multiple-threaded screw, divided pitch.**

double-throw switches (*Elec. Eng.*). Switches which are arranged so that the moving contact can be made to engage with two alternative sets of fixed contacts. Also called TWO-WAY (or THROW-OVER) SWITCHES.

double thrust-bearing (*Eng.*). A thrust-bearing for taking axial thrust in either direction.

double touch (*Acous.*). The use of two-step keys on manuals and pedals of an organ, the initial depression playing on one set of stops, the further depression adding further stops. Also for stop keys, the initial depression bringing in the relative stop in addition to all others drawn on the manual, the full depression cancelling all others.

double transfer process (*Photog.*). The use of an additional intermediate support, slightly waxed, in the carbon photographic process.

double-trolley system (*Elec. Eng.*). A system of electric traction where, instead of the running rails, a second insulated contact wire is used for the return or negative current. It avoids trouble due to stray earth currents.

double vibration (*Acous.*). The obsolete name for the *cycle* (q.v.).

double-wall coffer-dam (*Civ. Eng.*). A coffer-dam formed of a pair of parallel walls, separated by a mass of clay puddle, carried down to a water-tight stratum and to a level below the bottom of the water.

double-warp (*Textiles*). Said of lace for the manufacture of which two main warp beams are necessary.

double-webbed girder (*Eng.*). A built-up box girder in which the top and bottom booms are united by two parallel webs.

double window (*Build.*). A window arranged with double sashes enclosing air, which acts as a sound and heat insulator.

double-wire system (*Elec. Eng.*). The usual system of electric wiring; it employs separate wires for the go and return conductors, instead of using the earth as a return.

doubler (*Radio*). See **frequency doubler.**

doublet (*Jewel.*). A thin slice of precious stone backed by a thicker slice of darker-coloured or less precious material.

doublet (*Light*). A pair of associated lines in a spectrum, such as the two D lines of sodium. The arc spectra of the alkali metals consist entirely of series of doublets.

doublet (*Photog.*). A pair of simple lenses designed to be used together, so that optical distortion in one is balanced by reverse distortion in the other.

doublet antenna (*Radio*). An antenna comprising two short straight conductors arranged in line and connected at the centre to a transmission line. It is very similar to a dipole antenna, and the terms are frequently used interchangeably, but strictly a *doublet* refers to an antenna whose dimensions are small compared to a quarter of a wavelength.

doubling (*Spinning*). The combining of two or more threads to form a folded or compound yarn.

doubling course (*Build.*). A special course of slates laid at the eaves, to ensure that the lowest margin there has two thicknesses of slate throughout its depth. Also called a DOUBLE (or EAVES) COURSE.

doubling (or **twisting**) **frame** (*Spinning*). A machine (flyer, cap, or ring type) in which yarns are folded or twisted together.

doubling piece (*Build.*). A *tilting fillet* (q.v.).

doubly-fed series (or **repulsion**) **motor** (*Elec. Eng.*). A single-phase series (or repulsion) motor in which the armature receives its power partly by conduction and partly by induction.

Douglas bag (*Med.*). A specially constructed bag for the collection of air expired from the lung, from the analysis of which the rate of metabolism can be determined.

Douglas fir (*Timber*). See **Oregon pine.**

Douglas sea and swell scale (*Meteor.*). A combination of two numbers, each 0-9, the first of which describes the degree of disturbance of the sea and the second the degree of swell.

Douglas's pouch (*Anat.*). In the female pelvis, the pouch of peritoneum between the rectum and the posterior wall of the uterus.

doup (*Textiles*). A half heald used in weaving gauze fabrics to facilitate the movement of particular warp threads.

dourine (*Vet.*). A contagious infection of breeding horses, characterised by inflammation of the external genital organs and paralysis of the hind limbs; due to *Trypanosoma equiperdum*, which is transmitted through coitus.

douse (*Cinema.*). To switch off illumination provided by lamps. (Colloquial.)

douser (*Cinema.*). The automatic screen which cuts off the light falling on to the film from the projector arc, when it is not passing intermittently through the gate.

douzième, dooz-yem' (*Horol.*). A unit of measurement used in the watch trade. See **ligne.**

douzième gauge (*Horol.*). A form of calliper gauge on which the readings are given in douzièmes.

dovetail (*Carp., Join.*). A joint formed between a flaring tenon, having a width diminishing towards the root, and a corresponding recess or mortise.

dovetail box plane (*Join.*). A special rabbeting plane for finishing dovetails.

dovetail cutter (*Carp.*). A specially shaped rotary cutting tool, used for shaping dovetail grooves.

dovetail halving (*Carp.*). A form of *halving* (q.v.) in which the mating parts are cut to a dovetail shape.

dovetail hinge (*Join.*). A hinge whose leaves increase in width outwards from the hinge joint.

dovetail key (*Eng.*). A parallel key in which the part sunk in the boss or hub is of dovetail section, the portion on the shaft being of rectangular section. See **key.**

dovetail key (*Join.*). A batten, of dovetail-shaped section, which is driven into a corresponding groove cut across the back of adjacent boards in a panel, and serves to prevent warping.

dovetail mitre (*Join.*). See **secret dovetail.**

dovetail saw (*Join.*). A saw similar to the tenon saw but of smaller size and having usually 12 teeth to the inch.

Dow metal (*Met.*). Magnesium base alloys. Manufactured by the Dow Chemical Co. Alloys are of Elektron type, i.e. contain aluminium and manganese and sometimes zinc. See **Elektron.**

dowel (*Eng.*). (1) A pin fixed in one part which, by accurately fitting in a hole in another attached part, locates the two, thus facilitating accurate re-assembly.—(2) A pin similarly used for locating divided patterns.

dowel (*Masonry*). A copper, slate, or stone pin sunk into opposing holes in the adjacent faces of two stones, when it is required to unite these more strongly than is possible with a mortar joint.

dowel bit (*Carp.*). A wood-boring bit of semi-cylindrical form, with the cutting end ground to a conoidal shape. Also called a SPOON BIT or DUCK'S-BILL BIT.

dowel plate (*Join.*). A steel plate having a number of tapered holes in it; used as a pattern for making tapered dowel pins.

dowel screw (*Join.*). See **handrail screw.**

dowelling jig (*Build.*). A device for directing the bit in drilling holes to receive dowels.

dowk (*Mining*). Impure barytes, barium sulphate; a mineral occurring in lead- and zinc-mines.

dowlas (*Textiles*). A plain linen fabric of coarse texture, used for towelling, etc.

down (*Bot.*). A fine soft coating of hairs on the surface of a plant member.

down feathers (*Zool.*). See **plumulae.**

downcast (*Mining*). A contraction for *downcast shaft*, i.e. the shaft down which fresh air enters a mine. The fresh air may be sucked or forced down the shaft.

downcast (or **downthrow**) **side** (*Geol.*). That side of a fault on which the strata have been displaced downwards in relation to the up-throw or up-cast side.

downcomer (*Build.*). A *downpipe* (q.v.).—(*Met.*) See **downtake.**

downlead (*Radio*). The vertically inclined conductor connecting the uppermost parts of an antenna to the transmitting and/or receiving apparatus.

downpipe (*Build.*). A pipe (usually vertical) for conveying rain water from the gutter to the drain, or to an intermediate gulley. Also called a DOWNCOMER, DOWNSPOUT, FALL PIPE.

downrights (*Textiles*). The term applied by woolsorters to wool from the lower part of the sides of a fleece.

downspout (*Build.*). See **downpipe.**

downtake or **downcomer** (*Met.*). The pipe through which the blast-furnace gas is taken down outside the furnace from the top of the furnace to the duct catcher.

downthrow (*Geol.*). In a fault, the vertical displacement of the fractured strata. Indicated on geological maps by a tick attached to the fault line, with (where known) a figure alongside indicating the downthrow in fathoms.—(*Mining*) A plane of fracture along which a seam or lode has slipped down. See **fault.**

downwash (*Aero.*). The air which is deflected downwards from the relative motion of an aerofoil.

Down wools (*Textiles*). Wools of medium fineness produced by the Down breeds of sheep; the staple is crimpy and ranges from 3 inches (Shropshire Down) to 6 inches (Oxford Down); Southdown Wool is the best of this class.

downer (*Mining*). See **crib** (1).

Downton Castle Sandstone (*Geol.*). A prominent yellow sandstone, massive enough to be used as building-stone, occurring near the base of the Downtonian Stage.

Downtonian Stage (*Geol.*). The lowest stage of the Old Red Sandstone facies of the Devonian System, named from its typical development around Downton Castle, and reaching a thickness of 2500 ft. in the Welsh Borderlands. It commences with the Ludlow Bone Bed, and consists essentially of red marls with thin, chemically formed limestones (cornstones) and sandstones By some the highest part of the Silurian and lowest parts of the Devonian are included.

dowsing. The process of locating underground water by the twitching of a twig held in the hand.

draconti'asis (*Med.*). The presence of the Guinea worm, *Dracunculus medinensis*, in the subcutaneous and interstitial tissues of the body.

draft. See also **draught.**

draft (*Moulding*). The taper given to the sides of a pattern to enable it to be withdrawn easily from the mould.

draft (*Spinning*). The term used to indicate the attenuation of a textile material on passing from the feeding end to the delivery end of a carding engine, draw frame, fly frame, or spinning frame.

draft (*Weaving*). The order in which the warp threads are drawn through the eyes of the heald shafts.

draft stop (*Build*). See **fire stop.**

draft tube (*Eng.*). A discharge-pipe from a water-turbine to the tail race. By running full, it decreases the pressure at outlet and increases the turbine efficiency.

drafting (*Lace*). The process of indicating the details of a design on ruled paper by means of numerals, which show the movement of the different threads.

drafting (*Weaving*). The process of determining the arrangement of warp threads in the heald eyes and the dents of the reed.

drag (*Aero.*). (1) That component of the aerodynamic force on an aircraft part which lies along the longitudinal axis of the machine. The component of the airscrew thrust is not included in this. Known as the ***head resistance*** of a part.—(2) The sum of the induced and the profile drags of a lifting surface.

See **form—** **pressure—**
induced— **profile—**
parasitic— **surface-friction—**

drag (*Foundry*). The bottom half of a moulding box or flask.

drag (*Masonry*). A steel-toothed tool for dressing stone surfaces.

drag axis (*Aero.*). The line through the centre of gravity of an aircraft and parallel to the wind, considered relative to the aircraft.

drag-bar (*Eng.*). See **draw-bar.**

drag conveyor or **drag chain conveyor** (*Eng.*). A conveyor in which an endless chain, having wide links carrying projections or wings, is dragged through a trough into which the material to be conveyed is fed; it is used for loose material.

dragline excavator (*Civ. Eng.*). A mechanical excavating appliance consisting of a steel scoop bucket which is suspended from a movable jib; after biting into the material to be excavated, it is dragged towards the machine by means of a wire rope.

drag link (*Eng.*). A rod by which the link motion of a steam-engine is moved for varying the cut-off. See **link motion.**

drag link or **steering rod** (*Automobiles*). A link which conveys motion from the drop arm of a steering gear to the steering arm carried by a stub axle, which it connects through ball joints at its ends.

dragged work (*Masonry*). Stone-dressing done with a drag.

dragon-beam or **dragging-beam** (*Build.*). The horizontal timber on which the foot of the hip-rafter rests.

dragon-tie (*Carp.*). An *angle-tie* (q.v.).

dragon's blood (*Chem.*). A resinous exudation from the fruit of palm trees and the stems of different species of *Dracaena*. It is a red, amorphous substance, m.p. 120° C., soluble in organic solvents. By destructive distillation the resin yields toluene and styrene. It is used for colouring varnishes and lacquers; also, in photo-engraving, to protect parts of a plate in the etching process.

drain (*Civ. Eng., San. Eng.*). (1) A water-channel to carry away surface or excess waters.—(2) A pipe or channel to carry away wastes and liquid sewage. See also **rubble drain***.

drain (*Surg.*). Any piece of material, such as a rubber tube, used for directing away the discharges of a wound.

drain cock (*Eng.*). A cock placed (1) at the lowest point of a vessel or space, for draining off liquid; (2) in an engine cylinder, for discharging condensed steam.

drain pipe (*San. Eng.*). See **drain.**

drain plug (*San. Eng.*). A device for closing the outlet of drain pipes when these are to be tested. See **bag plug, screw plug.**

drain tiles (*Civ. Eng.*). Hollow tiles laid end to end without joints, to carry off surface or excess water.

drain-trap (*San. Eng.*) See **air-trap.**

drain-well (*Civ. Eng.*). An *absorbing well* (q.v.).

drainage (*Geol.*). The removal of surplus meteoric waters by rivers and streams. The complicated network of rivers is related to the geological structure of a district, being determined by the existing rocks and superficial deposits in the case of youthful drainage systems; but in those that are mature, the courses may have been determined by strata subsequently removed.

See **consequent— superimposed— insequent—**

drainage (*Surg.*). The action of draining discharges from wounds or infected areas.

drainage area (*Civ. Eng.*). See **catchment area.**

drainage coil (*Elec. Comm.*). A coil bridged between the legs of a communication pair, with its electrical mid-point earthed, in order to prevent the accumulation of static charges on the conductors.

dramatic control (*Elec. Comm.*). The use of a number of isolated channels carrying the outputs of microphones for mixing, under the action of a director, in building up an aural effect in broadcasting-programme material.

Draper effect (*Chem.*). See **photochemical induction.**

drapery panel (*Join.*). A raised panel moulded and carved in imitation of draped linen. Also called a LINEN-FOLD PANEL.

draught. See also **draft.**

draught (*Eng.*). (1) The flow of air through a boiler furnace.—(2) The degree of vacuum inducing air-flow through a boiler furnace, measured in inches of water.

draught (*Ship Constr.*). The depth of water that a ship will require to float freely. *Load draught* is the same, with a ship fully loaded; but this is regulated by law, and the amount of cargo must not be such as to cause the ship to exceed its specified draught as indicated by freeboard markings.

draught-bar (*Eng.*). See **draw-bar.**

draught bead (*Join.*). A *deep bead* (q.v.).

draught gauge (*Eng.*). A sensitive vacuum gauge for indicating, in inches of water, the draught in a boiler furnace or flue.

dravite (*Min.*). According to Kunitz, one of the three chief varieties of tourmaline; a complex borosilicate of magnesium and sodium; may be referred to as magnesium-tourmaline; used as a gemstone.

draw (*Cotton Spinning*). The outward and inward run of a mule carriage.

draw (*Horol.*). The action whereby one part is drawn into another. In a lever escapement, the locking faces of the pallets are formed at an angle relative to the teeth such that a tooth of the escape-wheel, when pressing against the locking face, tends to draw the pallet into the wheel.

draw (*Mining*). (1) To allow ore to run from working places, stopes, through a chute into trucks.—(2) To withdraw timber props or sprags from overhanging coal, so that it falls down ready for collection.—(3) To collect broken coal in trucks.

draw (*Typog.*). When type has not been locked securely in the forme, the rollers *draw* it out during printing.

draws (*Foundry*). Internal cavities or spongy areas occurring in a casting at junctions of bosses or ribs with walls, due to lack of feeding and to unequal contraction.

drawback (*Foundry*). An independent section of a mould, made like a core, to facilitate delivery of the pattern or reduce the number of joints.

draw-bar (*Acous.*). The unit which is pulled out by the hand and thereby adjusts the contribution of harmonic tone in a stop of an electronic organ (such as the Hammond).

draw-bar, drag-bar, or **draught-bar** (*Eng.*). The bar by which the tractive effort of a locomotive is transmitted to the vehicles behind it; it usually terminates in a hook which engages the coupling link.

draw-bar cradle (*Eng.*). A closed frame or link for connecting the ends of the draw-bars of railway vehicles, so coupling them together.

draw-bar plate (*Eng.*). On a locomotive frame, a heavy transverse plate through which the draw-bar is attached.

draw-bar pull (*Eng.*). The tractive effort exerted, in given circumstances, by a locomotive drawing a train.

draw-bar spring (*Eng.*). A shock-absorbing spring fitted between the end of a railway carriage draw-bar and the frame.

draw-bit (*Lace*). A hook which connects the steel bar with the jacquard dropper box.

draw-bore (*Carp.*). A hole drilled transversely through a mortise and tenon so that, when a pin is driven in, it will force the shoulders of the tenon down upon the abutment cheeks of the mortise.

draw box (*Textiles*). This consists of two or more pairs of fluted rollers between the doffer and the coiler of a carding engine. The web of fibres from the doffer passes through the draw box and is delivered to the coiler in the form of sliver.

draw-bridge (*Civ. Eng.*). A general name for any type of bridge of which the span is capable of being moved bodily to allow of the passage of large vessels.

draw-door weir (*Civ. Eng.*). A weir fitted with doors or gates capable of being raised vertically, so as to retain water when desired.

draw-filing (*Eng.*). The operation of finishing a filed surface by drawing the file along the work in a direction at right-angles to the length of the file.

draw-gate (*Hyd. Eng.*). A name given to the valve controlling a sluice.

draw-in box (or **pit**) (*Elec. Eng*). A box or pit to enable cables to be drawn into, or removed from, a conduit or duct.

draw-in system (*Cables*). The system whereby the cables are pulled into conduits or ducts of earthenware, concrete, or iron, from one manhole to another. The cables have a serving of hessian but no armouring.

draw knife (*Carp.*). A cutting blade with a handle at each end at right-angles to the blade; used for shaving wood.

draw knob, draw stop (*Acous.*). The knob on the jamb of an organ console which is drawn to bring in the associated stop.

draw-nail (*Moulding*). A pointed steel rod driven into a pattern to act as a handle for withdrawing it from the mould. See **draw-screw.**

draw-off valve (*Plumb.*). A *bib-valve* (q.v.).

draw-out metal-clad switchgear (*Elec. Eng.*). Metal-clad switchgear in which the switch itself can be isolated from the bus-bars, for inspection and maintenance, by moving it away from the bars along suitable guides.

See **horizontal—** **vertical—**

draw plate (*Eng.*). The plate on which dies are supported in wire- and tube-drawing operations.

draw-screw (*Moulding*). A screwed rod provided with an eye at the end to act as a handle; screwed into a pattern for lifting it from the mould. See **draw-nail.**

draw sheet (*Print.*). The sheet drawn over the completed make-ready on a press before proceeding with the printing.

draw stop (*Acous.*). See **draw knob.**

draw-tube telescope (*Surv.*). A form of surveying telescope in which the object-glass and the eyepiece are fixed in separate tubes, of which one is capable of sliding axially within the other under the action of a rack gearing with pinion attached to the focusing screw.

drawer-front dovetail (*Join.*). See **lap dovetail.**

drawing compasses. See **compasses.**

drawing (*Cotton Spinning*). The running together and attenuation of a number of slivers, usually six, preparatory to spinning.

drawing (*Met.*). The operation of producing wire, or giving rods a good surface and accurate dimensions, by pulling through one or a series of tapered dies.

drawing (*Worsted*). The operation by which worsted tops are reduced to a roving suitable for spinning.

drawing-down (*Eng.*). The operation of reducing the diameter of a bar, and increasing its length, by forging.

drawing fires (*Eng.*). The operation of raking out the fires from boiler furnaces, when shutting down.

drawing-in (*Weaving*). The operation of placing the warp threads in the eyes of the healds, in accordance with the draft.

drawing of patterns (*Foundry*). The removal of a pattern from a mould; also termed LIFTING. It is facilitated by the taper or draught of the pattern, and by loosening the pattern by *rapping* (q.v.).

drawing of tubes (*Eng.*). See **tube drawing.**

drawing rollers (*Cotton Spinning*). The rollers through which cotton sliver is passed to effect attenuation. The top roller of a pair is covered with leather and the bottom one is fluted.

drawing temper (*Eng.*). The operation of tempering hardened steel by heating to some specific temperature and quenching, in order to obtain some definite degree of hardness. See **tempering.**

drawing timber (*Mining*). The operation of removing timber props from a worked-out area.

drawn (*Bot.*). Etiolated.

drawn on (*Bind.*). Said of a book cover which is attached by gluing down the back; if the end-papers are pasted down it is said to be *drawn on solid.*

drawn-wire filament (*Illum.*). An incandescent lamp filament, made by a wire-drawing process as opposed to a squirting process.

dredge (*Civ. Eng.*). Any apparatus used for excavating under water.

dredge or **dredger** (*Mining*). A large raft or barge on which are mounted either a chain of buckets or suction pumps and other appliances, to elevate and wash alluvial deposits and gravel for gold, tin, platinum, diamonds, sapphires, etc.

dredge (*Ocean.*). A type of bag-net used for investigating the fauna of the sea-bottom where it is too rough to admit of trawling.

dredger (*Civ. Eng.*). A vessel specially equipped for dredging.

See **bucket-ladder—** **sand-pump—**
dipper— **suction-cutter—**
grab—

dredger excavator (*Eng.*). An excavator working on the same principle as the *bucket-ladder dredger* (q.v.) but designed to work on land.

dredging (*Civ. Eng.*). A form of excavation conducted under water.

dredging well (*Civ. Eng.*). The opening through a dredging vessel in which the bucket ladders work. See **bucket-ladder dredger.**

dreikanter, drī′— (*Geol.*). A three-edged stone which has been so shaped by the natural sand-blast operating in sandy deserts. The term is often expanded to include wind-shaped pebbles with more than three sides: a better general term is *ventifacts,* a term comparable with artefacts.

drenching (*Leather*). A process for removing from light skins (intended for gloves, etc.) any traces of lime present after bating.

drepa′nium (*Bot.*). A monochasial cyme in which all the branches arise on the same side of the relatively main axis.

drep′anocyto′sis (*Med.*). Sickle-celled anaemia; a severe anaemia, afflicting negroes, in which red blood-cells of a peculiar sickle shape appear in the blood.

dress linen (*Textiles*). A linen fabric, generally made from half-bleached yarns and then mercerised and dyed; used for curtains as well as for dresses.

dressed stuff (*Build.*). Timber which has been worked more or less to shape.

dresser (*Eng.*). (1) An iron block used in forging bent work on an anvil.—(2) A mallet for flattening sheet-lead.—(3) A tool for facing and grooving millstones, or for trueing grinding wheels.

dresser (*Med.*). A medical student who assists a surgeon in the treatment of patients; one who dresses wounds.

dresser (*Plumb.*). A boxwood tool for straightening lead piping and sheet-lead.

dresser sizing (*Textiles*). See **Scotch dressing.**

dressing (*Cotton*). A method of preparing a warp for the loom. Threads are taken from one or more ball warps, they are tensioned, opened out into sheet form, and wound on a beam.

dressing (*Furs, Leather*). A process in which fleshed skins are treated with oil in order to give them a smooth finish.

dressing (*Lace*). The process of stretching lace in a wet condition on a tenter frame in order to straighten it.

dressing (*Linen*). The process of (1) applying a slight coating of starch to warp yarns when on the beam, in order to prevent fraying by the shuttle during weaving; (2) preparing a warp for the loom.

dressing (*Masonry*). The operation of smoothing the surface of a stone.

dressing (*Plumb.*). The operation of flattening out sheet-lead with a dresser.

dressing (*Surg.*). The application of sterile material, gauze, lint, etc., to a wound or infected part; material so used.

dressing (*Typog.*). The operation of fitting furniture around the pages in a forme preparatory to locking it up.

dressings (*Build.*). The mouldings, quoins, strings, and like features, in a room or building.

dressing-off (*Foundry*). The process of removing runners, risers, and cores from a casting after removal from the mould, cleaning the surfaces, and chipping away projections, before sand-blasting and machining. Also called FETTLING, TRIMMING.

driers (*Chem.*). Substances accelerating the drying of vegetable oils; e g. linseed oil in paints. The most important representatives of this group are the resinates, naphthenates and oleates of lead, calcium, manganese, cobalt, tin, copper, and zinc.

drift (*Aero.*). The motion of an aircraft in a horizontal plane, under the influence of an air current.

drift (*Civ. Eng.*). The direction in which a tunnel is driven.

drift (*Eng.*). (1) A tapered steel bar used to draw rivet holes into line.—(2) A brass or copper bar used as a punch.

drift (*Geol.*). A general name for the superficial, as distinct from the solid, formations of the earth's crust. It includes typically the Glacial Drift, comprising all the varied deposits of boulder clay, outwash gravel, and sand of Quaternary age. Much of the drift is of fluvio-glacial origin.

drift (*Hyd. Eng.*). The rate of flow of a current of water.

drift (*Mining*). (1) A level or tunnel pushed forward underground in a metal-mine, for purposes of exploration or exploitation. The inner end of the drift is called a *dead end*.—(2) A heading driven obliquely through a coal-seam.—(3) A heading in a coal-mine for exploration or ventilation.—(4) An inclined haulage road to the surface.

drift currents (*Meteor.*). Ocean currents produced by prevailing winds.

drift-net (*Ocean.*). A form of *gill-net* (q.v.) used for fishing at or near the surface; allowed to drift with the tide; used especially by herring-boats or drifters.

drift plug (*Plumb.*). A wooden plug which is driven through the bore of a lead pipe in order to smooth out a kink.

drifter (*Mining*). A cradle-mounted compressed-air rock drill, used for making tunnels (drifts or cross-cuts).

drifting (*Eng.*). The process of bringing holes into line by hammering a drift through them.

drifting test (*Eng.*). A workshop test for ductility; a hole is drilled near the edge of a plate and opened by a conical drift until cracking occurs.

drill (*Agric. Mach.*). A machine for sowing seed in regularly spaced rows. See **cup-feed drill.**

drill coulter (*Agric. Mach.*). A form of coulter used on a drill to make the shallow trench into which the seed drops. See **disc coulter, hoe coulter, Suffolk coulter.**

drill (*Eng.*). A revolving tool with cutting edges at one end, and having flats or flutes for the release of chips; used for making cylindrical holes in metal. See **twist drill.**—See also **drilling machine.**

drill (*Mining*). (1) An abbrev. for *compressed-air-operated rock drill*, either of the piston or hammer type. Also used to denote only the 'steel' or 'borer' itself, a straight steel bar, generally with a shank at one end and a bit or cutting edge at the other.—(2) To bore a short hole for blasting, or a long hole for exploration for coal, oil, or mineral.

drill chuck (*Eng.*). A small self-centring chuck usually having three jaws which are contracted on to the drill by the rotation of an internally coned sleeve encasing them.

drill-extractor (*Civ. Eng.*). A tool used to remove from a boring a broken drill or one which has fallen free of the drilling apparatus.

drill feed (*Eng.*). The hand- or power-operated mechanism by which a drill is fed into the work in a drilling machine.

drill-rod (*Civ. Eng.*). The long rod reaching down into a boring, and carrying at its lower end the boring-tool proper.

drill (*Textiles*). (1) A linen or cotton fabric with a twill weave, used for tropical suitings, etc.—(2) A heavy twilled cotton cloth used for sheeting and clothing. There are numerous qualities.

drilling (*Mining*). (1) The operation of tunnelling or stoping, whether with a compressed-air rock drill, a jack hammer, or a drifter.—(2) The operation of making deep holes with a diamond drill for prospecting or exploration. Cf. *boring.*

drilling cramp (*Eng.*). A frame bolted to a large or unwieldy piece of work for the purpose of supporting a portable drilling machine.

drilling machine (*Eng.*). A machine tool for drilling holes, consisting generally of a vertical standard, carrying a table for supporting the work and an arm provided with bearings for the drilling spindle. See **pillar drill, radial drill, sensitive drill.**

drilling spindle (*Eng.*). The revolving spindle holding the drill in a *drilling machine* (q.v.).

drilling table (*Eng.*). The table on which work is supported and clamped in a *drilling machine* (q.v.).

drillette (*Textiles*). A cotton fabric with fine twill lines; used for linings.

drip (*Build., Civ. Eng.*). A groove in the projecting under-surfaces of a coping brick or stone wider than the wall; designed to prevent water from passing from the coping to the wall. Also called GORGE or THROAT.

drip (*Plumb.*). A joint made across the direction of fall, between the edges of two lead sheets on a roof surface, the sheets being overlapped over a 2 in. or 3 in. step in the roof.

drip-feed lubricator (*Eng.*). A small reservoir from which lubricating oil is supplied in drops to a bearing, sometimes through a glass tube to render the rate of feed visible. See **sight-feed lubricator.**

drip mould (*Build.*). A projecting moulding arranged to throw off rain water from the face of a wall.

drip-proof (*Elec. Eng.*). Said of an electric machine or other electrical equipment which is protected by an enclosure whose openings for ventilation are covered with suitable cowls, or other devices, to prevent the ingress of moisture or dirt falling vertically.

drip sink (*Build.*). A shallow sink at, or just higher than, floor level, to take the drip from a tap.

dripstone (*Build.*). A projecting moulding built in above a doorway, window opening, etc., to deflect rain water.

drip tip (*Bot.*). A marked elongation of the tip of the leaf, said to facilitate the shedding of rain from the surface of the leaf.

dripping eave (*Build.*). An eave which is not fitted with a gutter and which therefore allows the rain to flow over to a lower roof or to the ground.

drive (*Mining*). See **driving.**

drive (*Radio*). Generally, the alternating voltage applied to the grid of an amplifying thermionic tube. Specially, the master oscillator circuit and its immediately subsequent amplifying stages in a transmitter using independent drive.

driver plate (*Eng.*). A disc which is screwed to the mandrel nose of a lathe, and carries a pin which engages with and drives a carrier attached to the work. See **double driver plate.**

driver unit (*Radio*). See **exciter.**

driving (*Mining*). (1) The making of a tunnel or level (a *drive*) in a mineralised lode or vein, as distinct from making one in country rock (*cross-cutting*).—(2) Breaking down coal with wedges and hammers.

driving axle (*Eng.*). A vehicle axle through which the driving effort is transmitted to the wheels fixed to it. Also called a LIVE AXLE.

driving band (*Ammunition*). A band, usually of copper, which is pressed round the rear end of a projectile and engages with the rifling, thus causing rotation of the projectile and preventing escape of gas to the front. See **rifling.**

driving blade (*Textiles*). In a lace machine, a brass strip on the front edge of a catch bar, or on the rollers of locker bars.

driving chain (*Eng.*). An endless chain consisting of steel links which engage with toothed wheels, so transmitting power from one shaft to another. See **roller chain.**

driving chuck (*Eng.*). A lathe *driving plate* (q.v.) provided with slots by which dogs are attached for gripping the work, instead of a projecting pin.

driving fit (*Eng.*). A degree of fit between two mating pieces such that the inner member, being slightly larger than the outer, must be driven in by a hammer or press.

driving gear (*Eng.*). Any system of shafts, gears, belts, chains, links, etc. through which power is transmitted from one shaft to another.

driving plate (*Eng.*). A flange screwed to the spindle of a lathe, and carrying a projecting pin for engaging and driving the carrier attached to the work.

driving-point impedance (*Elec. Eng.*). A term sometimes used to denote the ratio of the e.m.f. at a particular point in a system to the current at that point.

driving potential (*Photo-Electronics*). The positive potential applied to the anode of a photo-electric cell to drive the electrons to the anode after they have been released from the cathode by the incident light.

driving side (*Eng.*). The tension side of a driving belt; the side moving from the follower to the driving pulley.

driving-trailer (*Elec. Eng.*). A trailer-coach for use in a multiple-unit electric train; provided with driver's equipment at one end.

driving wheel (*Eng.*). (1) The first member of a train of gears.—(2) The road wheels through which the tractive force is exerted in a locomotive or road vehicle.

drizzle (*Meteor.*). Very fine rain.

drogue (*Aero.*). A sea anchor used on seaplanes and flying-boats; it is a conical canvas sleeve, open at both ends, like a bottomless bucket. Used to check the way of the aircraft.

dromaeog'nathous (*Zool.*). (In Birds) said of a type of palate in which the vomers are large and flat and diverge posteriorly to prevent the junction of the basisphenoid rostrum with the pterygoids and palatines.

drone (*Zool.*). In social Bees (*Apidae*), a male.

drop (*Elec. Eng.*). A term commonly used to denote *voltage-drop*.

See **impedance—** **resistance—** **reactance—**

drop (*Horol.*). The space moved by a tooth of the escape wheel when it is entirely free from contact with the pallets.

drop (*Mining*). The vertical displacement in a downthrow fault: the amount by which the seam is lower on the other side of the fault.

drop (*Typog.*). To unlock a forme and remove the chase after printing. The type matter is then either distributed or tied up and stored.

drop-annunciator (*Elec. Eng.*). A device used in connexion with an electric signalling system, e.g. an electric bell, to indicate the point from which the signal has originated, the indication being given by the dropping of a coloured disc.

drop arch (*Build.*). An arch similar to, but less pointed than, the *equilateral arch* (q.v.).

drop arm (*Automobiles*). A lever attached to a horizontal spindle which receives rotary motion from the steering gear; used to transmit linear motion through the attached steering rod or drag link to the arms carried by the stub axles.

drop black (*Dec., Paint., etc.*). Charcoal black pigment in drop or cone form.

drop box (*Weaving*). A shuttle box constructed to hold shuttles carrying weft of different sorts, which can be brought into position for picking as required.

drop cuts (*Furs*). Cuts of V or W shape.

drop-down curve (*Hyd. Eng.*). The longitudinal profile of the water surface in the case of non-uniform flow in an open channel, when the water surface is not parallel to the invert, owing to the depth of water having been diminished by a sudden drop in the invert.

drop elbow (*Plumb.*). A small elbow with ears, by means of which it can be fixed to a support.

drop electrode (*Chem.*). A half-element consisting of mercury dropping in a fine stream through a solution.

drop ell (*Plumb.*). A small ell with ears, by means of which it can be fixed to a support.

drop foot (*Med.*). Dropping of the foot from paralysis of the muscles maintaining its normal position, due to injury or inflammation of the nerves supplying them.

drop forging (*Met.*). The process of shaping metal parts by forging between two dies, one fixed to the hammer and the other to the anvil of a steam or mechanical hammer. The dies are expensive, and the process is used for the mass-production of parts such as connecting-rods, crankshafts, etc.

drop gate (*Foundry*). A pouring-gate or runner leading directly into the top of a mould.

drop-in winding (*Elec. Eng.*). A term sometimes used for an armature winding which can be dropped into the slots on the armature instead of having to be pushed through from the end.

drop-point slating (*Build.*). A mode of laying asbestos slates so that one diagonal is horizontal.

drop shaft (*Mining*). A shallow shaft, connecting two coal-seams, through which full trucks are lowered and empties raised by gravity.

drop siding (*Build.*). Weather-boarding (see **weather board**) which is rebated and overlapped.

drop stamping (*Met.*). See **drop forging.**

drop tee (*Plumb.*). A small tee with ears, by means of which it can be fixed to a support.

drop test (*Elec. Eng.*). (1) A test employed for locating a fault in a commutator winding; the voltage drop between each pair of adjacent segments when a current is passed through the winding is measured.—(2) The *fall-of-potential test* (q.v.) for locating a fault in a cable.

drop test (*Eng.*). A strength test for steel tyres, consisting in dropping on to a rail from a specified height (dependent on the tyre diameter).

drop tracery (*Arch.*). Tracery which lies partly below the springing of the arch which it decorates.

drop valve (*Eng.*). A conical-seated valve used in some steam-engines; rapid operation by a trip-gear and return spring reduces wire-drawing losses.

drop wrist (*Med.*). Limp flexion of the wrist from paralysis of the extensor muscles, as a result of neuritis or of injury to the nerve supplying them; e.g. in lead poisoning.

dropped beat (*Med.*). Intermission of a regular pulse wave at the wrist, due to intermission of the heart beat or to an extrasystole.

dropped head (*Typog.*). The first page of a chapter, etc., which begins lower down than ordinary pages. As far as possible, the drop should be constant throughout the book.

dropper (*Elec. Eng.*). In catenary constructions for electric traction systems, the fitting used for supporting the contact wire from the catenary wire.

dropper (*Lace*). One of the distance pieces in a lace machine which are lifted into position between the dropper box and the driving blade by the jacquard card.

dropper box (*Lace*). A movable metal blade on the jacquard in a lace machine; to it the steel bar is connected.

dropper gauge (*Lace*). The thickness of the distance piece of a dropper, determined by the gauge of the lace machine.

dropping bottle (*Chem.*). A small bottle having usually a ground-glass stopper in which is cut a narrow channel. The bottle neck, in which this stopper fits tightly, has a similar channel, so that the stopper can be rotated until the two channels meet. By this means liquid poured from the bottle and down the channel, drop by drop, can be readily controlled.

dropping-out (*Furs*). The operation of lengthening skins by means of *drop cuts* (q.v.).

dropsy (*Med.*). See **oedema.**

drosom'eter (*Meteor.*). An instrument for measuring the amount of dew deposited.

dross (*Met.*). Similar to slag but consisting of metallic oxides that rise to the surface in metallurgical oxidation processes.

dross (*Mining*). Small coal which is inferior or worthless.

drossing (*Met.*). The process for removing copper from work lead. Molten metal from the blast-furnace is allowed to cool while agitated in a drossing kettle. Owing to its low solubility in molten lead, copper separates from solution. Iron and certain amounts of other impurities are also eliminated.

drought (*Meteor.*). Lack of rain. A *partial drought* is a period of at least 29 days the mean daily rainfall of which does not exceed ·01 in. An *absolute drought* is said to exist if, for at least 15 days, the rainfall on each day has been less than ·01 in.

drought resistivity (*Bot.*). The degree of fitness of a plant for withstanding drought, upon which depends its chances of success in competition, in dry places, with other plants.

drove (*Hyd. Eng.*). A narrow channel used for irrigation.

drove (*Masonry*). A broad-edged chisel for dressing stone.

drove work (*Masonry*). Stone dressing done with a boaster, leaving rows of parallel chisel marks on the slant across the face. Also called BOASTED WORK.

drowned (*Mining, etc.*). Flooded; e.g. *drowned workings*, flooded workings.

drowned valleys (*Geol.*). Literally, river valleys which have become drowned by a rise of sea-level relative to the land. This may be due to actual depression of the land, sea-level remaining stationary; or to a eustatic rise in sea-level, as during the interglacial periods in the Pleistocene, when melting of the ice-caps took place. See also **ria** and **fiords.**

drowning pipe (*Plumb.*). A storage cistern inlet pipe which reaches down below the surface of the water in the tank, the noise of the discharge being thereby lessened.

drum (*Build.*). (1) A circular wall carrying a cupola.—(2) A cylindrical section of a column.

drum (*Eng.*). (1) Any hollow cylindrical barrel; e.g. a metal barrel in which oil is stored.—(2) The rotor of a reaction turbine. See **brake drum, disc-and-drum turbine, winding drum.**

drum (*Join.*). (1) Any timber structure cylindrical in shape.—(2) Any cylinder used as a form for bending wood to shape.

drum (*Lace*). A cylinder on which threads are wound to definite length, for transfer to brass bobbins.

drum (*Mining*). The large cylinder or cone on to which the rope is coiled when hoisting a load up a shaft.

drum (*Photog.*). A light wooden frame, in the form of a drum, on which lengths of cinematograph film are wound so that on rotation they dip into a small quantity of developer or fixer.

drum (*Textiles*). The term is applied to various revolving parts which transmit motion to other parts by surface contact.

drum armature (*Elec. Eng.*). An armature for an electric machine, having on it a drum winding.

drum breaker starter (*Elec. Eng.*). A drum starter in which a separate circuit-breaker is provided for interrupting the circuit.

drum controller (*Elec. Eng.*). A controller in which the connexions for performing the desired operation are made by means of fixed contact fingers, bearing on metallic contact strips mounted in the form of a rotating cylindrical drum.

drum-curb (*Civ. Eng.*). See **curb.**

drum development (*Cinema.*). The use of rotating drums for carrying film during processing, as contrasted with frame or continuous development.

drum, ear. See **ear drum.**

drum movement (*Horol.*). A clock movement housed in a cylindrical metal case.

drum pump (*Eng.*). See **rotary pump.**

drum, recording (*Cinema.*). See **recording drum.**

drum scanner (*Television*). A rotating drum carrying a set of apertures, lenses, mirrors, or other picture-scanning elements, used in mechanical scanning systems.

drum starter (*Elec. Eng.*). A motor starter in which the necessary operations are carried out by fixed contact fingers bearing upon contact strips mounted in the form of a rotating cylindrical drum.

drum washer (*Paper*). A gauze-covered cylinder in the breaking engine which washes the pulp by withdrawing dirty water and replacing it with clean.

drum weir (*Civ. Eng.*). A weir formed by a gate capable of rotation about a horizontal axis in the line of the river bed, by which means the discharge over the weir may be controlled.

drum winding (*Elec. Eng.*). A winding for electrical machines in which the conductors are all placed under the outer surface of the armature core. It is the form of winding almost invariably used.

drum winding (*Textiles*). The method of winding yarn on to a flanged bobbin by means of a driving drum in contact with the bobbin.

drumlin (*Geol.*). An Irish term, meaning a little hill, applied to accumulations of glacial drift moulded by the ice into small hog-backed hills, oval in plan, with the longer axes lying parallel to the direction of ice movement. Drumlins often occur in groups, giving the 'basket of eggs' topography which is seen in many parts of Britain and dates from the last glaciation.

Drumm accumulator (*Elec. Eng.*). A special form of alkaline accumulator capable of high discharge rates; the positive plate contains nickel oxides and the negative plate is of zinc.

drumming (*Furs*). The process of tossing skins in drums or cages to remove dust.

drumming (*Leather*). The term covers any of the processes to which raw hides and skins are subjected in a revolving drum to convert them into leather; e.g. soaking, tanning, currying, dyeing.

drunken saw (*Carp.*). A circular saw revolving about an axis which is not absolutely at right-angles to the plane of the saw, consequently cutting a wide kerf.

drupa'ceous (*Bot.*). Resembling a drupe.

drupe (*Bot.*). A succulent fruit formed from a superior ovary, usually one-seeded, with the pericarp clearly differentiated into epicarp, mesocarp, and endocarp.

dru'pel or **dru'pelet** (*Bot.*). A small drupe. Drupels usually occur in groups, forming together a larger fruit.

druse (*Bot.*). A globose mass of crystals of calcium oxalate around a central foundation of organic material, occurring in some plant cells.

drusy (*Mining*). Containing cavities; said of mineralised lodes or veins.

drusy cavities (*Geol.*). See **geodes.**

drusy structure (*Geol.*). See **miarolitic structure.**

dry area (*Build.*). The 2 in. or 3 in. cavity in the wall below ground-level in basement walls built hollow; the purpose of the cavity is to keep the basement walls dry.

dry assay (*Chem.*). The determination of a given constituent in ores, metallurgical residues, and alloys, by methods which do not involve liquid means of separation. See also **wet assay, scorification, cupellation.**

dry-back boiler (*Eng.*). A shell-type boiler with one or more furnaces passing to a chamber at the back, from which an upper bank of fire-tubes leads to the uptake at the front.

dry battery (*Elec. Eng.*). A battery composed of *dry cells* (q.v.).

dry blowing (*Textiles*). A process used for setting and lustring fancy woollens and worsteds.

dry bone ore (*Min.*). See **smithsonite.**

dry cell (*Elec. Eng.*). A primary cell in which the contents are in the form of a paste. Usually of the Leclanché type, the combination of the hydrogen at the carbon anode and the oxygen from the depolariser, manganese dioxide, tending to keep the paste moist.

dry copper (*Met.*). Copper containing oxygen in excess of that required to give 'tough pitch.' Such metal is liable to be brittle in hot- and cold-working operations.

dry-core cable (*Elec. Comm.*). A multi-core lead-covered core for telephone or telegraph use, in which the separate conductors are covered with a continuous spiral of ribbon-shaped paper. The paper covering provides the insulation after being dried with carbon dioxide, which is pumped through the cable and kept under pressure.

dry dock (*Civ. Eng.*). A dock in which ships are repaired. Water is excluded by means of gates or caissons, after the dock has been emptied. Also called a GRAVING DOCK.

dry electrolytic condenser (*Elec. Comm.*). An electrolytic condenser in which the negative pole of the condenser takes the form of a sticky paste, which is sufficiently conducting to maintain the oxide film on the positive aluminium electrode.

dry flashover voltage (*Elec. Eng.*). The voltage at which the air surrounding a clean dry insulator breaks down, causing the insulator to flash over. Also called DRY SPARKOVER VOLTAGE.

dry flue gas (*Eng.*). The gaseous products of combustion from a boiler furnace, excluding water vapour. See **flue gas.**

dry fruit (*Bot.*). A fruit in which the pericarp does not become fleshy at maturity.

dry hopping (*Brew.*). The addition of a small quantity of raw hops to certain classes of beers, to improve the flavour.

dry liner (*Eng.*). See **liner.**

dry moulding (*Foundry*). The preparation of moulds in dry sand, as distinct from the use of greensand or *loam* (q.v.).

dry mounting (*Photog.*). The use of a shellac or gum tissue for fixing photographic prints on supports; heat is applied with an iron or from a steam bath.

dry pile (*Elec. Eng.*). An early form of primary battery consisting of a pile of discs separated by layers of paper; the discs were alternately of different metals and formed the electrodes, while the electrolyte was the slight moisture contained in the paper.

dry pipe (*Eng.*). A blanked-off and perforated steam-collecting pipe placed in the steam space of a boiler and leading to the stop-valve, for the purpose of excluding water resulting from *priming* (q.v.). See **anti-priming pipe.**

dry plate (*Photog.*). The normal glass plate supporting emulsion for photographic purposes, as contrasted with the older *wet plate* (q.v.).

dry-plate rectifier (*Radio*). A term sometimes applied to a copper oxide, selenium, or similar rectifier; a *metal rectifier* (q.v.).

dry rot (*Build.*). A decay of timber due to the attack of certain fungi, the wood becoming light, dry, and friable, and so quite unsuitable for building purposes.

dry sand (*Foundry*). A moulding sand possessing the requisite cohesion and strength when dried. It is moulded in a moist state, then dried in an oven, when a coherent and porous mould results.

dry sparkover voltage (*Elec. Eng.*). See **dry flashover voltage.**

dry spinning (*Textiles*). A method of spinning flax which produces a coarse and bulky yarn; also used for tow yarns.

dry steam (*Eng.*). Steam free from water, but unsuperheated. Often called DRY SATURATED STEAM.

dry sump (*I.C. Engs.*). An internal-combustion engine lubrication system in which the upper crankcase is kept dry by an oil scavenge pump, which returns the oil to a tank, from which it is delivered to the engine bearings by a pressure pump.

dry taping (*Textiles*). See **Scotch dressing.**

dry-thread raising (*Textiles*). A process of raising used to produce a rough fibrous type of pile, e.g. moss or blanket type; or for loosening the short fibres on the surface of Saxony and Cheviot woollen fabrics of certain kinds.

dry valley (*Geol.*). A valley produced at some former period by running water, though at present streamless. This may be due to a fall of the water table, to river capture, or to climatic changes. Dry valleys are common in the Chalk uplands of S.E. England and are believed to date from the close of the Pleistocene glaciation, when precipitation was possibly greater and erosion by running water was certainly much more active than now.

dry wood (*Timber*). Seasoned timber which is free from sap.

drying box (*Photog.*). A container for drying sensitised plates or for other photographic purposes; calcium chloride is the drying agent.

drying cylinder (*Paper*). A hollow cylinder, heated by steam, over which the web of paper is passed to dry it.

drying-off (*Furs*). The process of placing furs in a hot closet to remove moisture.

drying oils (*Paint.*). Vegetable oils forming, by oxidation, a film on exposure to air (e.g linseed oil), in contrast to non-drying oils (e g olive oil); used extensively as vehicles in paints and varnishes.

drying-out (*Elec. Eng.*). (1) The process of heating the windings of electrical equipment in order to drive all moisture out of the insulation; usually done by passing current through the windings.—(2) In electroplating, the process of removing moisture from a metal by passing it through hot water and then through sawdust or a current of hot air.

drying rack (*Photog*) An arrangement for supporting plates or films during drying, preferably in a stream of warm air.

drying room or **drying loft** (*Paper*). A room in the paper mill in which sheets of hand-made paper are hung to dry before and after sizing.

drying stove (*Foundry*). A large stove or oven in which dry sand moulds and cores are dried. See **dry sand, core oven.**

dryness fraction (*Eng*). The proportion, by weight, of dry steam in a mixture of steam and water, i.e. in wet steam.

Drysdale permeameter (*Elec. Eng*). An instrument for determining, by a ballistic method, the permeability of a sample of iron; a plug carrying a primary and secondary coil is inserted in an annular hole in the sample of material under test.

Drysdale potentiometer (*Elec. Eng.*). A form of potentiometer for use with alternating currents. A known current is passed through the potentiometer wire, and a phase-shifting transformer is used to bring this into phase with the e.m.f. to be measured.

Ds (*Chem.*). An alternative symbol for *dysprosium.*

d.s.c. (*Elec. Eng*). An abbrev. for *double-silk-covered wire.*

dual-amplification circuit (*Radio*). See **reflex circuit.**

dual combustion cycle (*Eng.*). An internal-combustion engine cycle sometimes taken as a standard of comparison for the compression-ignition engine, in which combustion takes place in two stages, i.e. partly at constant volume and partly at constant pressure.

dual ignition (*I.C. Engs.*). (1) The provision of two sparking-plugs in each cylinder of an aero engine or other petrol engine, the plugs being supplied by two independent magnetos.—(2) A duplicated ignition system comprising battery ignition and magneto ignition with separate sparking-plugs; used on some high-quality automobiles to ensure reliability.

dual ion (*Chem.*). See **zwitterion.**

dual lift control (*Elec. Eng.*). A control system for an electric lift whereby the latter can be operated either fully automatically or by a car-switch inside the lift.

dual personality (*Psycho-an.*). That type of multiple personality in which the split is in two parts only.

dubbing (*Cinema.*). The re-recording of sound tracks for sound-films, particularly when there is to be alteration in the level of the recorded sound, or when a number of tracks are separately reproduced and, after mixing, re-recorded together.

dubbing (*Plast.*). The operation of filling in hollows in the surface of a wall with coarse stuff, as a preliminary to plastering.

dubbing (*Vet.*). See **cropping.**

dubbing-out (*Plast*). The operation of attaching pieces of slate, tile, etc. to a wall with plaster, and then likewise covering them in order to fill out hollows or to form projections.

Dubi'ni's disease (*Med.*). Electric chorea. A nervous disease of acute onset, with severe pains and involuntary shock-like movements.

Du Bois balance, du bwah (*Elec. Eng*). An instrument used for measuring the permeability of iron or steel rods. The magnetic attraction across an air gap in a magnetic circuit, of which the sample forms a part, is balanced against the gravitational force due to a sliding weight on a beam.

Duchemin's formula, du-shem-an^{g} (*Struct.*). An expression giving the normal wind pressure on an inclined area in terms of that on a vertical area. It states that:

$$N = F \cdot \frac{2 \sin \alpha}{1 + \sin^2 \alpha},$$

where F = force of wind in lb. per sq. ft. of vertical surface; α = angle of the inclined surface with the horizontal; N = normal pressure per sq ft of inclined surface.

Duchenne-Erb paralysis, du-shen′ (*Med.*). A form of paralysis in which the arm can be neither abducted nor turned outwards nor raised nor flexed at the elbow, as a result of a lesion of the fifth and sixth cervical nerves.

duchess (*Build.*). A slate, 24 × 12 in.

duchess (*Paper*). A notepaper size, 5¾ × 8¾ in.

duck (*Textiles*). A heavy plain cotton cloth, used for tropical suitings; heavier makes are used for sails and for tents. A similar linen cloth is used for coarse suitings.

duck board (*Build.*). A board which has slats nailed across it at intervals and is used as steps in repair works on roofs.

duck cholera (*Vet.*). See **cholera (fowl, duck).**

duck sickness (*Vet.*). Botulism of waterfowl due to *Clostridium botulinum, type C.*

duck's-bill bit (*Carp.*). See **dowel bit.**

duct (*Elec. Eng.*). (1) A pipe for containing electric cables, usually laid underground.—(2) An air passage in the core or other parts of an electric machine along which cooling air may pass; also called VENTILATING DUCT or COOLING DUCT.

See **armature—** **earthenware—**
axial— **multiple—**
cable— **radial—**

duct (*Eng.*). A large sheet-metal tube or casing through which air is passed for forced-draught, ventilating, or conditioning purposes.

duct (*Print.*). See **ductor.**

duct or **ductus** (*Zool.*). A tube formed of cells: a tubular aperture in a non-living substance, through which gases and liquids or other substances (such as spermatozoa, ova, spores) may pass.

ducter (*Elec. Eng.*). A measuring instrument which gives a direct reading of low resistances.

ductility (*Met.*). The property of metals that enables them to be mechanically deformed when cold, while becoming progressively more resistant to deformation. See **work-hardening.**

ductless glands (*Zool.*). Masses of glandular tissue which lack ducts and discharge their products directly into the blood; as the lymph glands and the endocrine glands.

ductor or **duct** (*Print.*). A reservoir holding the ink in a printing machine. The supply is regulated by a number of screws.

ductule (*Zool.*). A duct with a very narrow lumen: a small duct: the fine terminal portion of a duct.

ductus (*Zool.*). See **duct.**

ductus arterio'sus (*Zool.*). See **Botall's duct.**

ductus carot'icus (*Zool.*). In some Vertebrates, a persistent connexion between the systemic and carotid arches.

ductus Cuvierii (*Zool.*). See **Cuvierian ducts.**

ductus ejaculato'rius (*Zool.*). In many *Invertebrata*, as the *Platyhelminthes*, a narrow muscular tube forming the lower part of the vas deferens and leading into the copulatory organ.

ductus endolymphat'icus (*Zool.*). In lower Vertebrates and the embryos of higher Vertebrates, the tube by which the internal ear communicates with the surrounding medium.

ductus pneumat'icus (*Zool.*). In physostomous Fish, a duct which connects the gullet with the air-bladder.

ductus veno'sus (*Zool.*). In the development of Vertebrates, the left omphalomesenteric vein during the formation of the liver.

Duddell oscillograph (*Elec. Eng.*). An oscillograph operating on the moving-coil principle. The coil consists of two fine wires carrying the current to be observed, and these move in the field of an electromagnet. Mirrors are attached to the wires, so that their movement can be observed by means of a light beam.

Dufaycolor (*Photog.*). An additive colour process using a ruled coloured mosaic on the base before coating it with panchromatic emulsion. After exposure and development this negative is used to print a positive on similar stock.

duff (*Mining*). Fine coal obtained from a coal-screening plant.

Duguet's ulcerations, dü-gā' (*Med.*). Ulcers in the tonsillar region and the pharynx, occurring in typhoid fever.

Dühring's disease, dü'ring (*Med.*). Dermatitis herpetiformis. A skin disease in which weals or reddish patches, surmounted by vesicles, appear in successive crops on the surface of the body.

duke (*Paper*). A notepaper size, 7 × 10½ in.

dukey (*Mining*). (1) A train, or journey of tubs or trains, travelling on an inclined haulage road underground.—(2) A carriage or platform on wheels on which tubs or trams are placed in a horizontal position to be lowered on unusually steep self-acting inclines.

dull (*Med.*). Not resonant to percussion; said of certain regions of the body, especially the chest.

dull-emitter cathode (*Thermionics*). A cathode from which electrons are emitted in large quantities at temperatures at which incandescence is barely visible. The emitting surface is usually the oxide of one or more of the alkaline-earth metals.

dull-emitter valve (*Thermionics*). Any thermionic valve employing a dull-emitter cathode.

Dulong and Petit's law (*Chem.*). See **law of Dulong and Petit.**

dulo'sis (*Zool.*). Among Ants (*Formicoidea*), an extreme form of social parasitism in which the work of the colony of one species is done by captured 'slaves' of another species: slavery, helotism.

dumb aerial (*Radio*). A non-radiating resistive network, similar to an artificial antenna; used for absorbing the output power from a transmitter during the spacing periods, in some systems of absorber keying.

dumb-bell bone (*Zool.*). See **prevomer.**

dumb buddle (*Mining*). A buddle without revolving arms or sweeps, for concentrating tin ores.

dumb iron (*Automobiles*). Forgings attached to the front of the side-members of the frame, to carry the spring shackles and front cross-member.

dumb pintle. See **pintle.**

Dumfries sandstone (*Build.*). A not very durable brownish-red sandstone, used locally for general building purposes; of Permo-Triassic age.

dummy (*Plumb.*). A lump of lead fastened to the end of a cane, to form a mallet which may be used for straightening out lead pipes.

dummy (*Print.*). An unprinted volume, generally unbound, made up for the use of publishers in estimating their requirements. Measurement should be tested at the fore-edge and bottom.

dummy antenna (*Radio*). Same as *artificial antenna.*

dummy coil (*Elec. Eng.*). A coil put on to an armature in order to preserve mechanical balance and symmetry, but not electrically connected to the rest of the winding.

dummy piston (*Eng.*). A disc placed on the shaft of a reaction turbine; to one side of it steam pressure is applied in order to balance the end thrust; sometimes called a BALANCE PISTON

dummying (*Eng.*). The preliminary rough-shaping of the heated metal before placing between the dies for drop-forging.

dump or **tip** (*Mining*). The heap of accumulated waste material from a metal-mine, or of treated tailings from a mill or ore-dressing plant.

dumping wagon (*Civ. Eng.*). A wagon used, in the construction of earthworks, for conveying excavated material about on site and dumping it where required.

dumpling (*Civ. Eng.*). The soil remaining in the centre of an open excavation which is commenced by sinking a trench around the site; the dumpling is removed later.

dumpy level (*Surv.*). A type of level in which the essential characteristic is the rigid connexion of the telescope to the vertical spindle.

dun whin (*Mining*). A hard compact stone occasionally occurring in a coal-seam.

Dundee Sandstone (*Geol.*). See **Arbroath Sandstone.**

dune (*Geol.*). See **sand dunes.**

dune bedding (*Geol.*). That type of current bedding commonly exhibited by sand dunes and interpreted in sandstones as evidence of desert conditions.

dungaree (*Textiles*). A coloured cotton cloth, with a twill or satin weave; generally used for men's overalls.

dun'ite (*Geol.*). A coarse-grained, deep-seated igneous rock, almost monomineralic, consisting essentially of olivine only, though chromite is an almost constant accessory. In several parts of the world (e.g. Bushveld Complex, S. Africa) it contains native platinum and related metals. Named from Mt. Dun, New Zealand.

Dunkard Series (*Geol.*). Continental strata, including thin coal-seams, similar to the Pennsylvanian, but of Permian age, occurring in N. America. Strata of the same age are marine in Kansas, but include marginal red beds with gypsum, and thick salt deposits were formed later in the Kansas basin. See also **Cimarron Series.**

dunking (*Cinema.*). A colloquialism for the process of dipping the film into chemical solutions for any stage of processing.

Dunning (*Cinema.*). A double-exposure system in motion-picture production; a yellow transparent print of a previously photographed background is used as a synchronous mask while photographing action illuminated with yellow against a violet plain background.

dunted (*Pot.*). Said of ware which cracks after firing in the biscuit oven.

duodecimo (*Print.*). A sheet of paper folded into twelve leaves. Usually called TWELVEMO, and written 12*mo.*

duode′nal ileus (*Med.*). Chronic obstruction of the duodenum from kinking of its wall by anomalously placed blood-vessels, associated with visceroptosis.

duodenec′tomy (*Surg*). Excision of the duodenum.

duodeni′tis (*Med.*). Inflammation of the duodenum.

duode′nochol′ecystos′tomy (*Surg.*). A communication, made by operation, between the duodenum and the gall-bladder.

duode′nojejunos′tomy (*Surg*). A communication surgically made between the duodenum and the jejunum.

duode′num (*Zool.*). In Vertebrates, the region of the small intestine immediately following the pylorus, distinguished usually by the structure of its walls; so called because it is approximately twelve inches long in Man.—*adj.* **duode′nal.**

duody′natron (*Radio*). A system comprising two resonant circuits, connected to the inner grid and anode of a tetrode, the outer grid being maintained at a higher potential than any of the other electrodes, oscillations of different frequencies being maintained in the two resonant circuits owing to secondary emission from the inner grid and anode. See also **dynatron.**

duolateral coil (*Radio*). See **honeycomb coil.**

duophase (*Elec. Comm.*). The use of a choke in the anode circuit of a valve in an amplifier, to obtain a reversed-phase voltage for driving a push-pull output-stage. Cf. *paraphase.*

Duosonic (*Cinema.*). The trade-name of sound-film reproducing equipment manufactured by Gaumont-British; it provides for the uniform high quality reproduction over an entire auditorium.

Dupack (*Photog.*). A bipack made by Du Pont in America.

dupe (*Cinema*). A colloquialism for *duplicate*, particularly the duplicate negative made from a positive in order to print further positives.

duped print (*Cinema*). A print, usually of reduced photographic quality, from a duplicate negative, which has been made from a good positive to avoid import duties.

Duperreys lines (*Elec. Eng.*). Lines on a magnetic map indicating the direction of the magnetic meridian.

du′plet (*Chem.*). A pair of electrons shared between two atoms, forming a single bond.

duplex (*Cyt.*). Said of a triploid organism which has three homologous chromosomes, two of them carrying a given dominant gene, and the third carrying the corresponding recessive.

duplex balance. Telegraph name for *line balance.*

duplex carburettor (*I.C. Engs.*). A carburettor in which two barrels or mixing chambers are fed from a single float chamber; used on some aero engines.

duplex channel (*Elec. Comm.*). A channel which is used independently in both directions, over the same frequency band.

duplex dialling (*Auto. Teleph.*). Dialling over both line wires of a subscriber's loop, with separate batteries and earth return.

duplex, differential (*Teleg.*). See **differential duplex.**

duplex escapement (*Horol.*). An escapement in which the escape wheel has two sets of teeth, one for giving impulse and one for locking. The locking teeth are in the plane of the wheel, and lock by pressing against the outside of a hollow cylinder on the axis of the balance staff. This cylinder has a notch to allow the tooth to escape for unlocking. The impulse teeth are raised above the plane of the escape wheel and give impulse to the balance by striking against a finger fixed to the balance staff; impulse is given every alternate vibration. Although capable of giving very satisfactory results, this escapement is now rarely met with in watches, as it is sensitive and liable to set.

duplex group (*Cyt.*). The diploid outfit of factors and chromosomes.

duplex lathe (*Eng*). A lathe in which two cutting tools are used, one on each side of the work, either to avoid springing of the latter, or to increase the rate of working. See **multiple tool lathe.**

duplex paper (*Paper*). (1) Paper having two differently coloured surfaces.—(2) Any paper made up by pasting two sheets together.

duplex processes (*Met*). The combination of two alternative methods in performing one operation; as when steel making is carried out in two stages, first in the open hearth and second in the electric furnace.

duplex pump (*Eng*). A pump with two working cylinders side by side.

duplex winding (*Elec. Eng.*). A winding for d.c. machines in which there are two separate and distinct windings on the machine, the two being connected in parallel by the brushes.

duplicate feeder (*Elec. Eng.*). A feeder forming an alternative path to that normally in use.

duplicating papers (*Paper*). Absorbent or semi-absorbent papers used on duplicating machines They are specially prepared to prevent the ink smearing.

duplication (*Cyt*) The union of a fragment of a chromosome with a whole chromosome of the same sort.

duplicational polyploid (*Cyt*). See **autopolyploid.**

du′plicature (*Zool.*). In some *Polyzoa*, a circular fold surrounding the base of the protrusible portion of a polyp.

duplicident, —plis′i-dent (*Zool.*). Having two pairs of incisor teeth in the upper jaw; as Hares and Rabbits.

duplic′itas anterior (*Zool.*). In experimental embryology, an abnormal embryo produced by constriction of the two-celled stage in the sagittal plane; characterised by the duplication of the anterior parts of the head (cerebral hemispheres, epiphysis, hypophysis, and paraphysis, but not the eyes).

Dupuytren's contraction, dū-pwĕ-trahn^{g}′ (*Med.*). Thickening and contraction of the fascia of the palm of the hand, with resulting flexion of the fingers, especially of the ring and little fingers.

dura mater (*Zool.*). The outermost of the three membranes surrounding the brain and spinal cord in Vertebrates, a tough fibrous layer.

durain′ (*Min.*). A separable constituent of dull coal; of firm, rather granular structure, sometimes containing many spores.

Dural′umin (*Met.*). An aluminium base alloy containing copper 3·5-4·5%, magnesium 0·4-0·7%, manganese 0·4-0·7%, and silicon up to 0·7%. Capable of age-hardening at room temperature, after quenching from 500° C. Tensile strength, after forging and heat treatment, 25-28 tons per sq. in.; sp. gr. 2·7-2·8. Specific electrical resistivity 5 microhms per cm^3.

du′ramen (*Bot.*). See **heart wood.**

durchmu′sterung (*Astron.*). The German word meaning a systematic counting or cataloguing of the stars; often applied in the title of catalogues; e.g. the *Bonn Durchmusterung.*

Durness Limestone (*Geol.*). A massive dolomitic limestone, at some levels somewhat argillaceous, occurring in the N.W. Highlands of Scotland. The lower part is Lower Cambrian in age, but the upper part has yielded the fossils of the Beekmantown Limestone of the U.S A., this being Arenigian in age. See **Beekmantown Limestone.**

Duroziez's murmur, dū-rō-zi-ā (*Med.*). A murmur heard over the main artery in the thigh during diastole of the heart; indicative of disease of the aortic valve.

dust catcher (*Met.*). A chamber in which dust is extracted from furnace gases by causing a sudden change in the direction of the gas stream.

dust collector. Apparatus by means of which suspended dust can be precipitated; the process is generally effected by means of an exhausting fan or by an electrical precipitation plant.

dust counter (*Meteor.*). An instrument for counting the dust particles in a known volume of air.

dust cover (*Print.*). See **jacket.**

dust explosion (*Eng.*). An explosion resulting from the ignition of small concentrations of inflammable dust (e g. coal dust or flour) in the air.

dust figure (*Elec. Eng.*). See **Lichtenberg figure.**

dust panel (*Join.*). A thin board fixed horizontally between two drawers.

dust-proof (*Elec. Eng.*). Said of a piece of electrical apparatus which is constructed so as to exclude dust or textile flyings.

duster (*Paint.*). A brush used to remove dust from a surface which is to be painted.

dusting-on process (*Photog.*). The deposition of powdered colouring matter on a bichromate tacky material which has been differentially hardened by exposure to an image.

Dutch arch (*Build.*). See **French arch.**

Dutch bond (*Build.*). A bond differing from English bond only in the angle detail, the vertical joints of one stretching course being in line with the centre of the stretchers in the next stretching course.

Dutch clinkers (*Build.*). Small, hard, well-burnt yellow bricks, used mostly for paving purposes.

Dutch gilding (*Dec.*). Transparent yellow lacquer over burnished silver or tinfoil.

Dutch gold (*Dec.*). A cheap alternative to *gold-leaf* (q.v.), consisting of copper-leaf, which, by exposure to the fumes from molten zinc, acquires a yellow colour.

Dutch marble paper (*Bind.*). A strong paper with variegated marble patterns on the face; used extensively as end-papers in account books.

Dutch pink (*Paint.*). A transparent yellow pigment produced by staining whiting with a tincture of quercitron bark. Also called ENGLISH PINK and ITALIAN PINK.

Dutch process (*Chem.*). A process of making *white lead* (q.v.) by corroding metallic lead in stacks where fermentation of tan or bark is taking place, in the presence of dilute acetic acid.

dutchman (*Carp.*). A piece of wood driven into a gap left in a joint which has been badly cut.

duty cycle (*Elec. Eng.*). The cycle of operations which a piece of electrical apparatus is called upon to perform whenever it is used; e.g. with a motor, it is the starting, running for a given period, and stopping; or with a circuit-breaker, it may be closing and opening, for a given number of times with given time intervals between.

duty-cycle factor (*Elec. Eng.*). The ratio of the equivalent current taken by a motor or other apparatus running on a variable load to the full-load current of the motor (continuous rating).

DV (*Elec. Comm.*). Abbrev. for *double vibration* (q.v.).

dwang (*Carp.*). A *nogging-piece* (q.v.).

dwang (*Masonry*). A mason's term for a crowbar.

dwarf male (*Zool.*). A male animal which is greatly reduced in size, and usually in complexity of internal structure also, in comparison with the female of the same species; such males may be free-living but are more usually carried by the female, to which they may be attached by a vascular connexion in extreme cases, as some kinds of deep-sea Angler Fish.

dwarf rafter (*Carp.*). A *jack rafter* (q.v.).

dwarf shoot (*Bot.*). See **short shoot.**

dwarf star (*Astron.*). The name arising from Russell's theory of stellar evolution according to which a star passes through the spectral sequence M to O as a 'giant,' and then retraces the sequence O to M as a 'dwarf,' so that the stars of any given spectral type below O fall into two classes differing greatly in mass.

dwarf wall (*Masonry*). A low parapet or retaining wall.

dwarf waves (*Radio*). Electromagnetic waves of length less than one centimetre, produced by electronic oscillations in the inter-electrode space of a thermionic valve.

dwell (*Eng.*). (Of a cam) the angular period during which the cam follower is allowed to remain at its maximum lift.

dwell (*Print.*). The slight pause in the motion of a hand-press or platen when the impression is being made.

Dy (*Chem.*). The symbol for *dysprosium.*

dy (*Ecol.*). A type of lake-bottom deposit largely composed of plant detritus and having a marked effect on the fauna.

dy'ad (*Cyt.*). Half of a tetrad group of chromosomes passing to one pole at meiosis.

dyads (*Photog.*). Colour combinations in pairs, according to aesthetic rules.

Dyas (*Geol.*). An obsolete term for the Permian System.

dyestuffs (*Chem.*). Groups of aromatic compounds having the property of dyeing silk, wool, or cotton, and containing characteristic groups essential to their qualification as dyes. The more important dyestuffs are classified as follows: (*a*) nitroso- and nitro-dyestuffs, (*b*) azo-dyes, (*c*) stilbene, pyrazole, and thiazole dyestuffs, (*d*) di- and triphenylmethane dyes, (*e*) xanthene dyestuffs, (*f*) acridine and quinoline dyestuffs, (*g*) indamine and indophenol dyestuffs, (*h*) azines, oxazines, and thiazines, (*i*) hydroxyketone dyestuffs, (*j*) sulphide dyes, (*k*) vat dyestuffs, indigo, and indanthrenes.—(*Photog.*) For **acid dyes** and **colloidal dye** see these headings.

dye toning (*Photog.*). The chemical process whereby a dye is made to replace the silver in a normal photographic image, or to adhere to it by mordanting.

dyke (*Geol.*). A form of minor intrusion injected into the crust during its subjection to tension, the dyke being thin, with parallel sides, and maintaining a constant direction in some cases for more than a hundred miles. Some dykes prove less resistant to weathering than the surrounding country rock and therefore form long narrow depressions in the surface of the ground, thus resembling ditches (hence the name); others, on the contrary, stand up like walls.

dyke (*Hyd. Eng.*). A wall or embankment of timber, stone, concrete, fascines, or other material, built as training works for a river, so as rigidly to confine flow within definite limits over the length treated.*

dyke phase (*Geol.*). That episode in a volcanic cycle characterised by the injection of minor intrusions, especially dykes. The dyke phase usually comes after the major intrusions, and is the last event in the cycle.

dyke swarm (*Geol.*). A series of dykes of the same age, usually trending in a constant direction over a wide area. Occasionally dykes may radiate outwards from a volcanic centre, as the Tertiary dyke swarm in Rum, Scotland; but usually they are rigidly parallel; e.g. the O.R.S. dyke swarm of S.W. Scotland, of which the trend is north-east to south-west.

dynam-, dynamo- (Greek *dynamis*, power) A prefix used in the construction of compound terms; e.g. *dynamometer* (q.v.).

dynam'ics. See **mechanics.**

dynamic balancing (*Acous.*). See **balancing (dynamic).**

dynamic braking (*Elec. Eng.*). See **rheostatic braking.**

dynamic characteristic (*Radio, Thermionics*). Generally, any characteristic curve taken under normal working conditions. Specifically applied to the anode-current-versus-grid-voltage relationship, when the effect of the anode-circuit load impedance is included.

dynamic damper or **detuner** (*Eng*). A supplementary rotating mass driven through springs attached to a crankshaft at a point remote from the node, in order to eliminate a troublesome critical speed. See **vibration dampers, pendulum damper.**

dynamic drive (*Acous.*). The actuation of a mechanism (e.g. a loudspeaking receiver) by a current in a coil situated in the air-gap of a permanent or coil-excited magnet.

dynamic electricity (*Elec. Eng*). A term sometimes used to denote electric currents, i.e. electric charges in motion, as opposed to *static electricity*, in which the charges are normally stationary.

dynamic isomerism (*Chem.*). See **tautomerism.**

dynamic metamorphism (*Geol.*). A name, now little used, for that type of metamorphism in which the chief factor is greatly increased pressure. As rise of temperature is, under natural conditions, inseparable from increase of pressure, a better term is *dynamo-thermal metamorphism*. See **metamorphism.**

dy'namite (*Chem.*). A mixture of nitro-glycerine with kieselguhr (3:1), a most powerful explosive.

dy'namo (*Elec. Eng.*). A term used to denote any electromagnetic generator, but commonly used only for a direct-current generator.

dynamom'eter (*Elec. Eng.*). An electrical measuring instrument in which the pointer is deflected as a result of the force exerted between fixed and moving coils, the pointer being attached to the latter. The term is also used for a *torque meter*. See **Siemens dynamometer, Weber dynamometer, dynamometer ammeter, dynamometer voltmeter, dynamometer wattmeter.**

dynamometer (*Eng.*). A machine for measuring the brake horse-power of a prime-mover or electric motor. See **absorption dynamometer, electric dynamometer, Froude brake, rope brake, transmission dynamometer.**

dynamometer (*Med.*). An instrument for measuring the force of contraction of muscle.

dynamometer ammeter (*Elec. Eng.*). An ammeter operating on the dynamometer principle, the fixed and moving coils being connected in series and carrying the current to be measured.

dynamometer voltmeter (*Elec. Eng.*). A voltmeter operating on the dynamometer principle, the fixed and moving coils being connected in series, and in series with a high resistance across the voltage to be measured.

dynamometer wattmeter (*Elec. Eng.*). A commonly used type of wattmeter operating on the dynamometer principle, the fixed coil being usually in the current circuit and the moving coil in the pressure circuit.

dy'namotor (*Elec. Eng.*). An electric machine having two armature windings, one acting as a generator and the other as a motor, but only a single magnet frame. Also called a ROTARY TRANSFORMER.

dy'natron (*Thermionics*) A multielectrode thermionic tube, usually a triode or tetrode, in which two adjacent electrodes are maintained at positive potentials with respect to the cathode, that nearer the cathode being at the higher potential. The emission of secondary electrons from the electrode at the lower potential, usually the anode, causes the current thereto to be decreased by an increase in its potential, and vice versa, over a certain range of potentials.

dynatron oscillator (*Radio*). An oscillator in which the negative differential resistance exhibited by the anode-to-cathode circuit of a dynatron maintains oscillations in a resonant circuit connected in parallel therewith.

dyne (*Mech*). The unit of force in the c.g.s. system of units. A force of one dyne, acting on a mass of 1 gm., imparts to it an acceleration of 1 cm. per sec. per sec. Approximately 981 dynes are equal to 1 gm. weight.

dynode (*Thermionics*). An electrode the chief function of which is to emit secondary electrons; e g. the anode of a dynatron. See also **dynatron.**

dys- (Greek *dys-*, =English mis-, un-). Prefix used in the construction of compound terms; e.g. *dysphoria* (q.v).

dysan'alyte (*Min*). A rare accessory mineral, apparently cubic, and related to perovskite in composition, but containing columbate as well as titanate of calcium, and a variable content of iron.

dysar'thria (*Med.*). Difficult articulation of speech, due to a lesion in the brain.

dysba'sia (*Med.*). Difficulty in walking.

dysbasia an'giosclerot'ica (*Med.*). Pain in the legs on walking, due to thickening of the arteries. See **intermittent claudication.**

dysbou'lia, dysbu'lia (*Psychol.*). Psychopathological weakness of the will.

dyschezia,—ked'zi-a (*Med.*). A form of constipation in which the faeces are retained in the rectum, as a result of blunting of a normal reflex due to faulty habits.

dyscra'sia (*Med.*). Any disordered condition of the body, especially of the body fluids.

dys'diado'kokine'sia (*Med.*). Inability to perform rapid alternate movements as a result of a lesion in the cerebellum.

dysentery (*Med*). A term formerly applied to any condition in which inflammation of the colon was associated with the frequent passage of bloody stools. Now confined to *amoebic dysentery*, the result of infection with the *Entamoeba histolytica*; and to *bacillary dysentery*, due to infection with *Bacterium dysenteriae*.

dysentery, lamb (*Vet.*). An infectious disease of newborn lambs due to *Clostridium welchii, type B*.

dysgen'ic (*Zool.*). Causing, or tending towards, racial degeneration.

dyshidro'sis, dysidro'sis (*Med.*). See **cheiropompholyx.**

dyskine'sia (*Med.*). A term applied to any one of a number of conditions characterised by involuntary movements which follow a definite pattern; e.g. tics.

dysmenorrhoe'a, dysmenorrhe'a (*Med.*). Painful and difficult menstruation.

dysme'tria (*Med.*). Faulty estimation of distance in the performance of muscular movements, due to a lesion in the cerebellum.

dysosto'sis (*Med.*). Defect in the normal ossification of cartilage.

dyspareu'nia (*Med.*). Painful or difficult coitus.

dyspep'sia (*Med.*). Indigestion: any disturbance of digestion.

dyspha'gia (*Med.*). Difficulty in swallowing.

dyspha'sia (*Med.*). Disturbed utterance of speech due to a lesion in the brain.

dyspho'nia (*Med.*). Difficulty of speaking, due to any affection of the vocal cords.

dyspho'ria (*Med.*). Unease; absence of feeling of well-being.

dyspitu'itarism (*Med.*). A condition in which there is disordered function of the pituitary gland.

dyspla'sia (*Med.*). Abnormality of development.

dysplastic (*Psychiatry*). Showing deviations from the three well-defined Kretschmer types, or showing a mixture of features from these types, with possible predomination of one of them.

dyspnoe'a, dyspne'a (*Med.*). Laboured or difficult respiration.

dyspro'sium (*Chem.*). Symbol, Dy. A metallic element, a member of the rare-earth group. At. no. 66, at. wt. 162·5. It is the most basic of the erbium sub-group (Dy, Ho, Er, Tm) of the yttrium family.

dyssyner'gia (*Med.*). Inco-ordination of muscular movements, due to disease of the cerebellum.

dystectic mixture (*Chem.*). A mixture having a maximum melting-point.

dysto'cia, dysto'kia (*Obstet.*). Painful or difficult childbirth.

dystro'phia adipo'sogenita'lis (*Med.*). Fröhlich's syndrome. A condition characterised by obesity, hairlessness of the body, and underdeveloped genital organs, due to disordered function of the pituitary gland.

dystrophia myotonica (*Med.*). See **myotonia atrophica.**

dystro'phic (*Ecol.*). Said of a lake-habitat in which iron and humic acids in the water reduce the dissolved oxygen-content.

dys'trophy (*Bot.*). The condition when insects visiting flowers do not enter in the normal fashion, but perforate the perianth and remove the nectar without working the pollination mechanism; the flower is damaged, and the plant obtains no advantage from the visit.

dysu'ria, dys'ury (*Med.*). Painful or difficult passage of urine.

Dzierzon's theory, dzyer'zhon (*Zool.*) The theory that a Queen Bee can lay at will eggs which will produce either males or females, and that all the eggs will develop into males if unfertilised, into females if fertilised.

e-. Prefix. See under **ex-**.

e (*Chem.*). (With subscript) a symbol for single electrode potential. See ***E*** (2).

e or **ε** (*Maths.*). The base of hyperbolic or natural logarithms, defined as the limiting value of $\left(1+\frac{1}{m}\right)^m$ as m approaches infinity; e has the value 2·718282 to six places of decimals.

e (*Struct.*). A symbol for eccentricity of a load.

ε (*Chem.*). A symbol for molar extinction coefficient.

ε- (*Chem.*). (1) Substituted on the fifth carbon atom.—(2) *epi-*, i.e. containing a condensed double aromatic nucleus substituted in the 1.6 positions —(3) *epi-*, i.e. containing an intramolecular bridge.

ε (*Maths.*). See ***e***.

η (*Chem.*). A symbol for electrolytic polarisation, overvoltage.

η (*Eng.*). A symbol for some specified efficiency of a machine.

η (*Phys.*). A symbol for the *coefficient of viscosity*.

E (*Chem.*). A symbol for (1) potential difference, especially electromotive force of voltaic cells; (2) (With subscript) single electrode potential—

E_H, on the hydrogen scale;
E_0, standard electrode potential.

[E] (*Light*). One of the Fraunhofer lines in the green of the solar spectrum. Its wavelength is 5269·723 A., and it is due to iron.

E. & O.E. (*Build.*, *Civ. Eng.*). The common abbrev. for *errors and omissions excepted*.

E-layer (*Radio*). The most regular of the upper ionised regions in the ionosphere, with effective maximum density increasing from zero before dawn, to its greatest at noon, and decreasing to zero after sunset, at heights varying between 110 and 120 km.; the 'Kennelly-Heaviside layer.'

eagle (*Cinema.*). (1) Same as *bug*.—(2) A take which is photographically perfect.

ear (*Acous.*). The organ of hearing (see below **ear**, *Zool.*). The normal pair of ears provide directive facility, in addition to the faculty of perceiving of sound waves of suitable frequency and amplitude.

ear (*Build.*). A *crossette* (q.v.).

ear (*Elec. Eng.*). A metal fitting attached to the contact wire of an electric traction system, for the purpose of suspending it.

See **anchor—** **splicing—**
feeder— **straight-line—**

ear (*Eng.*). A projection, cast or forged integral, or attached to an object, for the purpose of supporting it or of attaching another part to it pivotally; often referred to as a LUG.

ear (*Plumb.*). A projection on a metal pipe, by means of which the pipe may be nailed to a wall.

ear (*Zool.*). Strictly, the sense-organ which receives auditory impressions: in Invertebrates, various sensory structures formerly supposed to be auditory in function, as the statocysts of medusae: in some Birds and Mammals, a prominent tuft of feathers or hair close to the opening of the external auditory meatus: in Mammals, the pinna: more generally, any ear-like structure.

ears (*Mining*). The cross-piece forming two projections, one on each side of a sprag, near to the handle. The ears prevent the sprag, or drag, which is used to lock the wheels of tubs or trains on inclines, from falling through the spokes.

ear, artificial (*Acous.*). See **artificial ear.**

ear defenders (*Acous.*). Plugs of various materials for insertion into the ear to reduce perception of noise, particularly impulse noises, such as gun-fire.

ear drum (*Anat.*). The outer termination of the aural mechanism of the ear, consisting of a membrane, in tension, for transferring the acoustic pressures applied from without to the ossicles for transmission therefrom to the inner ear.

ear muffs (*Acous.*). (1) Pads of rubber or similar material which are placed on head telephone receivers to minimise discomfort during long use. —(2) Large pads for reducing the effect of noise on factory workers.

Earth (*Astron.*). The third planet in the solar system, counting from the sun outwards. It has one satellite, the *moon* (q.v.). Its mass is 1/329,390 that of the sun's mass, or $5{\cdot}98 \times 10^{27}$ grams. Its mean distance from the sun is 92,900,000 miles. It revolves round the sun in one year, its orbit being slightly elliptical, and it rotates on its own axis from west to east in one day. Its axis is inclined to the plane of the ecliptic (see **obliquity of the ecliptic**). The origin of the earth, and of the other planets, is attributed to condensation from a filament ejected from the sun under the gravitational influence of a large star passing, in the remote past, close to the sun's surface.—Estimates of the AGE OF THE EARTH have varied between large limits, but two lines of argument, the one from cosmogony and the other from geology, now seem to indicate an age of about three thousand million years.—CRUST OF THE EARTH. The outer shell of the earth consists of igneous rocks having a composition approximating to that of granite; covering this there is a thin veneer of sedimentary rocks. See also **lithosphere.**—DENSITY OF THE EARTH. The average density is about 5·6; but as that of the surface rocks is approximately only 2·5, it is inferred that denser materials lie beneath and include a core of nickel-iron, with a density of about 8.—FORM OF THE EARTH. An oblate spheroid, flattened at the poles and having a bulge round the equator, is the true figure of the earth; the equatorial and polar radii of the earth are respectively 3963·35 miles and 3950·01 miles.—TEMPERATURE OF THE EARTH. The temperature of the earth's crust varies seasonally to a depth of about 30 feet, and diurnally to about 2 feet. Below 30 feet the temperature rises with increasing depth at an average rate of about 30° C. per kilometre.

earth (*Elec.*). Connexion to the main mass of the earth by means of a conductor having a very low impedance.—(*Radio*) A system of plates or wires buried in the ground, to which connexion is made to provide a path to ground for currents flowing in the antenna circuit.—The U.S. equivalent is GROUND.

See **artificial—** **intermittent—**
counterpoise— **partial—**
dead— **earth plate.**

earth circuit (*Radio*). That part of a radio transmitter or receiver circuit which includes the earth lead or counterpoise.

earth closet (*San. Eng.*). A metal-lined receptacle, usually placed beneath a pierced seat, for receiving human excreta, the latter being deodorised by covering with dry earth, sometimes mixed with chemicals.

earth coil (*Elec. Eng.*). A pivoted coil of large diameter for measuring the strength of the earth's magnetic field; this is done by suddenly changing the position of the coil in this field and observing the throw of a ballistic galvanometer connected to it. Also called an EARTH INDUCTOR.

earth colours (*Paint.*). Pigments prepared from natural earths; e.g. ochres, umbers, chalk, lime.

earth current (*Radio*). The current flowing in the earth lead.

earth currents (*Elec. Comm.*). (1) Currents in the earth which, by induction, cause irregular currents to flow in submarine cables and so interfere with the reception of the transmitted signals.—(2) Direct currents in the earth, which are liable to cause corrosion of the lead sheaths of cables; they are the earth return currents of electric power systems (such as single-rail traction systems).

earth-detector (*Elec. Eng.*). See **leakage-indicator.**

earth fault (*Elec. Eng.*). An accidental connexion between a live part of an electrical system and earth.

earth impedance (*Elec. Comm.*). The impedance as normally measured—with all extraneous electromotive forces reduced to zero—between any point in a communicating system or a measuring circuit and earth.

earth inductor (*Elec. Eng.*). See **earth coil.**

earth inductor compass (*Aero.*). A course indicator used on aircraft. It consists of a mechanically driven coil which generates an e.m.f. due to its rotation in the earth's magnetic field; the magnitude of the e.m.f. varies if the aircraft deviates from its straight course and causes a deflection on a galvanometer. Also called INDUCTION COMPASS.

earth (or **ground) lead** (*Radio*). The connexion between a radio transmitting or receiving apparatus and the earth.

earth magnetism (*Elec. Eng.*). See **terrestrial magnetism.**

earth movements (*Geol.*). The general term covering change of attitude of strata due to compression and tension in the earth's crust; it includes folding and faulting of different kinds. See **epeirogenic earth movements, orogenesis, eustatic movements, fault.**

earth-pillars (*Geol.*). These occur where sediments consisting of relatively large and preferably flat stones, embedded in a soft, finer-grained matrix, are undergoing erosion, especially in regions of heavy rainfall. As the ground is progressively lowered the flat stones protect the softer material beneath them and are therefore left standing on tall, acutely conical pillars.

earth plate (*Elec. Eng.*). A metal plate buried in the earth for the purpose of providing an electrical connexion between an electrical system and the earth.

earth potential (*Elec.*) The electric potential of the earth; it is usually regarded as zero, so that all other potentials are referred to it.—(*Radio*) A term applied to the potential of any point in a circuit when the potential of that point does not vary at a radio-frequency, no matter what the steady or low-frequency potential may be. See **earthy.**

earth pressure (*Civ. Eng.*). The pressure exerted on a wall by earth which is retained, i.e. supported laterally by the wall.

earthquake (*Geol.*). A shaking of the earth's crust caused, perhaps in most cases, by displacement along a fault. The place of maximum displacement is the *focus* (cf. *epicentre*). Although the amount of the displacement may be small, a matter of inches only, the destruction wrought at the surface may be very great, due in part to secondary causes; e.g. the severing of gas mains and water mains, as in the great San Francisco earthquake in 1906. Earthquakes are classified as *simple*, *twin*, or *compound*, according to the nature of the shock, which is recorded by a seismometer. Volcanic phenomena are frequently accompanied by earthquakes. See **seismology.**

earth resistance (*Elec. Comm.*). The resistance offered by the earth between two points of connexion, and therefore forming a coupling between all circuits making use of the same current path in the earth.

earth return (*Elec. Eng.*). The return path of an electric circuit in which the current returns to the source through the earth.

earth return circuit (*Elec. Comm.*). A telegraphic circuit using one transmission wire, the return current passing through the earth and thereby encountering a low resistance.

earth screen (*Radio*). See **counterpoise.**

earthshine (*Astron.*). The reflected sunlight from the surface of the earth which enables the part of the moon not directly illumined by the sun to be seen faintly against the sky.

earth-table (*Build.*). The course of bricks or stone which just appears above ground-level.

earth terminal (*Elec. Eng*). A terminal provided on the frame of a piece of electrical apparatus for making a connexion to earth. Also called an EARTHING TERMINAL.

earth thermometer (*Meteor.*). A thermometer used for measuring the temperature of the earth at depths up to a few feet. Symons's earth thermometer (the most commonly used) consists of a mercury thermometer, with its bulb embedded in paraffin wax, suspended in a steel tube.

earth wax (*Chem.*). *Ozokerite* (q.v.).

earth-wire (*Elec. Eng.*). A wire which is electrically connected to earth and strung from the same supports as the conductors of an overhead transmission line; it minimises the probability of the transmission line's being damaged by lightning strokes.

earthwork (*Civ. Eng.*). A bank or cutting.

earth's magnetic field. See **terrestrial magnetism.**

earths, rare (*Chem.*). See **rare earths.**

earthed circuit (*Elec. Eng.*). An electric circuit which is intentionally connected to earth at one or more points.

earthed concentric wiring system (*Elec. Eng.*). A 2-wire system, for wiring or general distribution, which employs twin-concentric conductors, the outer conductor being earthed.

earthed neutral (*Elec. Eng.*). A neutral point of a polyphase system or piece of electrical apparatus which is connected to earth, either directly or through a low impedance.

earthed pole (*Elec. Eng.*). The pole or line of an earthed circuit which is connected to earth.

earthed switch (*Elec. Eng.*). A switch, used in wiring installations, in which provision is made for earthing all exposed metal parts. Also called a HOME-OFFICE SWITCH.

earthed system (*Elec. Eng.*). A system of electric supply in which one pole or the neutral point is earthed, either directly or through a low impedance, the former being known as a solidly earthed system.

earthenware (*Pot.*). Glazed or unglazed pottery, with soft body; usually inferior to china.—(*San. Eng.*) Earthenware made from ordinary brick earths is used for some sanitary fittings.

earthenware duct (*Elec. Eng.*). A conduit made of earthenware, used for carrying underground cable.

earthing reactor (*Elec. Eng.*). (1) A reactor connected between the neutral point of an a.c. supply system and earth, in order to limit the earth current which flows on the occurrence of an earth fault.—(2) An arrangement of reactors or transformers, so connected to a polyphase system that a neutral point is artificially obtained. Also called EARTHING AUTO-TRANSFORMER, NEUTRAL COMPENSATOR, NEUTRAL AUTO-TRANSFORMER, NEUTRALATOR.

earthing resistor (*Elec. Eng.*). A resistance through which the neutral point of a supply system is earthed, in order to limit the current which flows on the occurrence of an earth fault. Also called EARTHING RESISTANCE.

earthing switch (*Radio*). A switch for connecting an antenna to ground when not in use, as a protection against lightning and/or the accumulation of static charge.

earthing terminal (*Elec. Eng.*). See **earth terminal.**

earthy (*Elec. Comm.*). Said of (1) circuits when they are connected to earth, either directly (as for direct currents) or through a condenser (in the case of alternating currents); (2) any point in a communicating system (e.g. the mid-point of a shunting resistance across a balanced line) which is at earth potential, although not actually connected to earth, through zero impedance.

earthy cobalt (*Min.*). A variety of wad containing up to about 32% of cobalt oxide. Also called ABSOLITE.

Easdale Slates, ēz′dăl (*Geol.*). A series of graphitic slates occurring in the Dalradian System in the South-West Highlands of Scotland.

easement (*Build., Civ. Eng.*). A right which one man may have at law over the land of another; e.g. a private right of way, a right to draw water, or *ancient lights* (q.v.).

easement curve (*Surv.*). See **transition curve.**

easing (*Build., Civ. Eng.*). The shaping of a curve so that there is no abrupt change of curvature in it.

easing centres (*Build., Civ. Eng.*). The process of gradually removing the centring from beneath a newly completed arch, thereby transferring its weight slowly to the arch abutments.

easing motion (*Weaving*). A movable bar over which the crossing ends are passed in order to facilitate the making of a crossed shed in weaving gauze fabrics.

easing wedges (*Civ. Eng.*). *Striking wedges* (q.v.).

East Coast fever (*Vet.*). An infectious disease of cattle in East and South Africa, due to a protozoan *Theileria parva*; transmitted by ticks of the genus *Rhipicephalus.*

Eastern Schists (*Geol.*). See **Moine Schists.**

easting (*Surv.*). An east departure.

eat-out (*Mining*). Said of a seam when the district or working place reaches a fault, or the boundary of old workings, or any other barren part of a mine.

eau de Javelle, ō de zha-vel′ (*Chem.*). See **Javel water.**

eave (*Build.*). The lower part of a roof which projects beyond the face of the walls.

eave-board (*Build.*). See **tilting fillet.**

eave-lead (*Build.*). A lead gutter behind a parapet around the edge of a roof.

eaves catch (*Build.*). A *tilting fillet* (q.v.).

eaves course (*Build.*). See **doubling course.**

eaves fascia (*Carp.*). See **fascia** (2).

eaves gutter (*Build.*). A trough fixed beneath an eave to catch and carry away the drip from the roof.

eaves plate (*Build.*). A beam carried on piers or posts and supporting the feet of roof rafters in cases where there is no wall beneath.

eaves pole (*Build.*). A *tilting fillet* (q.v.).

eaves soffit (*Build.*). The horizontal surface beneath a projecting eave.

Ebanoid (*Build.*). Trade-name for a form of bitumen used for setting wood block flooring.

ébauche, ā-bōsh′ (*Horol.*). A partly finished watch movement, consisting of the dial plate, bridges, and balance cock.

Eberhardt effect, ā′ber-hart (*Photog.*). The blurring of sharp edges in a photographic image because of the differential diffusion of developer in the emulsion.

Ebnerite (*Build.*). Trade-name for a particular material used in making jointless flooring.

ebonite (*Diel.*). Rubber vulcanised with sulphur; called HARD RUBBER in America. It attacks copper, and must not be put on a conductor.

ebony sindanyo (*Elec. Eng.*). See **Sindanyo.**

ebrac′teate (*Bot.*). Without bracts.

ebrac′teolate (*Bot.*). Without bracteoles.

ebullios′copy (*Chem.*). The determination of the molecular weight of a substance by observing the elevation of the boiling-point of a suitable solvent.

ebullition (*Heat*). See **boiling.**

eburnation (*Med.*) Ivory-like hardening of bone which occurs in chronic infection of bone and in osteo-arthritis.

eburneum process (*Photog.*). The treatment of a photographic image on glass with zinc white to give the image an ivory-like backing.

ec′ad (*Bot.*). A plant form which is assumed to be adapted to the habitat.

ecal′carate (*Bot.*). Not spurred.

ecar′dinal, ecar′dinate (*Zool.*). Without a hinge, as some *Brachiopoda.*

Ecar′dines, —din-ēz (*Zool.*). A class of *Brachiopoda* in which there is no internal skeleton to support the lophophore; the shell is without a hinge, and an anus is present.

ecbol′ic (*Med.*). Promoting expulsion of the foetus.

eccentric (*Eng.*). (1) Displaced with reference to a centre; not concentric.—(2) A crank in which the pin diameter exceeds the stroke, resulting in a disc eccentric to the shaft; used as a crank, particularly for operating steam-engine valves, pump plungers, etc.

eccentric, excentric (*Bot.*). (1) Situated to one side.—(2) Having fatty drops lying towards one side of a globular structure.

eccentric fitting (*Plumb.*). A fitting in which the centre line is offset.

eccentric load (*Struct.*). A non-axial load which is carried by a structural member and is incident at a point other than the centroid of the section.

eccentric oösphere (*Bot.*). A fungal oösphere with one large fatty drop to one side, or several large drops included in the protoplasm to one side, or a crescentic set of small drops lying to one side.

eccentric pole (*Elec. Eng.*). A pole on an electric machine in which the pole face is not concentric with the armature but has a greater air-gap at one pole tip than at the other, in order to assist in neutralising the effect of armature reaction.

eccentric sheave (*Eng.*). The disc of an *eccentric* (q.v.), often formed integral with the shaft.

eccentric strap (*Eng.*). A narrow split bearing, fitting on to an eccentric sheave and bolted to the end of a valve rod, etc.; corresponds to the 'big end' of a connecting-rod.

eccentric throw-out (*Eng.*). A device for engaging the back gear of a lathe. The back gear shaft runs in eccentric-bored bearings, which are rotated to bring the gears in and out of mesh with those on the mandrel. See **back gear.**

eccentricity (*Struct.*). The perpendicular distance from the centre of application of a load or system of loads to the centroid of the section of the structural member supporting them non-axially.

ecchondro′ma (*Med.*). A tumour composed of cartilage and growing from the surface of bone.

ecchondro'sis (*Med.*). An abnormal outgrowth of the joint cartilage, in chronic arthritis.

ecchymo'ma (*Med.*). A swelling due to extravasation of blood under the skin.

ecchymo'sis (*Med.*). A large discoloured patch due to extravasation of blood under the skin.

eccyesis, ek-si-ē'zis (*Med.*). Ectopic gestation. Fertilisation of the ovum and growth of the foetus outside the uterus.

ecdem'ic (*Zool.*). Foreign: not indigenous.

ecdy'sis (*Zool.*). The act of casting off the outer layers of the integument, as in *Ophidia* and many *Arthropoda*.

ecesis, ē-sē'sis (*Biol.*). An invasion of an area by a species which is unable to establish itself there, and which dies out after a few generations because it is not sufficiently well adapted to the new environment.

ec'gonine (*Chem.*). Tropine-carboxylic acid, a coca-base alkaloid, m.p. 198° C.

echard, ek'ard (*Bot.*). Water present in the soil which cannot be used by plants.

echelon grating, esh'el-on (*Light*). A form of interferometer resembling a flight of glass steps, light travelling through the instrument in a direction parallel to the treads of the steps. The number of interfering beams is therefore equal to the number of steps. Owing to the large path difference, $t(\mu-1)$ where t is the thickness of a step, the order of interference and therefore the resolving power are high, making the instrument suitable for studying the fine structure of spectral lines.

echinate, ek'in-āt (*Bot.*). Bearing an evenly distributed coating of rather long, stiff, pointed bristles or outgrowths.—*dim.* **echinulate.**

echi'nococ'cus (*Zool.*). A bladderworm possessing a well-developed bladder containing daughter bladders, each with numerous scolices.

Echi'noder'mata (*Zool.*). A phylum of radially symmetrical marine animals, having the body-wall strengthened by calcareous plates; there is a complex coelom; locomotion is usually carried out by the tube-feet, which are distensible finger-like protrusions of a part of the coelom known as the water-vascular system; the larva is bilaterally symmetrical and shows traces of metamerism. Starfish, Sea Urchins, Brittle Stars, Sea Cucumbers, and Sea Lilies.

Echinoi'dea (*Zool.*). A class of *Echinodermata* having a globular, ovoid, or heart-shaped body which is rarely flattened; there are no arms; the tube-feet possess ampullae and occur on all surfaces, but not in grooves; the anus is aboral or lateral, the madreporite aboral; there is a well-developed skeleton; free-living forms. Sea Urchins.—(*Geol.*) Fossil echinoids are found in strata ranging from the Lower Palaeozoic to the present. They are particularly important in the Jurassic (Clypeus Grit, etc.) and Cretaceous, where, in the Chalk, they have proved invaluable indices of horizon, especially the various species of *Micraster* and *Holaster*.

echinopae'dium (*Zool.*). See **dipleurula.**

echinoplu'teus (*Zool.*). In *Echinoidea*, a pelagic ciliated larval form, in which the posterolateral arms, if present, are small and directed outwards or backwards; see also **pluteus.**

echi'nus (*Arch.*). An ornament in the shape of an egg carved on a moulding, etc.

Echi'uroi'dea (*Zool.*). A class of *Annelida* of sedentary marine habit, in which nearly all trace of metamerism has been lost in the adult, and the setae are much reduced in number; the body is sac-shaped, and feeding is effected by an anterior non-retractile proboscis, bearing a ciliated groove leading to the mouth.

echo (*Acous.*). A delayed sound-wave which arrives at the recipient at a later time than the directly radiated sound-wave from a source because of its longer path *via* reflecting surfaces. See **flutter echo***, **multiple echo.**

echo (*Radio*). The reception of a signal additional to, and later than, the desired signal; caused by its having traversed a path completely round the earth instead of the direct path—(*Teleph.*) The perception of reproduced speech arising from the reflection of telephonic currents from the termination of lines where the matching of the impedances is not perfect.

echo meter (*Acous.*). An arrangement for recording the short intervals between direct sounds and their echoes from objects. Usually the principle is that of picking up the sounds with a microphone, and applying the output to a recording pen on a rotating drum carrying paper.

echo sounder (*Ocean.*). A sounding apparatus, used in sea water, for determining automatically the depth of sea beneath a ship. It makes use of echo delay, and is operated generally by transmitting an impulse of sound and obtaining an indication of the time elapsing before the return of the echo.

echo studio (*Acous.*). An enclosure of long reverberation period, used for the artificial introduction of an adjustable degree of reverberation in the main channel of a broadcast programme.

echo suppressor (*Elec. Comm.*). An arrangement of valves and relays, permitting speech in one direction only at a time in a four-wire telephone channel, so that the speaker does not hear an echo of his own speech through reflection at the far-end termination.

echograph'ia (*Med.*) Ability to copy writing associated with inability to express ideas in writing, due to a lesion in the brain.

echola'lia (*Med.*). Senseless repetition of words heard, occurring in disease of the brain or in insanity; often seen in catatonic schizophrenia.

echoprax'ia, echoprax'is (*Med.*). Imitation by an insane person of postures or of movements of those near him; commonly present in the catatonic type of schizophrenia.

eclamp'sia (*Med.*). A term now restricted to the acute toxaemia occurring in pregnancy, parturition, or in the puerperium, associated with convulsions and loss of consciousness.—*adj.* **eclamptic.**

eclipse (*Astron.*). A name strictly applicable only to cases where a non-luminous body passes into the shadow of another, as the moon does in a lunar eclipse; used in *eclipse of the sun* to mean the interposition of the moon's disc between the observer and the sun.

eclipse year (*Astron.*). The interval of time between two successive passages of the sun, in its apparent motion through the same node of the moon's orbit; it amounts to 346·62003 days.

Eclipse board (*Build.*). Trade-name for a form of plywood faced with metal.

Eclipse scaffold (*Build.*). An extensible form of scaffold board.

eclipsing binary (*Astron.*). See **binary (eclipsing).**

ecliptic (*Astron.*). The great circle in which the plane containing the centres of the earth and sun cuts the celestial sphere; hence, the apparent path of the sun's annual motion through the fixed stars. See **obliquity of the ecliptic.**

ec'logite (*Geol.*). A coarse-grained deep-seated ultramafic rock, consisting essentially of pink garnet, green pyroxene (some of which is often chrome-diopside) and (rarely) kyanite. Good examples occur in the Fichtelgebirge and in the kimberlite pipes in S. Africa.

eclosion (*Zool.*). The act of emergence from an egg or pupa case.

ecolog'ical (*Biol.*). Pertaining to the surroundings or environment of an organism or organisms.

ecological factor (*Bot.*). Anything in the environment which affects the growth, development and distribution of plants, and therefore aids in determining the characters of a plant community.

ecol′ogy. The study of organisms in relation to their environment.

economic ratio (*Civ. Eng.*). In reinforced concrete work, the ratio between steel reinforcement and concrete which allows the full strength of both to be developed.

economiser (*Eng.*). A bank of tubes, placed across a boiler flue, through which the feed water is pumped, being heated by the otherwise waste heat of the flue gases. See also **Supermiser.**

economiser (*Illum.*). A small hood of refractory material placed over the tip of an arc-lamp carbon. It results in a slower burning-away of the carbon, and also gives an improved light distribution.

Economo's disease (*Med.*). See **von Economo's disease.**

economy resistance (*Elec. Eng.*). A resistance inserted into the circuit of a contactor coil or other electromagnetic device after its initial operation, in order to reduce the current to a value just sufficient to hold the device closed.

ecor′ticate (*Bot.*). Lacking a cortex; said particularly of some seaweeds.

e′cospe′cies (*Biol.*). A category of variant individuals, based on genetical behaviour and ecological relationship.

e′cotone (*Bot.*). A boundary between two plant communities of major rank.

e′cotype (*Biol.*). See **ecospecies.**

ecphy′ma (*Med.*). An outgrowth or protuberance.

ecrusta′ceous (*Bot.*). Said of a lichen having no well-defined thallus.

ect-, ecto- (Greek *ektos*, outside, without). A prefix used in the construction of compound terms; e.g. *ectocranial*, outside the skull.

ectade′nia (*Zool.*). In Insects, accessory glands of the genital system, of ectodermal origin. Cf. *mesadenia.*

ectal layer (*Bot.*). A thin membrane at the extreme edge of an excipulum.

ecta′sia, ec′tasis (*Med.*). Pathological dilation or distension of any structure of the body.—*adj.* **ectatic.**

ecten′tal line (*Zool.*). In a gastrula, the line of union between ectoderm and endoderm at the lip of the blastopore.

ectep′icon′dylar (*Zool.*). (In many Reptiles and Mammals) said of a foramen, near the lower end of the humerus, for the median (ulnar) nerve.

ecteth′moid (*Zool.*). One of a pair of cartilage bones of the Vertebrate skull, formed by ossification of the ethmoid plate.

ectho′raeum (*Zool.*). The thread of a nematocyst.

ecthy′ma (*Med.*). Local gangrene and ulceration of the skin as a result of infection, the ulcer being covered by a crust and the skin round it being inflamed.

ecto-. See **ect-.**

ec′toblast (*Zool.*). See **epiblast.**

ectobron′chi (*Zool.*). In Birds, secondary bronchi leading to the air-sacs, being diverticula of the mesobronchium.

ectocar′pous (*Zool.*). Said of gonads which originate from ectoderm: having such gonads.

ec′tochondrosteo′sis (*Zool.*). Ossification of cartilage, beginning at the inner surface of the perichondrium and gradually invading the cartilage.

ectocoelic, —sē′lik (*Zool.*). In *Coelenterata*, situated outside the coelenteron.

ec′tocyst (*Zool.*). In *Polyzoa*, the cuticular exoskeleton of a zooecium secreted by the ectoderm: in *Protozoa*, the resistant outer layer of a cyst. Cf. *endocyst.*

ec′toderm (*Zool.*). The outer layer of cells forming the wall of a gastrula: the tissues directly derived from this layer.

ectogen′esis (*Bot.*). Variation under the influence of conditions outside the plant.

ectog′enous (*Zool.*). Independent: self-supporting.

ec′togen′y (*Bot.*). The effect of pollen on the tissues of the female organs of the plant.

ec′tolec′ithal (*Zool.*). Said of ova in which the yolk is deposited peripherally.

ec′topar′asite (*Zool.*). A parasite which lives on the exterior of its host.—*adj.* **ectoparasitic.**

ec′topata′gium (*Zool.*). In *Cheiroptera*, that part of the patagium borne by the metacarpals and phalanges.

ectophloeodal, —flē′dal (*Bot.*). Living on the outside of bark.

ectophlo′ic (*Bot.*). Said of a stem which has no internal phloem.

ec′tophyte (*Bot.*). A parasite growing on the surface of its host.

ecto′pia, ec′topy (*Med.*). Displacement from normal position.

ectopia cordis (*Med.*). Congenital displacement of the heart outside the thoracic cavity.

ectopia ve′sicae (*Med.*). A congenital abnormality in which the anterior wall of the bladder is absent and the posterior wall opens on to the surface of the abdomen, the lower abdominal wall being also absent.

ectopic gestation (*Med.*). See **eccyesis.**

ec′toplasm (*Cyt.*). A layer of clear non-granular cytoplasm at the periphery of a cell. Cf. *endoplasm.*

ec′toplast, ec′tosarc (*Bot.*). The outer surface of the cytoplasm of a plant cell, lying against the inner surface of the cell wall.

Ectoproc′ta (*Zool.*). A class of *Polyzoa* in which the anus is outside the circlet of tentacles; freshwater or marine forms.

ectopterygoid, —ter′i-goid (*Zool.*). In some Fish, a paired ventral bone of the skull, lying between the entopterygoid and the quadrate: in some Reptiles, a bone of the skull extending from the pterygoid to the maxilla.

ec′tosarc (*Bot.*). See **ectoplast.**—(*Zool.*) See **ectoplasm.**

ec′tosome (*Zool.*). In eurypylous *Porifera*, the dermal membrane covering the openings of the incurrent sinuses.

ectospo′rous (*Bot.*). Having exogenous spores.

ec′totrache′a (*Zool.*). A layer of pavement epithelium, lying outside the chitinous lining of a trachea.

ectotroph′ic mycorrhiza (*Bot.*). A mycorrhiza in which most of the fungal hyphae lie on the surface of the root of the higher plant.

ectotur′binals (*Zool.*). The longer outer series of ethmoturbinal plates in Mammals. Cf. *entoturbinals.*

ec′tozoon (*Zool.*). See **ectoparasite.**

ectrome′lia (*Med.*). (1) Congenital absence of a limb or limbs.—(2) An infectious disease of mice, due to a filter-passing virus.

ectro′pion, ectro′pium (*Med.*). Eversion of the eyelid.

ec′zema (*Med.*). The term generally applied to an itching inflammatory condition of the epidermis occurring as a reaction to irritants, such as chemical agents, poisons of some plants, materials used in trades, etc.—*adj.* **ecze′matous.**

ecze′matous conjunctivitis (*Med.*). See **phlyctenular conjunctivitis.**

Edale Shales (*Geol.*). A series of argillaceous sedimentary rocks in Derbyshire, belonging to the Namurian Stage of the Carboniferous System.

edaph′ic climax (*Bot.*). A climax community of which the existence is determined by some property of the soil.

edaphic factor (*Bot.*). Any property of the soil, physical or chemical, which influences plants growing on that soil.

edaph'on (*Bot.*). A community of bacteria, algae, fungi, protozoa, worms, crustacea, and insects, living in the soil and influencing its nitrogen content.

Eday Sandstones (*Geol.*). A division of the Middle Old Red Sandstone strata of the Orkney Islands, comprising 500 ft. of yellow fossiliferous flags succeeded by red barren sandstones.

eddy. An interruption in the steady flow of a fluid, caused by an obstacle in the line of flow.

eddy current (*Elec. Eng.*). A current induced in a mass of conducting material by a varying magnetic field. Also called FOUCAULT CURRENT. See **eddy-current brake, eddy-current loss.**

eddy-current brake (*Elec. Eng.*). (1) A form of brake for the loading of motors during testing; it consists of a mass of metal rotating in front of permanent magnets so that heavy eddy currents are set up in it.—(2) A form of brake, used on tramways, in which the retarding force is produced by the induction of eddy currents in the rail by an electromagnet on the vehicle.

eddy-current loss (*Elec. Eng.*). A loss caused in electric machinery or other apparatus by eddy currents. Losses will appear in the iron of any magnetic circuit if it carries an alternating flux, although they may be minimised by laminating the iron.

eddy-current speed indicator (*Elec. Eng.*). A speed indicator consisting of a rotating disc and a spring-controlled magnetic needle; the latter is deflected as a result of eddy currents induced in the disc.

eddy flow (*Hyd.*). A type of fluid flow in which there is an unsteady motion of the particles, the motion at a fixed point varying in no definite manner. Also called TURBULENT FLOW, SINUOUS FLOW.

eddy wind (*Meteor.*). See **whirlwind.**

Eddy's theorem (*Struct.*). The bending moment at any point in an arch is equal to the product of the horizontal thrust at the abutment and the vertical distance between the line of action of this thrust and the given point in the arch.

Edeleanu process, yā-dā-lyah'noo (*Chem.*). A process for the removal of unsaturated compounds from petroleum distillates by extraction with liquid SO_2.

edema, edematous (*Med.*). See **oedema, oedematous.**

E'denta'ta (*Zool.*). An order of primitive terrestrial Mammals characterised by the incomplete character of the dentition; incisors are almost always absent, and the canines and grinding teeth are devoid of enamel; there is no milk dentition; in some cases teeth are entirely lacking; the testes are abdominal; phytophagous or insectivorous forms. Sloths, Ant-eaters, Armadillos.

eden'tulous, eden'tate (*Zool.*). Without teeth.

edge coal (*Mining*). Highly inclined coal-seams: seams which dip steeply.

Edge Coal Group (*Geol.*). A subdivision of the Lower Carboniferous rocks of the Midland Valley of Scotland. So named from their steep dip where they plunge underground, off the Pentland anticline, to form the East Lothian coalfield. Now frequently known as the LIMESTONE COAL GROUP.

edge hinge (*Join.*). A butt hinge (Scottish).

edge-joint (*Carp.*). A general name for a joint made between the edges of two boards so that they include an angle.

edge nailing (*Carp.*). Secret nailing used on boarded surfaces.

edge runner. A grinding mill used for putty, mortar, pigments, etc.; it consists of cylindrical stones or rollers so mounted as to run on their edges in a circular pan containing the materials to be ground.

edge-shot (*Carp.*). Said of a board which has a planed edge.

edge tone (*Acous.*). A periodic disturbance, manifested as a sound-wave, radiated from a resonator, the latter being excited by the unstable vortex motion occurring when a stream of air is blown across an edge. The typical example is a flue organ pipe.

edge winding (*Elec. Eng.*). A form of winding frequently used for the field windings of salient-pole synchronous machines; it consists of copper strip wound on edge around the pole. Such a winding has good heat-dissipating properties.

edged (*Bot*). Having a margin of a different colour from the rest.

edger (*Carp.*). A circular-saw for cutting away wane left on the edges of boards.

edgewise instrument (*Elec Eng.*). A switchboard indicating instrument in which the pointer moves in a plane at right-angles to the face of the switchboard. The end of the pointer is bent, and moves over a narrow vertical or horizontal scale.

edifice (*Build.*). A building, usually large and/or fine.

Edison accumulator (*Elec. Eng.*). See **nickel-iron-alkaline accumulator.**

Edison effect (*Thermionics*). The name first given (after its discoverer) to the phenomenon of electrical conduction between an incandescent filament and an independent cold electrode contained in the same envelope, when the second electrode is made positive with respect to the filament.

Edison phonograph (*Acous.*). The original type of gramophone, in which the records were registered on the surface of hollow cylindrical waxes.

Edison screw-cap (*Illum.*). A lamp cap in which the outer wall forms one of the contacts, and which is in the form of a coarse screw for inserting into a corresponding socket. A central pin forms the other contact.

See **goliath—** **miniature—**
medium— **small—**

Edison screw-holder (*Elec. Eng.*). A holder for electric lamps with Edison screw-caps.

Ediswan wiring system (*Elec. Eng.*). A wiring system employing flat rubber- or metal-sheathed cables, with special junction boxes and fixing arrangements.

editing (*Cinema.*). In making up a motion-picture, the process of determining the shots to be taken, and the cutting of the resulting shots.

editor (*Cinema.*). The person who acts under the director in film production, and who does the cutting and editing of the shots while making up the final sequence in a film.

ed'riophthal'mic (*Zool.*). Having sessile eyes, as some *Crustacea.*

Edser and Butler's bands (*Light*). Dark bands, having a constant frequency separation, which are seen in the spectrum of white light which has traversed a thin, parallel-sided plate of a transparent material, or a thin parallel-sided film of air between glass plates. Unless the bounding surfaces are half-silvered, the bands are rather faint.

education. The process whereby the innate intelligences and emotions of individuals are exercised so as to prepare them to accept and appreciate social organisation, withstand deleterious propaganda, and, as far as possible, enable them to develop creative thoughts and actions. Training, in so far as it means the attainment of reliable repetition of specified processes of thought or action, is in opposition to education, which implies freedom of thought, with, however, acceptance of established knowledge. Modern education holds the balance between true education and training, so that the individual becomes responsible in his work and happy in his leisure.

educational film (*Cinema.*). Film, generally in the documentary style, for showing to children for educational purposes.

eduction (*Eng.*). The process of exhausting gases from an engine; more usually called *exhaust* (q.v.).

eduction port (*Eng.*). The *exhaust port* of an engine, more commonly referred to as such.

Edward's tiles (*Build.*). A special form of terracotta tile for making sills.

Edzell Shales (*Geol.*). A group of mottled and variegated shales and marls, occurring near the top of the Lower Old Red Sandstone in the Midland Valley of Scotland.

eel-grass (*Acous.*). A sea plant (*Zostera marina*) whose grass-like leaves are used for sound-insulation and for the correction of acoustical defects.

effective depth (*Civ. Eng.*). The depth of a reinforced concrete beam as measured from the surface of the concrete on the compression side to the centre of gravity of the tensile reinforcement. See **cover.**

effective heating surface (*Eng.*). The total area of a boiler surface in contact with water on one side and hot gases on the other.

effective height of antenna (*Radio*). The height (in metres) which, when multiplied by the field-strength (in volts per metre) incident upon the antenna, gives the e.m.f. (in volts) induced therein. It is less than the physical height. It differs from the equivalent height in that it is a function of the direction of arrival of the incident wave.

effective pillar length (*Struct.*). The pillar length which is used in finding the *ratio of slenderness* (q.v.).

effective range (*Elec. Eng.*). That part of the scale of an indicating instrument over which a reasonable precision may be expected.

effective resistance (*Elec. Eng.*). The resistance of a conductor measured on an alternating or pulsating current, and including the effect of any losses caused by the current. It is obtained by dividing the total loss by the square of the r.m.s. value of the current.

effective span (*Build.*). The horizontal distance between the centres of the two bearings at the ends of a beam.

effective temperature (*Astron.*). The temperature which a given star would have if it were a perfect radiator, or 'black body,' with the same distribution of energy among the different wavelengths as the star itself.

effective value (*Elec. Eng*). A term sometimes used to denote the r.m.s. value of an alternating quantity.

effective wavelength (*Photog.*). See **dominant wavelength.**

effector (*Zool.*). A tissue-complex capable of effective response to the stimulus of a nervous impulse; e.g. a muscle or gland.

effector neurone (*Zool.*). A motor neurone.

ef′ferent (*Zool.*). Carrying outwards or away from; as the *efferent branchial vessels* in a Fish, which carry blood away from the gills, and *efferent nerves*, which carry impulses away from the central nervous system. Cf. *afferent.*

effervescence (*Chem.*). The vigorous escape of small gas bubbles from a liquid, especially as a result of chemical action.

efficiency (*Mech.*). The performance of a machine, etc. judged with respect to its theoretical maximum performance; or the ratio of the energy output to the energy input of a machine. For a simple mechanical device this may also be considered as the ratio of the mechanical advantage to the *velocity ratio* (q.v.). 'Efficiency,' which applies strictly to energy ratios, should not be used when efficacy is meant.

See **ampere-hour—**
boiler—
brake thermal—
current—
declared—
mechanical—
overall—
Rankine—
relative—
watt-hour—
efficiency ratio.

efficiency (*Illum.*). The ratio of the total luminous flux emitted by a light source to the total power or fuel consumed. For *window efficiency ratio* see **daylight factor.**

efficiency index (*Bot.*). The rate at which dry matter accumulates in the plant.

efficiency ratio (*Eng.*). (Of a heat engine) the ratio of the actual thermal efficiency to the ideal efficiency corresponding to the cycle on which the engine is operating.

effig′urate (*Bot.*). Having a distinct shape.

effleu′rage (*Med.*). The action of lightly stroking in massage.

efflores′cence (*Bot.*). Production of flowers: period of flowering.

efflorescence (*Build.*). Formation of a white crystalline deposit on the face of a wall; due to the drying out of salts in the mortar or stone.

efflorescence (*Chem.*). The loss of water from a crystalline hydrate on exposure to air, shown by the formation of a powder on the crystal surface.

efflorescence (*Min.*). A fine-grained crystalline deposit on the surface of a mineral or rock.

ef′fluent (*Sewage*). Liquid sewage after having passed through any stage in its purification.

effort syndrome (*Med*). *D.A.H.* (q.v.). Soldier's heart. A condition in which there are nervousness and symptoms of circulatory inefficiency and exhaustion after exercise, in the absence of heart disease; common in armies.

effuse (*Bot*). Spread out on a substratum, and often having a vaguely defined edge.

effusiom′eter (*Chem*). An apparatus for comparing the molecular weights of gases by observing the relative times taken to stream out through a small hole.

effusion (*Med.*). An abnormal outpouring of fluid into the tissues or cavities of the body, as a result of infection or of obstruction to blood-vessels or lymphatics.

effusion (*Phys.*). The flow of gases through larger holes than those to which diffusion is strictly applicable; see **Graham's law.** The rate of flow is approximately proportional to the square-root of the pressure difference.

e′gest (*Zool.*). To throw out, to expel: to defaecate, to excrete.—*n. pl.* **eges′ta.**

egg (*Bot., Zool.*). See **ovum.**

egg albumen (*Chem.*). A simple protein from the white of the egg, soluble in water and coagulable by heat.

egg and anchor (*Arch.*). An ornament carved on a moulding, resembling eggs separated by vertical anchors.

egg and dart (*Arch.*). Similar to the above, arrows taking the place of anchors.

egg apparatus (*Bot.*). The egg and the two synergidae in the embryo sac of an angiosperm.

egg-bound (*Vet.*). Said of the oviduct of birds when obstructed by an egg.

egg-cell (*Zool.*). The ovum, as distinct from any other cells associated with it.

egg-eating (*Vet.*). A vice developed by individual birds, characterised by the eating of their own eggs or of those of other birds.

egg nucleus (*Zool.*). The female pronucleus.

egg-peritonitis (*Vet.*). Septic peritonitis extending from an infected and obstructed oviduct of birds.

egg-shaped sewer (*Civ. Eng.*). A type of sewer section much used where the flow is a fluctuating one; the section resembles the longitudinal profile of an egg placed with the end of smaller radius at the bottom.

egg-shell finish (*Paper*). A soft dull finish on paper, obtained by omitting the calendering process.

egg-shell gloss (*Dec.*). A subdued gloss in enamel-paint-finish. Also called BASTARD FLATTING.

egg-shell porcelain (*Pot.*) The 'bodiless' porcelain of china, in which the clay body appears as a transparent membrane between two coats of thin, bright glaze.

egg sleeker (*Foundry*). A moulder's sleeker with a spoon-shaped end; used for smoothing rounded corners in a mould.

egg, soft-shelled (*Vet.*) A bird's egg in which lime salts are deficient or absent.

egg tooth (*Zool.*). A sharp projection at the tip of the upper beak of a young bird, by means of which it breaks open the egg shell.

Eg'gertz's method (*Chem.*). A method in chemical analysis for quickly forming an estimation of carbon in iron and steel. The metal is dissolved in nitric acid under standard conditions, and the colour of the solution is compared with that produced by a similar metal of known carbon content.

e'go (*Psycho-an.*). That part of the self formed originally from the instinctual life forces or *id*, which have become modified by contact with reality and the outside world, and has tested which part of the *id* can be accepted by the self in conjunction with the demands of reality.

ego-ideal (*Psycho-an*). The conscious aims and ideals of the individual, formed by his own conscious judgment, education, and culture, and supported by his early moral and ethical standards, based on those of the parents. See **super-ego.**

egophony (*Med.*). See **aegophony.**

Egyptian (*Typog*). A type face with square serifs and lines of uniform thickness.

Egyptian cotton (*Textiles*). Cotton of long staple, 1¼ in., of excellent quality and therefore used for spinning fine counts.

Egyptian jasper (*Min.*). A variety of jasper occurring in rounded pieces scattered over the surface of the desert, chiefly between Cairo and the Red Sea; used as a broochstone and for other ornamental purposes.

E.H.P. (*Eng.*). Abbrev. for *effective horse-power.*

Ehrlich's theory (*Med.*). See **side-chain theory.**

eidet'ic imagery (*Psychol.*). The ability to reproduce on a dark screen, or when the eyes are closed, a vividly clear picture or visual memory-image of previously seen objects. Commonly present in children up to 14 years, and occasionally persisting into adult life. The general representation of the previously seen objects is preserved, but in each instance certain features in form and colour are altered, depending on the characteristics of the individual.

eidograph, ī'dō— (*Surv.*). An instrument for reducing and enlarging plans.

Eife'lian Stage (*Geol.*). A series of marine Devonian strata, defined in terms of the succession in the Eifel. Smaller stage-names are now commonly used, *Eifelian* being almost obsolete.

eigenperiod, eigenton, ī'gen—, —tōn (*Acous.*). Frequencies at which acoustic resonance is experienced in rectangular chambers, because of continued reflections between opposite walls. These natural periods are largely obviated by skewing the walls.

eight-to-pica leads (*Typog.*). Strips of metal, 1½-point in thickness, used to space out lines of type. They are usually called thin leads, two being equivalent to a thick lead, and eight to a pica em or ⅛ in.

eighteenmo (*Print.*). Decimo-octavo, usually written 18*mo*; a sheet of paper folded into eighteen leaves. See also **octodecimo.**

eighth bend (*Eng.*). A pipe bend or junction piece for joining two pipes inclined at 22½°, i.e. one-eighth of a complete reversal of direction.

Eikmeyer coil, īk'mī-er (*Elec. Eng.*). The name given to the original type of former-wound armature coil which can be dropped straight into the slots of an electric machine.

Einhorn's tube, īn'horn (*Med.*). A narrow tube for the collection of the gastric secretion; it is passed through the mouth into the stomach.

Einstein shift, īn'stīn (*Astron.*). A spectroscopic phenomenon, predicted by the Einstein theory of gravitation and subsequently verified by observation, in which the lines of the solar spectrum are slightly displaced from their normal positions towards the red, owing to the intense gravitational field of the sun.

Einstein's law of photochemical equivalence (*Chem.*). Each quantum of radiation absorbed in a photochemical process causes the decomposition of one molecule.

Einthoven galvanometer, īnt'hō-ven (*Elec. Eng.*). A galvanometer in which the current is carried by a single current-carrying filament in a strong magnetic field, the deflection being usually magnified by a microscope. Also called a STRING GALVANOMETER.

eisenkiesel, ī'zen-kē'zel (*Min.*). A ferruginous quartz, yellow, red, or brown, according to the amount and kind of iron ore included.

eiso'dal aperture (*Bot.*). The enlargement of the stomatal pore nearest to the surface of the leaf.

ejaculation, ejection (*Bot.*). The forcible expulsion of spores from a sporangium.

ejaculatory duct (*Zool.*). See **ductus ejaculatorius.**

ejector. A device for extracting cartridge-shells from a fire-arm.

ejector (*Eng.*). A device for exhausting a fluid by entraining it by a high-velocity steam or air-jet; e.g. an *air-ejector* (q.v.).

ejector (*San. Eng.*). An appliance used for raising sewage from a low-level sewer to a sewer at a higher elevation; worked by compressed air.

eka- (*Chem.*). A prefix denoting the element occupying the next lower position in the same group in the periodic system; used in the naming of new elements and unstable radio-elements.

elae'oblast (*Zool.*). In certain *Urochorda*, a posterior mass of large mesodermal cells filled with nutritive matter.

elaeod'ochon (*Zool.*). See **oil-gland.**

elae'olite (*Min.*). A massive form of the mineral nepheline, greenish-grey or (when weathered) red in colour, usually shapeless, but in some S. African syenites exhibiting the hexagonal prismatic form of nepheline.

elaeolite-syenite (*Geol.*). See **nepheline-syenite.**

elaioplast, ē-lā'ō— (*Bot.*). A plastid which forms oils and fats.

elai'osome (*Bot.*). An outgrowth from the surface of a seed, containing fatty or oily material (often attractive to ants) and serving in seed dispersal.

Elasip'oda (*Zool.*). An order of abyssal *Holothuroidea*, characterised by the possession of shield-shaped buccal tentacles, without either ampullae or retractor-muscles, and having no respiratory trees or Cuvierian organs.

elastance (*Elec. Comm.*). The reciprocal of the capacity of a condenser, so termed because of its electromechanical analogy with a spring.

elastic bitumen (*Min.*). See **elaterite.**

elastic fatigue (*Eng., Phys.*). A temporary departure from perfect elasticity shown by some materials, which, after suffering elastic deformation, return only gradually to their original form.

elastic fibres (*Zool.*). See **yellow fibres.**

elastic fibrocartilage (*Zool.*). See **yellow fibrocartilage.**

elastic limit (*Phys.*). The limiting value of the deforming force beyond which a body does not return to its original shape or dimensions when the force is removed.—(*Met.*) The highest stress that can be applied to a metal without producing a measurable amount of plastic (i.e. permanent) deformation. Usually assumed to coincide with the limit of proportionality.

elastic medium (*Phys*). A medium which obeys *Hooke's law* (q.v.). No medium is perfectly elastic, but many are sufficiently so to justify the making of calculations which assume perfect elasticity.

elastic moduli (*Eng.*). See **Young's modulus, modulus of rigidity, bulk modulus.**

elastic packing (*Eng.*). Rubber-impregnated canvas material used for packing the glands or stuffing-boxes of water pumps. See **packing.**

elastic strain (*Eng.*). The strain or fractional deformation undergone by a material in the elastic state, i.e. a strain which disappears with the removal of the straining force.

elastic tissue (*Zool.*). A form of connective tissue in which elastic fibres predominate.

elas'tica exter'na (*Zool.*). In developing Vertebrates, a thin membrane secreted by the notochordal epithelium, lying outside the fibrous sheath.

elastica inter'na (*Zool.*). In developing Vertebrates, a thin membrane near the notochord, on the inner side of the fibrous sheath.

elasticity (*Phys.*). The tendency of a body to return to its original size or shape, after having been stretched, compressed, or deformed. The ratio of the stress called into play in the body by the action of the deforming forces to the strain or change in dimensions or shape is called the *coefficient* (or *modulus*) *of elasticity*. See the following definitions and **Hooke's law.**

elasticity of bulk (*Phys.*). The elasticity for changes in the volume of a body caused by changes in the pressure acting on it. The bulk modulus is the ratio of the change in pressure to the fractional change in volume. See **elasticity.**

elasticity of compression. See **elasticity of bulk.**

elasticity of elongation (*Phys.*). The stress in this case is the stretching force per unit area of cross-section and the strain is the elongation per unit length. The modulus of elasticity of elongation is known as Young's modulus. See **elasticity.**

elasticity of flexure (*Phys.*). The elasticity of a bent beam or cantilever which tends to straighten it. For a weightless beam supported at two points distant L apart, the sag, produced by a force P applied at the centre is equal to $\frac{PL^3}{4bd^3E}$, where b and d are the breadth and thickness of the beam and E is Young's modulus of elasticity.

elasticity of gases (*Phys.*). If the volume V of a gas is changed by δV when the pressure is changed by δp, the modulus of elasticity is given by $-V\frac{\delta p}{\delta V}$. This may be shown to be numerically equal to the pressure p for isothermal changes, and equal to γp for adiabatic changes, γ being the ratio of the specific heats of the gas.

elasticity of shear (or **rigidity**) (*Phys.*). The elasticity of a body which has been pulled out of shape by a shearing force. The stress is equal to the tangential shearing force per unit area, and the strain is equal to the angle of shear, that is, the angle turned through by a straight line originally at right-angles to the direction of the shearing force. See **elasticity, Poisson's ratio.**

elas'tin (*Zool.*). The substance of which elastic fibres are composed; it is resistant to the action of reagents.

el'ater (*Bot.*). (1) An elongated cell with spiral thickenings on the walls, found mixed with the spores of some liverworts.—(2) A thread of a capillitium.

elat'erite or **elastic bitumen** (*Min.*). A solid bitumen resembling dark-brown rubber; used in building. Sometimes known as MINERAL CAOUTCHOUC; occurs at Castleton, Derbyshire, and in Colorado and Utah.

elat'erophore (*Bot.*). The organ which bears elaters.

elaulic (*Hyd*). A term meaning *oil in pipes*, to correspond with the term *hydraulic* (meaning *water in pipes*).

elbow. A bend; as in a length of piping, or in a wall.

elbow (*Elec. Eng.*). A *sharp-bend* (q.v.).

elbow (*Eng.*). A short right-angle pipe joint for connecting gas, water, and steam pipes, as distinct from a bend which is circular, not angular.

elbow (*Masonry*). An arch stone whose lower bed is horizontal, while its upper bed is inclined towards the centre of the arch, to correspond with those of the voussoirs.

elbow (*Mining*). A sharp turn in a roadway underground: a sharp bend in a cable or pipe line.

elbow (*Plumb.*). A short pipe fitting used to connect two pipes at an angle, generally a right-angle.

elbow-board (*Carp.*). The window-board beneath a window, in the interior.

elbow linings (*Join.*). The panelling at the sides of a window recess, running from the floor to the level of the window-board. Cf. *jamb linings.*

Electra complex (*Psycho-an.*). Attraction for the father and hostility to the mother; analogous to the Oedipus complex in boys, but applied to girls.

electric-arc welding (*Elec. Eng.*). See **arc welding.**

electric balance (*Elec. Eng.*). A name sometimes applied to a type of electrometer, to a current weigher (which establishes the absolute ampère), and to a Wheatstone bridge.

electric bell (*Elec. Eng.*). A bell in which the hammer is operated electrically by means of a solenoid. A single stroke may be given, or, more commonly, a rapid succession of strokes may be maintained by means of a make-and-break contact on the solenoid.

electric boiling plate (*Elec. Eng.*). See **boiling plate.**

electric braking (*Elec. Eng.*). A method of braking for electrically driven vehicles; the motors are used as generators to return the braking energy to the supply, or to dissipate it as heat in resistances.

electric calamine (*Min.*). See **calamine.**

electric cautery (*Med.*). The burning of parts of the human body for surgical purposes by means of electrically heated instruments. Also called ELECTROCAUTERY.

electric cement (*Civ. Eng.*). See **Ciment Fondu.**

electric chorea (*Med.*). See **Dubini's disease.**

electric cleaner. (1) A vacuum or suction cleaner used for domestic or other purposes, when it is operated by an electric motor.—(2) In electroplating work, a cleansing solution in which the cleansing is accelerated by the passage of an electric current.

electric clocks (*Horol.*). Electric clocks may be regarded under the following heads: (*a*) Battery operated; (*b*) Impulse type; (*c*) Self-winding; (*d*) Synchronous a.c. mains clocks.

(*a*) *Pendulum type*, in which the vibrations of the pendulum are maintained by means of a solenoid and permanent magnet; *balance type*, in which impulse is given to the balance electromagnetically. (*b*) *Impulse type*, in which a master pendulum clock controls the operation of a number of slave clocks. The vibrations of the pendulum of the master clock are maintained by a gravity arm falling on to a pallet on the pendulum rod. The gravity arm is re-set electromagnetically. When the gravity arm falls for impulse it also closes the circuit to the slave clocks, giving an impulse to each of the slaves. Normally, the master clock has a seconds pendulum, and the gravity arm falls every half-minute, giving half-minute impulses to the slaves. (*c*) *Self-winding*. A spring-driven movement which is automatically wound, from either a.c. or d.c. supply, after a definite period of running. (*d*) *Synchronous a.c. mains clocks*, in which the motive power is a synchronous motor. The motor may be either of the 'self-starting' or 'non-self-starting' type, and as the speed of the motor is directly proportional to the frequency of the power supply, it is essential that these clocks be connected to a supply which is 'time-controlled.'

electric coal-cutter (*Mining*). A coal-cutter operated by an electric motor; used in coal-mines.

electric component (*Radio*). That component of an electromagnetic wave which produces a force on an electric charge, and along the direction of which currents in a conductor exposed to the field are urged to flow. Also called ELECTROSTATIC COMPONENT.

electric connective tissue (*Zool.*). Jelly-like connective tissue in which the electroplaxes of certain types of electric organs are embedded.

electric cooker (*Elec. Eng.*). An assembly of electric boiling plates and an electrically heated oven, for commercial or domestic cooking.

electric current (*Elec. Eng.*). See **current.**

electric discharge (*Elec. Eng.*). The passage of electricity through a gas as a result of ionisation of the gas; it takes the form of a brush discharge, an arc, or a spark.

electric discharge lamp (*Illum.*). A form of electric lamp in which the light is obtained from an electric discharge between two electrodes in an evacuated glass tube. Sometimes called a GAS-DISCHARGE LAMP.

See **cold-cathode— sodium—**
hot-cathode— Moore lamp
mercury— neon lamp.

electric displacement. See **displacement.**

electric dynamometer (*Eng.*). An electric generator used for measuring brake horse-power. The stator frame is capable of partial rotation in bearings concentric with those of the armature, and the torque is balanced and measured by hanging weights on an arm projecting from the frame.

electric field (*Elec. Eng.*). A region in which forces are exerted on any electric charge present in the region. Also called ELECTROSTATIC FIELD.

electric field strength (*Elec. Eng.*). The strength of an electric field at any point; measured by the force in dynes exerted on a unit charge at the point.

electric flux (*Elec. Eng.*). The surface integral of the electric field intensity normal to the surface. The electric flux is conceived as emanating from a positive charge and ending on a negative charge without loss.

electric flux density (*Elec. Eng.*). The integration of the electric field intensity per unit area, the integration being taken over an elementary area normal to the direction of the field intensity.

electric furnace (*Elec. Eng.*). A furnace for industrial purposes in which the heat is produced electrically. See **arc furnace, induction furnace, resistance oven.**

electric gas-lighter (*Elec. Eng.*). A device incorporating a battery which produces a spark for igniting the gas from a gas burner.

electric generator (*Elec. Eng.*). A machine for converting mechanical energy into electrical energy. Commonly called a GENERATOR. See **electromagnetic generator, electrostatic generator.**

electric harmonic analyser (*Elec. Eng.*). An electrical device for determining the magnitudes of the harmonics in the wave shape of an alternating current or voltage.

electric induction (*Diel.*). See **displacement.**

electric lamp (*Illum.*). A lamp in which an electric current is used as the source of energy for radiating light. See **electric discharge lamp, filament lamp, arc lamp.**

electric-light (*Illum.*). Light produced by the use of electric power, whether by heating a filament in a partially evacuated translucent or transparent container, or by the radiation from ionisation in an electric discharge, as in an arc in air or in a partially evacuated space. The basic colour distribution in the thermal method depends on the temperature; in the arc method, on the materials between which the arc is struck; and in the gas discharge method, on the composition of the gas.

electric-light ophthalmia (*Med.*). See **photophthalmia.**

electric locomotive (*Elec. Eng.*). A locomotive in which the driving power is supplied by electric motors, supplied either from a battery (*battery locomotive*), from a Diesel-driven generator mounted on the vehicle (*Diesel-electric locomotive*), or from a contact wire or rail (*track electrification*).

electric motor (*Elec. Eng.*). A machine for converting electrical energy into mechanical energy; occasionally called an ELECTROMOTOR. See **direct-current motor, alternating-current motor, electrostatic motor.**

electric nerve (*Zool.*). A modified motor nerve, serving an electric tissue.

electric organ (*Zool.*). A mass of muscular or epithelial tissue, modified for the production, storage, and discharge of electric energy; occurring mainly in Fish.

electric oscillations (*Radio*). Electric currents which periodically reverse their direction of flow, at a frequency determined by the constants of a resonant circuit. Distinguished from ordinary alternating currents in that their amplitude is not necessarily constant from one cycle to the next. See also **continuous oscillations, damped oscillations, electronic oscillations.**

electric rods (*Zool.*). Small rod-like structures, attached to the electrolemma of an electroplax, through which the electricity is discharged.

electric shock. The sudden pain or convulsion which results from the passage of an electric current through the body of a human being or animal. The shock may be sufficiently severe to cause death (*electrocution*).

electric storm (*Meteor.*). A condition of high electric field within a cloud, such that aircraft exhibit a *brush discharge* (q.v.) when passing through it.

electric strength (*Elec. Eng.*). The maximum voltage which can be applied to an insulator or insulating material without spark-over or breakdown taking place. The latter arises when the applied voltage gradient coincides with a breakdown strength at a temperature which is attained through normal heat dissipation.

electric tissue (*Zool.*). Modified tissue capable of generating electricity.

electric traction (*Elec. Eng.*). The operation of a railway or road vehicle by means of electric motors, which obtain their power from an overhead contact wire or from generators or batteries mounted on the vehicle.

electric wave filter (*Elec. Comm.*). The same as a *frequency-discriminating filter*, implying that there is a phase retardation in the filter for those currents which are passed and that there is an effective time-delay for a signal, comprising these frequencies, in getting through the filter.

electric wave telegraphy (*Radio*). An obsolescent term for *radio telegraphy*.

electric wind (*Elec. Eng.*). A stream of air caused by the repulsion of charged particles from a sharply pointed portion of a charged conductor.

electrical analogy (*Acous.*). The correspondence between electric and acoustic systems, which assists in applying to the latter procedures familiar in the former.

electrical angle (*Elec. Eng.*). A term often used in connexion with electrical machinery to denote distances measured round the periphery of the armature or air-gap. One pole pitch is equivalent to 180 electrical degrees, since the rotating vector representing the e.m.f. generated in a conductor, as it moves through this distance, rotates through 180°.

electrical bias (*Teleg.*). The use of a polarising winding on a relay core, for adjusting the sensitivity of the relay to signal currents.

electrical chain (*Elec. Comm.*). A number of circuits (e.g. tuned circuits) coupled together so that energy is transferred from one to the next.

electrical communication. The technique which employs electrical means for the conveyance of information, either between individuals or broadcast to a number of persons; e.g. the telephone, television, facsimile, and radio broadcasting, and extensions using similar apparatus (such as gramophone records and sound-films).

electrical degree (*Elec. Eng.*). See **electrical angle.**

electrical discharger gear (*Aero.*). Bands of copper, or other good electrical conductor, arranged so as to earth an aircraft before it actually alights.

electrical element. See **cell** (*Elec.*).

electrical engineer. A member of the engineering profession who is concerned particularly with electrical work. See also **chartered electrical engineer.**

electrical engineering. That branch of engineering chiefly concerned in the design and construction of all electrical machinery and devices, electrical communications, power transmission, etc.

electrical precipitation (*Elec. Eng.*). The precipitation of solid or liquid particles suspended in a gas by means of a unidirectional electric field, the precipitated particles being attracted to, and collected on, the positive electrode. Also called ELECTROSTATIC PRECIPITATION.

electrical recording (*Acous.*). The use of amplified currents from microphones for operating electromagnetic or electrodynamic drives for the cutting stylus in wax recording.

electrical reproduction (*Acous.*). Reproduction from gramophone records by electromagnetic devices operated by the tracking needle, as contrasted with *acoustic reproduction*, in which the tracking needle drives the centre of the diaphragm of a sound-box connected to a horn.

electrical resonance (*Elec.*). The condition arising when maxima of current or voltage occur when the frequency of the electrical source is varied; also when the length of a transmission line approximates to multiples of a quarter-wavelength and the current or voltage becomes abnormally large.

electrical technology. The science covering the practical applications of electricity. Also called ELECTROTECHNICS.

electrical thread (*Elec. Eng.*). A form of thread used on screwed steel conduit for electrical installation work.

electrician. A person engaged in the construction or maintenance of electrical apparatus or electrical installations.

electricity. The manifestation of a form of energy believed to be due to the separation or movement of certain constituent parts of an atom known as *electrons*.

See **animal—**
atmospheric—
dynamic—
frictional—
negative—
positive—
pyro—
resinous—
static—
thermo—
vitreous—
voltaic—

electricity meter (*Elec. Eng.*). See **integrating meter.**

electrification (*Elec. Eng.*). (1) The production of an electric charge on a body by frictional or other means.—(2) The process of changing over to electric operation a mechanically operated factory, railway, or other works.

elec'tro- (Greek *ēlektron*, amber). A prefix used in the construction of compound terms; e.g. *electrochemical, electrocardiograph.*

electro (*Print.*). Abbrev. for *electrotype.*

electro copper glazing (*Build.*). See **copper glazing.**

electroanal'ysis (*Chem.*). The quantitative separation of metals by electrolysis.

electroblast (*Zool.*) An embryonic cell which will give rise to an electroplax.

electrocar'diogram (*Med.*). A photographic record of the electrical variations which occur during contraction of the muscle of the heart.

electrocar'diograph (*Med.*). A modification of Einthoven's string galvanometer, used for making graphic records of the electrical changes during contraction of the muscle of the heart.

electrocardiog'raphy (*Med.*). The making or the study of electrocardiograms.

electrocautery (*Med.*). See **electric cautery.**

electro-cement (*Elec. Eng.*). Cement made, in an electric furnace, by adding lime to molten slag.

electrochemical condenser. See **electrolytic condenser.**

electrochemical constant (*Chem.*). See **faraday.**

electrochemical equivalent (*Chem.*). The weight of a substance or ion associated with unit quantity of electricity, i.e. with one coulomb.

electrochemical series (*Chem.*). See **electromotive series.**

electrochemistry (*Chem.*). The study of the relation between electricity and chemical change.

electrochon'dria (*Zool.*). Granules occurring in the cytoplasm of an electroplax.

electrocoagulation (*Med.*). Coagulation of bodily tissues by means of high-frequency electric current.

electrocrat'ic (*Chem.*). Owing its stability to an electric charge.

electro-culture (*Bot.*). The stimulation of the growth of plants by electrical means.

electrocution (*Elec. Eng.*). The causing of death by electric shock.

electrode (*Elec. Eng., etc.*). A conductor whereby an electric current is led into a liquid (as in an *electrolytic cell*) or into a gas (as in an electric discharge tube). See **anode, cathode, arc-welding, half-element.**

Also **active—**
bare—
bi-polar—
carbon—
collecting—
continuous—
control—
cored—
covered—
discharge—
hydrogen—
metal—
negative—
normal—
passive—
positive—
secondary—
self-baking—
sheathed—
Soderberg—

electrode boiler (*Elec. Eng.*). A boiler in which heat is produced by the passage of an electric current through the liquid to be heated.

electrode efficiency (*Elec. Eng.*). The ratio of the quantity of metal deposited in an electrolytic cell to the quantity which should theoretically be deposited according to Faraday's laws.

electrode-holder (*Elec. Eng.*). In electric arc-welding, a device used for holding the electrode and leading the current to it.

electrode potential, normal (*Chem.*). See **standard electrode potential.**

electrodeposit'ion (*Met., etc.*). The production of a layer of one metal on another, by making them the anode and cathode in an electrolytic cell containing a solution of a salt of the metal to be deposited.

electrodynamic instrument (*Elec. Eng.*). An electrical measuring instrument which depends for its action on the electromagnetic force between two or more current-carrying coils.

electrodynamic loudspeaker (*Acous*). The same as *moving-coil loudspeaker.*

electrodynamic microphone (*Acous.*). The same as *moving-coil microphone.*

electro-endosmo'sis (*Biol.*). Flow of liquid through a pore or pores in a membrane, due to a difference of electrical potential on the two sides of the membrane.

electro-extraction (*Met.*). The recovery of a metal from a solution of its salts by passing an electric current through the solution; a common process for extracting metal from its ore. Also called ELECTRO-WINNING.

electrofacing (*Elec. Eng.*). The process of coating, by electrodeposition, a metal surface with a harder metal in order to render it more durable.

electro-farming. A term applied to that type of farming in which many of the operations (e.g. ploughing, milking, driving of farm machinery) are performed electrically.

electroform'ing (*Met., etc.*). The production of metallic objects by electrodeposition. Also called GALVANOPLASTY.

electro-galvanising (*Elec. Eng.*). The electrodeposition of a protective coating of zinc on metal objects.

electro-gilding. The electrodeposition of a decorative coating of gold on metal objects.

electro-goniometer (*Elec. Eng.*). A name sometimes used to denote a *phase-indicator* (q.v.).

electrogram (*Elec. Eng.*). A chart, obtained from an electrograph, of variations in the atmospheric potential gradient.

electrograph (*Elec. Eng.*). A recording electrometer for measuring the potential gradient in the atmosphere.

electrokinet'ic potential (*Chem.*). The difference of potential existing at the surface of a colloidal particle.

electrolem'ma (*Zool.*). A thin membrane surrounding an electroplax.

electrolier' (*Illum.*). A hanging ornamental light-fitting carrying more than one lamp.

electrology (*Med.*). See **electro-therapy.**

electrol'ysis (*Chem.*). See **electrolytic conduction.**

elec'trolyte (*Chem.*). (1) An electrolytic conductor, especially a liquid.—(2) A substance which, on dissolution in a suitable solvent (usually water), conducts electrolytically.

electrolytic arrester (*Elec. Eng.*). See **aluminium arrester.**

electrolytic capacitor (*Elec. Eng*). A capacitor in which the dielectric between the plates is an electrolyte, instead of the more usual solid insulating material. Also called ELECTROLYTIC CONDENSER.

electrolytic cell (*Chem.*). A vessel in which electrolysis is carried out.

electrolytic condenser (*Elec. Comm.*). A condenser which is dependent on a thin film of aluminium oxide on the surface of aluminium foil for capacity, the other electrode being either a solution of non-corrosive salt, or a thick paste containing same. The aluminium base must be maintained positive, otherwise released hydrogen removes the oxide film. See also **electrolytic capacitor.**

See **d.c.—** **dry—** **wet—**

electrolytic conduction (*Chem.*). The conduction of electricity accompanied by the actual transfer of matter (migration of ions), which is shown by the occurrence of chemical changes at the electrodes.

electrolytic copper (*Met*). Copper refined by the electrolytic method. This gives metal of high purity (over 99·94% copper), and enables precious metals, such as gold and silver, to be recovered; used in refining about 80% of the copper produced.

electrolytic depolarisation (*Chem.*). The prevention of the accumulation of decomposition products at the electrodes during electrolysis, production of current by a galvanic cell, or electrochemical corrosion.

electrolytic detector (*Radio*). A fine wire, generally of platinum, immersed in an electrolyte and polarised by a small steady voltage. The incidence of a small high-frequency voltage breaks down the polarising film and permits the passage of direct current. Also called SCHLOEMILCH DETECTOR.

electrolytic dissociation (*Chem.*). The dissociation of a substance into ions on dissolution in a suitable solvent.

electrolytic instrument (*Elec. Eng.*). An instrument depending for its operation upon electrolytic action, e.g. an electrolytic meter.

electrolytic lead (*Met.*). Lead refined by the Betts Process; has purity of about 99·995-99·998% lead.

electrolytic lightning arrester (*Elec. Eng.*). A lightning arrester consisting of a number of electrolytic cells in series; it breaks down, allowing the lightning stroke to discharge to earth, when the voltage across it exceeds about 400 volts per cell.

electrolytic meter (*Elec. Eng.*). An integrating meter whose operation depends on electrolytic action.

electrolytic polarisation (*Chem.*). See **polarisation.**

electrolytic rectifier (*Elec. Eng.*). A rectifier consisting of an electrolytic cell, i.e. two electrodes immersed in an electrolyte, and depending for its action on the properties of certain combinations of metals and solutions to allow current to flow in one direction only. Sometimes called an ELECTROLYTIC VALVE.

electrolytic refining (*Met.*). The method of producing pure metals, by making the impure metal the anode in an electrolytic cell and depositing a pure cathode. The impurities either remain undissolved at the anode or pass into solution in the electrolyte.

electrolytic valve (*Elec. Eng.*). See **electrolytic rectifier.**

electrolytic wire bar (*Elec. Eng.*). A bar of electrolytically refined copper of suitable dimensions for rolling to form wire.

electrolytic zinc (*Met.*). Zinc produced from its ores by roasting (to convert sulphide to oxide), solution of oxide in sulphuric acid, precipitation of impurities by adding zinc dust, and final electrolytic deposition of zinc on aluminium cathodes. Product has purity over 99·9%.

electromagnet (*Elec. Eng.*). A core of iron or steel which is magnetised when a current is passed through a coil surrounding the core, and behaves as a magnet.

electromagnetics (*Elec. Eng.*). See **electromagnetism.**

electromagnetic brake (*Elec. Eng.*). A brake in which the braking force is produced by the friction between two surfaces pressed together by the action of a solenoid, or by magnetic attraction, the necessary flux being produced by an electromagnet.

electromagnetic component (*Radio*). (1) Strictly, that component of the combined field surrounding a transmitting antenna which represents the radiated energy.—(2) The magnetic component of an electromagnetic wave.

electromagnetic control (*Elec. Eng.*). A form of remote control for switchgear, etc. in which operation is effected by means of a solenoid.

electromagnetic damping (*Elec. Eng.*). See **magnetic damping.**

electromagnetic deflection (*Cathode Ray Tubes*). Deflection of the beam in a cathode ray tube by means of a magnetic field produced by a system of coils carrying a current.

electromagnetic generator (*Elec. Eng.*). An electric generator which depends for its action on the induction of e.m.f.'s in a circuit by a change in the magnetic flux linking with that circuit.

See the articles on the following electromagnetic generators:

alternating-current—
direct-current—
heteropolar—
homopolar—
induction—
inductor—
magneto—
reaction—
synchronous—

electromagnetic induction (*Elec. Eng.*). The production of an e.m.f. in a circuit by a change in the magnetic flux linking with that circuit.

electromagnetic inertia (*Elec. Eng.*). A term occasionally used to denote the energy required to stop or start the current in an inductive circuit.

electromagnetic instruments (*Elec. Eng.*). Electrical measuring instruments whose action depends on the electromagnetic forces set up between a current-carrying conductor and a magnetic field. See **moving-coil instrument, moving-iron instrument, dynamometer.**

electromagnetic loudspeaker (*Acous.*). The same as *moving-iron loudspeaker.*

electromagnetic microphone (*Acous.*). A type of microphone in which the generated electromotive force arises from the motion of a magnetic circuit, so that a varying flux generates the electromotive forces in a coil.

electromagnetic pick-up (*Acous.*). A pick-up in which the motion of the needle, in following the recorded track, causes a fluctuation in the magnetic flux carried in any part of a magnetic circuit and consequent electromotive forces in any coil embracing such magnetic circuit.

electromagnetic reaction (*Radio*). Reaction between the anode and grid circuits of a thermionic tube obtained by electromagnetic coupling. Also called INDUCTIVE REACTION, MAGNETIC REACTION.

electromagnetic separation. Removal of ferrous objects from town refuse, or 'tramp iron' from bulk materials, as they travel along a conveyor, over a drum, or into a revolving screen, by setting up a magnetic field which diverts the ferrous material from the rest.

electromagnetic switch (*Elec. Eng.*). A switch whose opening and closing is effected by means of electromagnets or solenoids.

electromagnetic theory (*Phys.*). The theory which accounts for the phenomena of radio transmission and of light in terms of electromagnetic waves.

electromagnetic wave (*Phys.*). A travelling disturbance in space produced by the acceleration of an electric charge, and comprising an electric field at right-angles to a magnetic field, both moving at the same velocity in a direction normal to the plane containing the two fields. Light waves and the waves used in radio are of this nature.

electromagnetism (*Elec. Eng.*). A name given to the science of the properties of, and relations between, magnetism and electric currents. Also called ELECTROMAGNETICS.

electromalux (*Television*). A tube employing a mosaic, which functions photo-electrically when used as a television camera.

electromechanical brake (*Elec. Eng.*). A form of electric brake in which the braking force is obtained partly as the result of the attraction of two magnetised surfaces, and partly by mechanical means, as a result of the operation of a solenoid.

electrom′erism (*Chem.*). A form of tautomerism caused by a redistribution of electrons among the atoms of a molecule or group.

electrometallisation (*Elec. Eng.*). The electrodeposition of a metal on a non-conducting base, either for decorative purposes or to give a protective covering.

electrometallurgy (*Met.*). A term covering the various electrical processes for the industrial working of metals; e.g. electrodeposition, electrorefining, and operations in electric furnaces.

electrom′eter (*Elec. Eng.*). An electrical measuring instrument for measuring potential difference; it depends for its action on the force of attraction or repulsion between charged plates or needles.

See **absolute—**
attracted disc—
capillary—
Dolezalek—
filament—
portable—
quadrant—
tachometric—

electrometer gauge (*Elec. Eng.*). A small attracted-disc electrometer sometimes attached to the needle of a quadrant electrometer in order to determine whether the needle is sufficiently charged.

electrometric titration (*Chem.*). A titration in which the end-point is determined by observing the change of potential of an electrode immersed in the solution titrated.

elec′tromobile, —ĕl′ (*Elec. Eng.*). A name sometimes given to a battery-driven road vehicle.

electromotive force (*Elec. Eng.*). The force which tends to cause a movement of electricity around an electric circuit. Commonly abbreviated to **e.m.f.**

See **back—** **counter—** **thermo—**

electromotive intensity (*Elec. Eng.*). See **potential gradient.**

electromotive series (*Chem.*). The chemical elements arranged in order of their standard electrode potentials.

elec′tromo′tor (*Elec. Eng.*). See **electric motor.**

electron (*Phys.*). An electrically charged particle, or element of charge having inertia, which is the most numerous constituent of matter. Although normally existing within the system known as the atom, electrons may be isolated from matter (as in cathode rays). The electronic charge e is $-4{\cdot}774 \times 10^{-10}$ *E.S.U.*, its mass when at rest m_0 is $9{\cdot}042 \times 10^{-28}$ gm.

electron affinity (*Chem.*). The tendency of certain substances, oxidising agents, to capture an electron.

electron camera (*Television*). A generic term for any device which converts an optical image into a corresponding electric current directly by electronic means, without the intervention of mechanical scanning. See **Emitron, Iconoscope, image dissector.**

electron cloud (*Thermionics*). A region in the inter-electrode space of an electron discharge tube containing large numbers of relatively stationary electrons. See also **space charge.**

electron-coupled oscillator (*Radio*). An oscillator using a four- (or more) electrode tube, the first three electrodes being used for the production of the oscillations, the output being taken from a subsequent electrode which is electron-coupled to the oscillator circuit proper. Characterised by the very small effect of the load on the frequency of oscillation.

electron coupling (*Radio*). Coupling between two circuits due to an electron stream controlled by the one circuit influencing the other circuit. Such coupling tends to be unidirectional, currents in the second circuit having little influence on the first.

electron diffraction (*Phys.*). Diffraction effects obtained when electrons are passed through very thin metal foil, the metal crystals forming a diffraction space lattice in a similar manner to X-ray diffraction crystals. Electron diffraction experiments have supported De Broglie's wave hypothesis. See **De Broglie waves.**

electron discharge (*Thermionics*). An electric current produced by the passage of electrons through otherwise empty space.

electron discharge tube (*Thermionics*). An evacuated container containing two or more electrodes between which an electron discharge takes place.

electron gun (*Cathode Ray Tubes*). The assembly of electrodes in a cathode ray tube which produces the electron beam. It comprises a cathode from which electrons are emitted, an apertured anode, and one or more focusing electrodes. Those electrons which pass through the aperture form the beam.

electron jet (*Thermionics*). A narrow stream of electrons, similar to a beam, but not necessarily focused.

electron lens (*Cathode Ray Tubes*). A distribution of electric field in the path of the electron beam which concentrates the electrons to a focus, in the same manner as an optical lens acts on a ray of light. See also **electrostatic focusing.**

electron microscope (*Thermionics*). A thermionic tube in which the electrons emitted from the cathode are focused, by means of suitable electrostatic fields, to form an enlarged image of the cathode on a fluorescent screen.

electron multiplier (*Photo-electronics*). A photo-electric cell comprising a photo-cathode and a series of auxiliary electrodes, maintained at successively increasing positive potentials up to the final anode. Photo-electrons emitted from the cathode impinge on the first of the auxiliary electrodes, from which secondary electrons are ejected and travel to the next electrode, where the process is repeated. By the use of suitable materials for the auxiliary electrodes, the number of secondary electrons emitted at each stage is made greater than the number of incident electrons, so that very high overall amplification of the original photo current results.

electron pair (*Chem.*). See **duplet.**

electron relay (*Thermionics*). An electron discharge tube in which the discharge is controlled, without the expenditure of energy, by the controlling agent; e.g. a three- (or more) electrode vacuum tube.

electron tube (*Thermionics*). See **electron discharge tube.**

electron valve (*Thermionics*). A *thermionic valve* (q.v.).

electron waves (*Phys.*). See **De Broglie waves.**

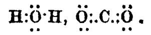
Electron (*Met.*). See **Elektron.**

Electrone (*Acous.*). The trade-name of a system of electronic music generation using electrostatic generators for pure frequencies, which are synthesised into desired timbres. Recently applied to church and theatre organs.

electronegative (*Chem.*). (1) Carrying a negative charge of electricity.—(2) Tending to form negative ions, i.e. having a relatively positive electrode potential.

electronics. The science which deals with the behaviour of free electrons.

electronic formula (*Chem.*). A formula in which the electrons in the outermost shells of the atoms are represented, generally by dots surrounding the symbols of the elements; thus,



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electronic music (*Acous.*). Music generated by synthetic means, as by valve oscillators, electrostatic or electromagnetic generators, photo-electric filters, or amplified string motions, etc., which are controlled by keyboards, etc.; put forward as economic alternatives to normal types of musical instruments, such as organs, etc.

electronic oscillations (*Radio*). Oscillations of very high frequency performed by electrons during their journey from cathode to anode of a thermionic tube, the frequency being determined by the transit time. See **Barkhausen-Kurz oscillations.**

electronic rectifier (*Elec. Eng.*). See **metal rectifier.**

electro-osmosis (*Chem.*). The movement of a liquid through a membrane under the influence of an electric field.

electro-parting (*Elec. Eng.*). The electrolytic separation of two or more metals.

electro-pathology, electropathy (*Med.*). See **electro-therapy.**

electrophone (*Elec. Comm.*). An electrical relay system for reproducing theatre programmes in domestic premises.

elec'trophore'sis (*Chem.*). The migration of suspended particles under the influence of an electric field.

electroph'orus (*Elec. Eng.*). A device, used in simple electrostatic experiments, which consists of a sheet of ebonite attached to a metal plate, together with a second metal plate with an insulated handle. A charge initially obtained by rubbing the ebonite can be multiplied many times. See **continuous electrophorus.**

electro-physiology (*Biol.*). The science of electrical phenomena associated with living organisms.

electroplating. The production of a thin coating of one metal on another by *electrodeposition* (q.v.), either for protection against corrosion or for the sake of appearance.

electroplating (*Acous.*). The deposition of a layer of copper on wax recordings, after the surface of the latter has been made conducting by brushing on graphite powder or by sputtering.

electroplating bath. See **electroplating vat.**

electroplating generator (*Elec. Eng.*). A direct-current electric generator, specially designed for electroplating work; it gives a heavy current at a low voltage.

electroplating vat. A tank in which objects to be electroplated are hung. The tank is filled with the electrolyte and contains plates of the metal to be deposited, while the objects themselves form the cathodes. Also called ELECTROPLATING BATH.

elec'troplax (*Zool.*). In certain Vertebrates, one of the plates of which the electrical organ is built up.

electro-pneumatic contactor (*Elec. Eng.*). A contactor operated by compressed air but controlled by electrically operated valves.

electro-pneumatic control (*Elec. Eng.*). A form of remote control in which switches or other apparatus are operated by compressed air controlled by electrically operated valves; commonly used on electric trains.

electro-pneumatic signalling (*Elec. Eng.*). A signalling system operated by compressed air, the valves which control the latter being operated electrically.

electropositive (*Chem.*). (1) Carrying a positive charge of electricity.—(2) Tending to form positive ions, i.e. having a relatively negative electrode potential.

electrorefining (*Met.*). See **electrolytic refining.**

elec'troscope (*Elec. Eng.*). An apparatus, depending for its action on the electrostatic repulsion between charged bodies, which indicates the presence of a charge or a potential difference.

See **condensing—** **pith-ball—**
gold-leaf—

electroscopic powder (*Elec. Eng.*). A mixture of finely divided materials which can acquire charges by rubbing together, so that, if dusted on to a plate, the different materials adhere to differently charged portions of the plate, forming a figure.

electro-sherardising (*Met.*) A method of *sherardising* (q.v.) in which the vessel is heated electrically.

elec'trosol (*Chem.*). A colloidal solution prepared by arcing metal electrodes under distilled water.

electrosonic music, etc. (*Acous.*). Music or other sounds produced by electronic means (e.g. by oscillators, photo-electric cells, or generators), which are combined electrically and reproduced through loudspeakers, as contrasted with the normal production of sounds by musical instruments.

electrostatics (*Elec. Eng.*). The science which deals with the behaviour of electric charges and potentials.

electrostatic adhesion (*Elec. Eng.*). Adhesion between two substances, or surfaces, due to electrostatic attraction between opposite charges.

electrostatic component (*Radio*). See **electric component.**

electrostatic coupling (*Radio, etc.*). See **capacity coupling.**

electrostatic deflection (*Cathode Ray Tubes*). Deflection of the beam of a cathode ray tube by means of an electrostatic field between two plates between which the beam passes on its way to the fluorescent screen. Cf. *electromagnetic deflection.*

electrostatic error (*Radio*). The error in bearings given by a direction-finder due to asymmetrical distribution of the capacity of the loop to earth. See also **antenna effect.**

electrostatic field (*Elec. Eng.*). See **electric field.**

electrostatic focusing (*Cathode Ray Tubes*). A method of focusing high-vacuum cathode ray tubes by the electrostatic field produced by two or more electrodes maintained at suitable potentials. See also **electron lens, gas focusing, magnetic focusing.**

electrostatic generator (*Elec. Eng.*). An electric generator which depends for its action on electrostatic processes for the production of charges at high potentials. Also called INFLUENCE MACHINE, INDUCTION MACHINE, STATIC MACHINE, FRICTIONAL MACHINE.

See **Bonnetti machine** **Tudsbury machine**
Holtz do. **Voss** do.
Lemstrom do. **Wimshurst** do.
Pidgeon do. **Wommelsdorf** do.
Toepler do.

electrostatic induction (*Elec. Eng.*). The production of a charge on a body by virtue of the presence of an opposite charge on a neighbouring conductor.

electrostatic instrument (*Elec. Eng.*). An electrical measuring instrument depending for its action on electrostatic forces set up between charged bodies.

electrostatic Kerr effect (*Television*). The dispersion of the plane of polarisation experienced by a beam of plane-polarised light on its passage through a transparent medium subjected to an electrostatic strain. It is the basis of action of several light-modulation systems.

electrostatic loudspeaker (*Acous.*). The same as *condenser loudspeaker.*

electrostatic microphone (*Acous.*). The same as *condenser microphone.*

electrostatic motor (*Elec. Eng.*). An electric motor depending for its action on electrostatic attraction and repulsion.

electrostatic oscillograph (*Elec. Eng.*). An oscillograph in which the moving element is actuated by electrostatic attraction or repulsion.

electrostatic precipitation (*Elec. Eng.*). See **electrical precipitation.**

electrostatic reaction (*Radio*). (1) Reaction between the anode and grid circuits of a thermionic tube due to the inter-electrode capacity coupling.—(2) Capacity reaction obtained by the use of a separate condenser.

electrostatic screening (*Radio*). The same as *electrostatic shielding.*

electrostatic separator (*Elec. Eng.*). An apparatus in which materials having different permitivities are deflected by different amounts when falling between charged electrodes, and therefore fall into different receptacles.

electrostatic shield (*Elec. Eng.*). A metallic shield surrounding instruments or other apparatus, in order to prevent their being influenced by external electric fields.—(*Radio*) An earthed conducting plate interposed between two circuits to prevent unwanted *capacity coupling* (q.v.) between them. Also called ELECTROSTATIC SCREEN.

electrostatic units (*Elec. Eng.*). A fundamental system of units based on the force exerted between two charges of electricity. Abbrev. **E.S.U.**

electrostatic voltmeter (*Elec. Eng.*). A voltmeter depending for its action upon the attraction or repulsion between charged bodies.

electrostatic wattmeter (*Elec. Eng.*). A quadrant electrometer used in conjunction with a shunt and arranged in such a way that its deflection is proportional to the power consumed by the circuit to which it is connected.

electrostenol'ysis (*Chem.*). The precipitation of metals in the pores of a membrane by electrolysis.

electrosynton'ic switch (*Elec. Eng.*). A switch remotely controlled by means of a high-frequency current superimposed on the main circuit.

electrotax'is (*Zool.*). See **galvanotaxis.**

electrotechnics. See **electrical technology.**

electrotellu'rograph (*Elec. Eng.*). An apparatus for the study of earth currents.

electro-therapy, electro-therapeutics (*Med.*). The treatment of diseases by electric currents, or by electrically produced radiations. Also called ELECTROLOGY, ELECTRO-PATHOLOGY, ELECTROPATHY, PHYSIO-THERAPY.

electrother'mics. The application of electrical energy to the production of heat, in chemical or metallurgical processes.

electrotint (*Print.*). A printing block produced by drawing with varnish on a metal plate, and depositing metal electrically on the parts not covered with the varnish.

elec'trotomes (*Zool.*). In the electric organ of some *Selachii*, a series of concentric cones into which the mass of electroplaxes is divided by the myotomes of the tail-muscles.

electroto'nus (*Physiol.*). The state of a nerve which is being subjected to a steady discharge of electricity.

electrotro'pism (*Zool.*). See **galvanotaxis.**

electrotype. A facsimile in relief of an object, produced by the electrodeposition of copper on a conducting matrix.—(*Print.*) A hard-wearing printing plate made by depositing a film of copper electrolytically on a wax mould taken from type or an original plate. The copper shell is backed with a lead alloy. Commonly abbreviated to ELECTRO.

electroty'pograph (*Typog.*). An electrically operated type-setting machine.

electrova'lence (*Chem.*). A chemical bond in which an electron is transferred from one atom to another, the resulting ions being held together by electrostatic attraction.

electro-winning (*Met.*). See **electro-extraction.**

electrum (*Met.*). An alloy of gold and silver (55-88% of gold) used for jewellery and ornaments. Also, nickel-silver (copper 52%, nickel 26%, and zinc 22%); it has the same uses as other nickel-silvers.

elec'tuary (*Med.*). A medicine consisting of the medicinal agent mixed with honey, syrup, or jam.

ele'idin (*Zool.*). A substance which occurs in the cells of the superficial layer of the rete mucosum of the skin of Vertebrates; it is in the form of granules or droplets, and stains deeply with haematoxylin.

Elektron, Electron (*Met.*). A series of magnesium-base alloys containing aluminium 3-12%, manganese 0·2-0·4%, and sometimes zinc 0·5-3·5%. They are comparatively strong and very light.

element (*Chem.*). A substance which cannot be decomposed by chemical means into simpler substances. There are 92 chemical elements. See **periodic system.**

element (*Elec. Eng.*). A term often used to denote the resistance wire and former of a resistance type of electric heater. Also used to denote one of the electrodes of a primary or secondary cell.

elements (*Meteor.*). Those components (such as temperature, pressure, humidity, wind, rainfall, cloudiness) which determine the state of the weather.

elements (*Photog.*). The individual filter particles of a colour screen, or the minute lenses of a lenticular film.

element-former (or **-carrier**) (*Elec. Eng.*). A refractory substance upon which the heated wire of a resistance type of electric heater is wound.

elements of an orbit (*Astron.*). The six data mathematically necessary to determine completely a planet's orbit and its position in it: viz. (1) longitude of the ascending node, (2) inclination of the orbit, (3) longitude of perihelion, (4) semi-axis major, (5) eccentricity, (6) epoch, or date of planet's passing perihelion.

elementary analysis (*Chem.*). The qualitative and quantitative analysis of the elements present in an organic compound, by combustion with cupric oxide. Carbon is oxidised to CO_2 and absorbed in a concentrated KOH solution, hydrogen is oxidised to H_2O and absorbed in a tube charged with anhydrous calcium chloride, oxygen is estimated by difference. Nitrogen is estimated by a separate combustion and measured as N_2, the CO_2 and H_2O being absorbed in concentrated KOH. Halogens, sulphur, etc. are estimated by different methods.

elementary bodies (*Med.*). Particles present in cells of the body in infections with filter-passing viruses.

elementary colours. See **primary colours.**

elephant (*Paper*). A paper size: writing and drawing, 23 × 28 in.; brown paper, 24 × 34 in.

elephanti'asis (*Med.*). Enlargement of the limbs, or of the scrotum, from thickening of the skin and stasis of lymph; due to obstruction to lymphatic channels, especially by filarial worms.

Elephantide pressboard (*Diel.*). This has a large cotton content and is used for the insulation of transformers, armature and stator coils. It is specially suitable for use under oil.

Eleu'theroblaste'a (*Zool.*). An order of *Hydrozoa* in which the medusoid phase is unknown, and the polyps are solitary and develop both male and female gonads from the ectoderm; there is no skeleton.

eleu'therodac'tyl (*Zool.*). Having the hind toe free.

eleu'theropet'alous (*Bot.*). Polypetalous.

Eleu'therozo'a (*Zool.*). A subphylum of *Echinodermata*, comprising forms of free and active habit. Cf. *Pelmatozoa.*

elevated railway (*Rail.*). An overhead railway which runs on girders supported by steel or iron pillars erected on the roadway.

elevation (*Build.*). The façade of a building.

elevation (*Surv.*). The American equivalent for *reduced level.*

elevation head (*Hyd.*). The energy possessed per unit weight of a fluid, due to its elevation above some datum. If at a given point the elevation is z feet, the elevation head at this point is said to be z feet. Also called POSITION HEAD.

elevation of boiling-point (*Chem.*). The raising of the boiling-point of a liquid by substances in solution.

elevator (*Aero.*). An aerodynamic surface, under the control of the pilot, for producing a pitching moment on the line of flight of an aircraft.

elevator (*Eng.*). (1) A type of *conveyor* (q.v.) for raising or lowering material which is temporarily carried in buckets or fingers attached to an endless chain.—(2) A *lift* (q.v.).

elevator (*Zool.*). A muscle which by its contraction raises a part of the body. Cf. *depressor.*

elevator dredger (*Civ. Eng.*). A *bucket-ladder dredger* (q.v.).

elimination (*Chem.*). The removal of a simple molecule (e.g. of water, ammonia, etc.) from two or more molecules, or from different parts of the same molecule. See **condensation** (2).

elimination filter (*Elec. Comm.*). See **band-elimination filter.**

eliminator (*Radio*). See **battery eliminator.**

elit'toral zone (*Ocean.*). The portion of the sea bottom over which is 40 metres or more of water.

elix'ir (*Med.*). A strong extract or tincture.

ell (*Plumb.*). A short L-shaped connecting pipe.

Elland stone (*Build.*). A fine greyish-brown sandstone from the Millstone Grit of Yorkshire.

ellipse (*Maths.*). (1) The section of a right circular cone by a plane, the whole of the section lying on one side of the vertex of the cone.—(2) The plane locus of a point such that the sum of the distances of the point from two fixed points (*foci*) is constant.—(3) The plane locus of a point such that the ratio of the distances of the point from a fixed point (*focus*) to the distance from a fixed line (*directrix*) is constant, and less than unity, this being the *eccentricity*. The *major* and *minor* axes are the maximum and minimum normally-bisecting diameters. The equation is of the form: $x^2/a^2-y^2/b^2=1$.

ellip′soid (*Geom.*). A closed solid figure of which all plane sections are ellipses. An ellipsoid of revolution is generated by the revolution of an ellipse about one of its axes, the major axis giving the prolate form, the minor axis the oblate form.

ellipsoi′dal hypothesis of star-streaming (*Astron.*). The method of analysing stellar motions graphically which results in a polar curve of oval or ellipsoidal form, the directions of observed motion being plotted in angle and the radius vector being proportional to the number of stars moving in any one direction.

elliptic comets (*Astron.*). See **comet.**

elliptic polarisation (*Light*). This may be regarded as being produced by two mutually perpendicular plane-polarised components which are not in phase. See **circular polarisation** (*Light*), **polarised light.**

elliptic polarisation (*Radio*). The state of polarisation of an electromagnetic wave in which the electric and magnetic fields each contain two unequal components, at right-angles in space and in phase quadrature. See also **circular polarisation** (*Radio*).

elliptic trammel (*Drawing*). An instrument for drawing ellipses, consisting of a straight arm having a pencil point at one end and two adjustable studs (all three of which project at right-angles to the arm), and a frame with two grooves crossing one another at right-angles. If a stud is placed in each of the grooves, then, as the arm is rotated, the pencil point describes an ellipse.

elliptical arch (*Build*, *Civ. Eng.*). An arch formed to an elliptical curve, or sometimes to a curve which is not a true ellipse but a combination of circular arcs.

elm (*Timber*). A dark-brown tough wood which soon rots if alternately exposed to wet and dry conditions, but is durable under either alone; largely used for piles, water pipes, pumps, etc.

Elo (*Plastics*). A thermosetting plastic, of the phenol-cresol-formaldehyde type. See **Bakelite.**

elongated (*Typog.*). A narrow form of type, often used in display work. It is commonly known as CONDENSED.

elongating stage (*Bot.*). The period of growth when an organ increases in length, before secondary thickening begins.

elongation (*Astron.*). The difference between the geocentric celestial longitude of the moon or planets and that of the sun, amounting to 0° at conjunction, 180° at opposition, 90° and 270° at the two quadratures; its period is the synodic period of the body in question. The planets Mercury and Venus have maximum elongations of about 28° and 46° respectively.

elongation (*Met.*). The total extension produced in a tensile test. Expressed as a percentage of the original gauge length, which should also be given. See **uniform extension, local extension.**

Elsworth Rock (*Geol.*). A compact limestone occurring at the base of the clay facies of the Corallian in the south Midlands of England.

elu′triator (*Chem.*, *Mining*). An appliance for washing or sizing very fine powders in an upward current of water.

elu′vial (eluvium) gravels (*Geol.*). Those gravels formed by the disintegration *in situ* of the rocks which contributed to their formation. Cf. *alluvial deposits.*

elvan (*Geol.*). A term applied by Cornish miners to the dyke rocks associated with the Armorican granites of that county. Elvans are actually quartz-porphyries, microgranites, and other medium- to fine-textured dyke rocks of granitic composition.

ely′tra (*Zool.*). In *Coleoptera*, the hardened, chitinised fore-wings which form horny sheaths to protect the hind-wings when the latter are not in use: in certain *Polychaeta*, plate-like modifications of the dorsal cirri.—*adjs.* **elytroid, elytriform.**

El′zevir, —vêr (*Print.*). A class of book named after the Elzevir family, Dutch printers of the 16th-17th century. A distinctive type-face used by them is also known by the same name.

Em (*Chem.*). The symbol for an *emanation.*

e/m (*Phys.*). The ratio of the electric charge to the mass for particles such as electrons and positive rays. For slow-moving electrons, the value of e/m is $1{\cdot}77 \times 10^8$ coulombs per gram. The value decreases with increasing velocity, however, on account of the increase in effective mass. See **mass of the electron.**

em (*Typog.*). The square of the body of any size of type; used as a unit of measurement in computing the cost of composition, size of pages, and for indicating the size of dashes, spaces, etc.

em quad (*Typog.*). A square quadrat one em in width. Less than type height, it is used for spacing. The full point at the end of sentences is usually followed by an em quad. Known to the compositor as a MUTTON.

em rule (*Typog.*). The dash. A thin horizontal line one em of the type body in width. Apart from its uses as a mark of punctuation, it is often employed to build up rules in tabular work. 2-, 3-, and 4-em rules are used for particular purposes. Also known as EM SCORE, METAL RULE, MUTTON RULE.

E.M. wave (*Radio*, *etc.*). See **electromagnetic wave.**

emanations (*Chem.*). Radon and its isotopes, radioactive, chemically inert gases resulting from the disintegration of radium, thorium, and actinium.

Emanueli porosimeter, ā-man-ū-ā′-li (*Diel.*). A double U-tube arrangement for measuring the porosity of a given sample. One tube has the sample in parallel with it, and the other a known porosity across it.

emar′ginate (*Bot.*). (1) Having a slight notch at the tip.—(2) As if scooped out close to the point of attachment.—(3) Lacking a distinct margin.—(*Zool.*) Having the tip or margin notched.

emasculation (*Bot.*). The removal of the stamens from an unopened flower.—(*Med.*) Removal of testes, or of testes and penis.

emas′culator (*Vet.*). An instrument for castrating horses and bulls by crushing the spermatic cord.

embankment (*Civ. Eng.*). A ridge of earth, stones, etc. specially constructed to carry a highway or railroad at a higher level than the surrounding ground; or as a protective bank to prevent water encroachment, etc. Also called a BANK.

embankment wall (*Civ. Eng.*). A retaining wall from the top of which the supported earth rises at a slope.

embattlemented (*Build.*). A term applied to a building feature (such as a parapet) which is indented along the top like a battlement.

embedded column (*Build.*). A column which is partly built into the face of a wall.

embedded temperature detector (*Elec. Eng.*). A resistance thermometer or thermocouple built into a machine or other piece of equipment during its construction, in order to be able to ascertain the temperature of a part which is inaccessible under working conditions.

embellishment (*Build.*). Ornamentation applied to building features.

Embiop′tera (*Zool.*). An order of small, elongate, soft-bodied *Exopterygota*, with short anal cerci; the males have two equal pairs of small wings, the females are wingless; the mouthparts are adapted for biting; the basal joint of the tarsi of the first pair of legs is swollen and contains a silk-gland; gregarious tropical Insects living in silken tunnels.

embolec'tomy (*Surg.*). Excision of an embolus.

embol'ic gastrulation (*Zool.*). Gastrulation by invagination.

em'bolism (*Med.*). The blocking of a blood-vessel by a mass carried, to the point of obstruction, from a remote part of the circulation.

em'bolite (*Min.*). The chief silver ore in some of the Chile mines, occurring as yellow-green incrustations and masses. Chemically, chloride and bromide of silver.

embo'lium (*Zool.*). In some *Hemiptera*, a narrow strip of the corium.

Embo'lobran'chia'ta (*Zool.*). A group of *Arachnida*, breathing by lung-books or tracheae, or both, usually of terrestrial habit.

embolom'erous (*Zool.*). Having the neural and haemal elements of the vertebrae alternating as a series of wedge-shaped bones, and forming two vertebral rings in each somite, completely enclosing the notochord.

embo'lus, *or* em'— (*Med.*). A clot or mass formed in one part of the circulation and impacted in another, to which it is carried by the blood-stream.

embolus (*Zool.*). The distal portion of the palpal organ of a male Spider, comprising the ejaculatory duct and the conductor.

em'boly (*Zool.*). Invagination: the condition of pushing in or growing in.—*adj.* **embolic.**

embossed (*Bot.*). Umbonate.

embossed (*Build.*). A term applied to any form of ornamentation which is raised from the general surface which it is decorating.

embossing (*Leather*). The process of imprinting a grain or pattern on leather by means of heated plates or rollers suitably engraved.

embossing (*Photog.*). The minute lenses and the process of impressing them on the film base of a colour film.

embrasure (*Arch.*). The splayed reveal of a window opening.

embrocation (*Med.*). The action of applying or rubbing a medicated liquid into an injured part: the liquid so used.

embroidery (*Textiles*). (1) Lace work consisting of a ground of traverse bobbin net on which an ornamental design has been stitched.—(2) Ornamental work done by needle or machine on a cloth, canvas, or other ground.

em'bryo (*Bot.*). A young plant in a rudimentary state of development, usually contained in a seed or surrounded by protective tissue.—(*Zool.*) An immature organism in the early stages of its development, before it emerges from the egg or from the uterus of the mother.—*adj.* **embryonic.**

embryo sac (*Bot.*). A cavity in the ovule of an angiosperm, formed by the enlargement of the megaspore, and usually containing eight nuclei, of which the most important is the egg nucleus.

embryocar'dia (*Med.*). A sign of cardiac weakness, in which the sounds of the heart in an adult resemble those heard in the foetus.

embryogeny, —oj'en-i (*Biol.*). The processes leading to the formation of the embryo: the study of these processes.

embryol'ogy (*Biol.*). The study of the formation and development of embryos.

embryo'ma (*Med.*). A tumour formed of embryonic or foetal elements.

embryon'ic fission (*Zool.*). See **polyembryony.**

embryonic tissue (*Bot.*). Meristematic tissue.

em'bryophore (*Zool.*). In the embryonic stages of certain *Cestoda*, a ciliated envelope which encloses the embryo and is formed from the superficial blastomeres.

em'bryophyte (*Bot.*). A plant which forms an embryo.

embryot'omy (*Med.*). The removal of the viscera or of the head of a foetus, in obstructed labour.

Emdecca (*Build.*). Zinc sheets so treated as to resemble tiling.

emerald (*Min.*). The brilliant green gemstone, a form of beryl; silicate of beryllium and aluminium, crystallising in hexagonal prismatic forms, occurring chiefly in mica-schists, and rarely in pegmatites.

See **Brazilian— Oriental— Uralian—**

emerald copper (*Min.*). See **dioptase.**

emerald green (*Paint.*). A bright-green pigment, produced from aceto-arsenite of copper.

emerald nickel (*Min.*). See **zaratite.**

emergence (*Biol.*). An epidermal or subepidermal outgrowth. In *Insecta*, the appearance of the imago from the cocoon, pupa-case, or pupal integument.

emergence (*Bot.*). An outgrowth from a plant, derived from epidermal and cortical tissues, but not containing vascular tissue, and not developing into a stem or leaf.

emergence of land (*Geol.*). The mere fact of emergence of land from the sea is proved by the occurrence of strata which are obviously indurated marine clays, and sands containing marine shells and fish-remains at many different levels in the stratigraphical column. It is also clearly demonstrated by the occurrence of raised beaches round our coasts. It is an open question as to how far these changes are due to isostatic readjustment, to eustatic changes of sea-level, or to other causes.

emergency release-push (*Elec. Eng.*). A switch fitted to an electric lift, to allow the car, in case of emergency, to be moved with the doors open.

emergency stop (*Elec. Eng.*). A switch installed in a lift-car, or other similar piece of equipment, by means of which the power to the operating motor can be cut off. Also called a SAFETY SWITCH.

emergency switch (*Elec. Eng.*). A switch placed in a convenient position for cutting off the supply of electricity to a piece of apparatus or to a building, in case of emergency.

emersed (*Bot.*). (1) Protruding upwards.—(2) Amphibious.

emersion (*Astron.*). The exit of the moon, or other body, from the shadow which causes its eclipse.

emery (*Min.*). A finely granular intimate admixture of corundum and either magnetite or haematite, occurring naturally in Greece and localities in Asia Minor, etc.; used extensively as an abrasive.

emery paper, emery cloth, emery buff (*Eng.*). Paper, or more often cloth, surfaced with emery powder, held on by an adhesive solution; used for polishing and cleaning metal. See **emery.**

emery wheel (*Eng.*). A *grinding wheel* (q.v.) in which the abrasive grain consists of emery powder, held by a suitable bonding material.

em'esis (*Med.*). The act of vomiting.

emet'ic (*Med.*). Having the power to cause vomiting: a medicament which has this power.

em'etine (*Chem.*). $C_{29}H_{40}O_4N_2$, an alkaloid of unknown constitution, obtained from the roots of Brazilian ipecacuanha. It forms a white amorphous powder, m.p. 74° C., soluble in alcohol, ether, or chloroform, slightly in water. Emetine is used in medicine as an emetic; its principal use, however, is in the form of emetine bismuthous iodide, a remedy for amoebic dysentery.

e.m.f. (*Elec. Eng.*). A commonly used abbrev. for *electromotive force.*

See **contact— induced—**

emic'tory (*Med.*). A drug which excites the excretion of urine.

eminently hydraulic lime (*Build.*). *Lime* (q.v.)

made by burning a limestone containing more than 22% clay.

emissa'rium (*Civ. Eng.*). A flood-gate or *sluice* (q.v.).

emissary (*Zool*). Passing out, as certain veins in *Vertebrata* which pass out through the cranial wall.

emission (*Thermionics*). Generally, the process of ejection of electrons from a conducting surface through the agency of heat, incidence of light, or ionic or electronic bombardment. Specifically, the total electronic current emitted from a heated cathode. Also called EMISSION CURRENT.

emission limitation (*Thermionics*). See **filament limitation.**

emissive power (*Phys.*). The ratio of the rate of loss of heat per unit area of a surface at a given temperature to the rate of loss of heat per unit area of a *black body* at the same temperature and with the same surroundings. The values of emissive powers range from 1·0 for lampblack down to ·02 for polished silver.

Emitron (*Television*). Trade-name for a form of electron camera in which the optical image is focused on a photo-emitting mosaic which is scanned by an electron beam.

emmen'agogue (*Med.*). Having the power to stimulate the menstrual flow: a drug which so acts.

em'metrope (*Med.*). One who is emmetropic.

emmetro'pia (*Med.*). The normal condition of the refractive system of the eye, in which parallel rays of light come to a focus on the retina, the eyes being at rest.

emmetrop'ic (*Med.*) Distinguished by emmetropia.

emotion (*Psychol.*). A mental state characterised by a strong degree of feeling, accompanied by psychological and physiological disturbances which represent primitive patterns of behaviour and action.

empais'tic (*Dec.*). Said of embossing or inlaying effected by stamping.

empennage (*Aero.*). See **tail.**

emperor (*Paper*). A standard size of writing and drawing paper, 48 × 72 in.; U.S., 40 × 60 in.

emphyse'ma (*Med.*). (1) The presence of air in the connective tissues.—(2) The formation in the lung of bullae or spaces containing air, as a result of distension of alveoli and rupture of weakened alveolar walls.

emphysema, cutaneous (*Vet.*). Distension of the tissues of the neck of birds by air which has been expired through a wound or ulcer in the pharynx or oesophagus.

emphyse'matous chest (*Med.*). The barrel-shaped, immobile chest which is the result of chronic emphysema and bronchitis.

Empire broadcasting (*Elec. Comm.*). The broadcasting, by directed radiation, of programmes to remote localities, for local radiation at appropriate times.

Empire cloth (*Diel.*). A varnished cambric or one impregnated with linseed oil, used for insulating armature windings. etc.

empirical. Said of a rule or generalisation which is induced solely from observations, without correlation with other scientific laws by an acceptable theory. See **law.**

empirical formula. A formula founded on experience or experimental data only, not deduced in form from purely theoretical considerations.

empirical formula (*Chem.*). A formula expressing the simplest numerical relationship between the atoms of the elements present in a compound; e.g. the empirical formula of benzene is CH, though its molecular formula is C_6H_6.

empiricism. The regular scientific procedure whereby scientific laws are induced by inductive reasoning from relevant observations. Critical phenomena are deduced from such laws for experimental observation, as a check on the assumptions or hypotheses inherent in the theory correlating such laws. Scientific procedure, described by empiricism, is not complete without the experimental checking of deductions from theory. See **idealism and positivism.**

emplas'trum (*Med*). A medicated plaster for external application.

emplec'tite (*Min.*). Sulphide of copper and bismuth occurring, at Tannenbaum and elsewhere, as thin, striated grey metallic prisms intimately associated with quartz.

emplec'tum (*Masonry*). An ancient form of masonry, showing a squared stone face, sometimes interrupted by courses of tiles at intervals.

empo'dium (*Zool.*). In Insects, a pad-like or bristle-like process of the terminal joint of the tarsus.

empress (*Build.*). A slate size, 26 × 16 in.

em'prosthot'onos (*Med*). Bending of the body forwards caused by spasm of the abdominal muscles, as in tetanus.

empty glume (*Bot*). See **sterile glume.**

empyema, em-pi-ē'ma (*Med*) Accumulation of pus in any cavity of the body, especially in the pleural cavity.

emulsifier (*Chem.*). An apparatus with a rotating or stirring device, used for making emulsions.

emulsifying agents (*Chem*). Substances whose presence in small quantities stabilises an emulsion; e g. ammonium linoleate, certain benzenesulphonic acids.

emul'sin (*Chem.*). An enzyme which splits lactose into galactose and induces hydrolysis of β-glucosides and β-galactosides.

emulsion (*Build.*). A preparation serving as a retarder.

emulsion (*Chem.*). A colloidal suspension of one liquid in another; e.g. milk.

emulsion (*Photog*). The light-sensitive coating, on supports, which forms the basis of photography.

emulsoid (*Chem.*). See **lyophilic colloid.**

emunc'tory (*Med.*). Conveying waste matter from the body: any organ or canal which does this.

Emy's roof (*Build.*). A form of roof in which the principal member is built up to a semicircular shape.

en (*Chem.*). A symbol for *ethylenediamine,* $NH_2CH_2CH_2NH_2$.

en (*Typog.*). A unit of measurement used in reckoning up composition. It is equal to the average width of a letter; and the average word, including the space following, is equal to six ens.

en quad (*Typog.*). A type space half an em wide. It is more usually known as a NUT, the word *en* being easily mistaken for *em.*

en rule (*Typog.*). A dash cast on an *en* body. Half the width of an *em* rule, it is often used to divide dates, etc. Also called EN SCORE.

en cabochon, ahn^g ka-bosh-on^g (*Jewel.*). A style of cutting used in the case of certain gemstones, notably garnets (carbuncles), and those gems which depend for their beauty largely upon minute orientated inclusions, such as cat's eye, crocidolite, star ruby, and star sapphire. Such stones are not facetted, but a smooth-domed surface is produced, the plan of the stone being circular or oval.

en gaine, ahn^g gen (*Build.*). A term applied to flutings which do not run parallel but converge downward to a point.

enamel (*Build.*). *Glaze* (q.v.).

enamel (*Dec.*). A transparent, opaque or semi-opaque vitreous material applied to metal, pottery, or glass and fired in the enamelling kiln.

enamel (*Diel.*). A finely ground oil paint containing resin. The oil is thickened by heating linseed oil with china-wood oil for some hours at 300° C. Unrivalled for insulating very fine wires.

enamel (*Zool.*). The external calcified layer of a tooth, of epidermal origin and consisting of elongate hexagonal prisms, set vertically on the surface of the underlying dentine; enamel also occurs in certain scales.

enamel cell (*Zool.*). See **ameloblast.**

enamel-insulated wire (*Elec. Eng.*). Wire having an insulating covering of *enamel* (q.v., *Diel.*), used for winding small magnet coils, etc.

enamel kiln (*Pot.*). A muffle kiln for firing painted and gilded ware.

enamel organ (*Zool.*). The epithelial dental rudiment of Mammals.

enamel paint (*Paint.*). A special class of oil paint, prepared ready for use without grinding or mixing and without the addition of oil, turpentine, or driers; it dries with a firm glossy surface or with a flat surface.

enamelled brick (*Build.*). A brick having a glazed surface.

enamelled cloth. A cloth with an enamel coating on one face, used for covering furniture, etc. The English name is AMERICAN CLOTH or AMERICAN LEATHER.

enamelled leather (*Leather*). Leather which has been coated with a special varnish—black or other colours.

enamelled paper (*Paper*). Paper coated on one side with china clay and highly finished. The best quality is used for litho work, cheaper sorts for box covers.

enamelled slate (*Elec. Eng.*). Slate covered with a coating of hard enamel in order to render it suitable for the construction of switchboards.

enamelling (*Photog.*). The production of a high glaze on prints, by using a volatile solution of pyroxyline and castor oil.

enan'them, enanthe'ma (*Med.*). An eruption on a mucous membrane.

enantiom'erism (*Chem.*). See **optical isomerism.**

enan'tiomor'phous (*Crystal.*). Related to one another as object to mirror image.

enan'tiosty'lous (*Bot.*). Said of a flower having the style or styles projecting to one side, the stamens often then projecting to the other.

enan'tiotrop'ic (*Chem.*). Existing in two crystalline forms, one stable above, the other stable below, a certain transition temperature.

enar'gite (*Min.*). Sulpharsenate of copper, often containing a little antimony. Occurs as black, metallic orthorhombic crystals in several mines in both N. and S. America.

enarthro'sis (*Zool.*). A ball-and-socket joint.

ena'tion (*Bot.*). (1) A general term for an outgrowth.—(2) An outgrowth from the veins of the underside of a leaf, caused by some virus infections.

encal'low (*Build.*). The mould which is first removed from the surface of the site where clay for brick-making is to be obtained, and which is stored in a spoil bank for resurfacing later.

encallowing (*Build.*). The process of removing the mould at the top surface of a site from which clay for brick-making is to be obtained. See **encallow.**

encase (*Build., Join.*). To surround or enclose with linings or other material.

encased knot (*Timber*). A *dead knot* (q.v.).

encastered (*Struct.*). A term applied to the end of a beam when it is fixed.

encastré, ahn^{g}kas-trā (*Build., Civ. Eng.*). A term applied to the end-fixing of a beam which is built in at one or both ends.

encaustic (*Pot.*). A term loosely applied to articles decorated with impressed designs filled in with coloured slip and fired.

encaustic painting (*Dec.*). A process of painting in which hot wax is used as a medium.

encaustic (or **cerate**) **paste** (*Photog.*). A paste made of white wax dissolved in oil, used for rubbing over prints to make them more brilliant by adding a gloss to the highlights.

encaustic tile (*Build.*). An ornamental coloured tile whose colours are produced by substances added to the clay before firing.

enceph-, encephalo- (Greek *enkephalos*, brain). A prefix used in the construction of compound terms; e.g. *encephalocystocele* (q.v.).

encephalal'gia (*Med.*). Pain inside the head.

encephalit'ic (*Med.*). Of the nature of, or affected with, encephalitis.

encephali'tis (*Med.*). Inflammation of the brain substance.

encephalitis lethar'gica (*Med.*). See **Von Economo's disease** and **epidemic encephalitis.**

encephalitis per'iaxia'lis, encephalitis periaxialis diffu'sa (*Med.*). Schilder's disease. A disease characterised by progressive destruction of the nerve fibres composing the central white matter of the brain, causing blindness, deafness, paralysis, and amentia.

enceph'alocele (*Med.*). Hernial protrusion of brain substance through a defect in the skull.

encephalocoele, —sēl (*Zool.*). The cerebral ventricle or brain cavity of *Cephalochorda.*

enceph'alocys'tocele (*Med.*). Hernia of brain substance which is also distended by cerebrospinal fluid.

enceph'alogram (*Med.*). An X-ray photograph of the skull and the brain obtained by encephalography.

encephalog'raphy (*Med.*). Radiography of the brain after its cavities and spaces have been filled with air previously injected into the space round the spinal cord.

enceph'aloid cancer (*Med.*). A cancer which is soft and rapidly growing.

enceph'alomala'cia (*Med.*). Pathological softening of the brain.

enceph'alomy'eli'tis (*Med.*). Diffuse inflammation of the brain and the spinal cord.

encephalomyelitis, enzootic, en-zō-ot'ik (*Vet.*). See **Borna disease.**

enceph'alon (*Zool.*). The *brain* (q.v.).

encephalop'athy (*Med.*). Any general disease of the brain; e.g. *lead encephalopathy* is the brain disorder caused by lead poisoning.

enceph'alospi'nal (*Zool.*). See **cerebrospinal.**

enchondro'ma (*Med.*). A tumour, often multiple, composed of cartilage and occurring in bones.

enchyle'ma (*Cyt.*). The more fluid constituents of cytoplasm.

enclit'ic (*Obstet.*). Having the planes of the foetal head inclined to those of the maternal pelvis.

enclosed arc lamp (*Illum.*). A lamp consisting of a carbon arc maintained in a translucent enclosure. The latter is designed to exclude air, so that the arc burns in an atmosphere of the products of combustion.

enclosed-flame arc lamp (*Illum.*). An enclosed arc lamp employing flame carbons.

enclosed fuse (*Elec. Eng.*). A fuse in which the fuse wire is enclosed in a tube or other covering.

enclosed self-cooled machine (*Elec. Eng.*). An electric machine which is enclosed in such a way as to prevent the circulation of air between the inside and the outside, but in which special provision is made for cooling the enclosed air by some attachment; e.g. an air cooler, forming part of the machine.

enclosed-ventilated (*Elec. Eng.*). Said of electrical apparatus which is protected from ordinary mechanical damage by an enclosure, with openings for ventilation.

enclosure (*Build.*). The framing surrounding a shop-window.

encysted (*Med.*). Enclosed in a cyst or a sac.

encyst'ment (*Bot.*). The formation of a walled, non-motile body from a swimming spore.

encystment, encystation (*Zool.*). The formation by an organism of a protective capsule surrounding itself.—*v.* **encyst.**

end (*Textiles*). (1) A warp thread.—(2) In the woollen trade, the name applied to one portion of a standard length of cloth that has been cut into two equal parts.

ends (*Carp.*). Odd lengths of timbers of various sizes.

end-and-end (*Weaving*). A term indicating an alternate arrangement of warp threads which vary in colour or style.

end-artery (*Anat.*). A terminal artery which does not anastomose with itself or with other arteries.

end bell (*Elec. Eng.*). A strong metal cover placed over the end-windings of the rotor of a high-speed machine, e.g. a turbo-alternator, in order to prevent their being displaced by the centrifugal forces.

end bracket (*Elec. Eng.*). An open structure fitted at the end of an electrical machine, for the purpose of carrying a bearing.

end-bulb (*Zool.*). In Vertebrates, a type of sensory nerve-ending in which the nerve loses its medullary sheath and breaks up into small branches, within a cylindrical or spherical connective-tissue capsule.

end-cell (*Elec. Eng.*). See **regulator-cell.**

end connexions (*Elec. Eng.*). That part of an armature winding which does not lie in the slots, and which serves to join the ends of the active or slot portions of the conductors.

end fixing (*Struct.*). A term used in referring to the condition of the ends of a pillar, whether fixed or only partially so.

end grain (*Timber*). The arrangement of the fibres shown on a section exposed by a cut across the grain, usually at right-angles.

end-lap joint (*Carp.*). A *halving* (q.v.) joint formed between the ends of two pieces of timber.

end leakage flux (*Elec. Eng.*). Leakage flux associated with the end connexions of an electric machine.

end links (*Eng.*). The links at either end of a chain; they are made slightly stronger than the remainder to allow for wear when attached to hooks, couplings, etc.

end measuring instruments (*Eng.*). Measuring instruments (e.g. micrometers, callipers, gauges) which measure length by making contact with the ends of an object.

end mill (*Eng.*). A *milling cutter* (q.v.) having radially disposed teeth on its circular cutting face; used for facing operations.

end-on (*Mining*). Headings or stalls are *end-on* when the coal is being worked away in a direction at right-angles to the natural cleats or main slips.

end-papers (*Bind.*). Stout papers formed from a folded sheet which is firmly attached to the first and last sections of a volume at the fold. One half of each sheet is securely pasted to the inner side of the front and the back cover, the other half forming a fly-leaf. Ornamental or illustrated end-papers are often used.

end plate (*Thermionics*). A disc-shaped electrode, partially or completely closing the end of a concentric cylindrical arrangement of anode and cathode in a thermionic tube, to which a negative potential is applied to prevent the escape of electrons from the end of the tubular anode.

end plate (*Zool.*). A form of motor nerve-ending in muscle.

end plates (*Elec. Eng.*). Thick plates between which the laminations of a laminated core or other structure are clamped.

end plate magnetron (*Thermionics*). A magnetron fitted with end plates which, in conjunction with a magnetic field directed exactly parallel with the filament, performs in the same manner as one without end plates, in which the magnetic field is slightly inclined to the axis of the filament.

end-play device (*Elec. Eng.*). A device, used with rotary convertors and other commutator machines, which gives a small oscillatory axial movement to the rotor, in order to prevent the wearing of grooves in the commutator.

end-point (*Chem.*). The point in a volumetric titration at which the amount of added reagent is equivalent to the solution titrated.

end-products of weathering (*Geol.*). These vary with the nature of the rocks acted upon; but in general the end products are: quartz sand, which is chemically stable and hard; clay, which is deposited, after transportation by rivers, on the bed of the sea; and salts, which are carried in solution and ultimately added to the amount already present in sea water.

end-sac (*Zool.*). In some *Arthropoda*, the small coelomic vesicle in which a coelomoduct terminates, in the absence of perivisceral coelom.

end-shake (*Horol.*). See **shake.**

end sheet (*Elec. Eng*). A sheet of insulating material placed between the end section of an accumulator and the lining of the container.

end shield (*Elec. Eng.*). A cover which wholly or partially encloses the end of an electric machine; it may carry a bearing.

end spring (*Elec. Eng.*). A small spring of hard lead placed in a lead-acid accumulator, between the end plates and the container, in order to prevent the plates from spreading.

end stone (*Horol.*). A flat jewel which acts as a bearing surface for the end of a pivot; e.g. the balance staff is provided with jewels, with through holes for the parallel portions of the pivots and end stones for the ends of the pivots.

ends down (*Weaving*). A term applied to warp threads that have broken during the operation of weaving.

enda'orti'tis (*Med*). Inflammation of the intima of the aorta.

en'darch (*Bot.*). Said of a xylem strand having the protoxylem on the edge nearest to the centre of the axis.

endar'teri'tis (*Med.*). Inflammation of the intima of an artery.

endarteritis oblit'erans (*Med.*). Obliteration of the lumen of an artery, as a result of inflammatory thickening of the intima.

endecan'drous (*Bot.*). Having eleven stamens.

endel'lionite (*Min.*). Another name for *bournonite.*

Endemann's process (*Photog.*). An early photographic process in which an exposed bichromated emulsion was treated with aniline fumes, giving a blue-black image.

endem'ic (*Med.*). Prevalent in, and confined to, a particular country or district; said of disease.

endemic (*Zool.*). See **indigenous.**

en'deron (*Zool.*). See **endoderm.**

endite (*Zool.*). In *Crustacea*, a lobe on the inner side of a phyllopodium: any process on the inner side of a limb, such as a gnathobase.

endless paper (*Print.*). Paper used on rotary printing machines. It is supplied in large reels, and flows continuously through the press.

endless rope haulage (*Mining*). A method of hauling trucks underground by means of a long loop of rope, guided by many pulleys along the roads or haulage ways, and actuated by a power-driven drum. Much favoured in Britain.

endless saw (*Tools*). A *band saw* (q.v.).

endo- (Greek *endon*, within). A prefix used in the construction of compound terms; e.g. *endocranial*, inside the skull.

en'doaneurysmor'rhaphy (*Surg.*). (1) Obliteration, by suture at either end, of an aneurysm of an artery.—(2) Obliteration, by suture, of the aneurysmal sac, with reconstruction of the original arterial channel.

endobiot'ic (*Bot.*). (1) Growing inside another plant.—(2) Formed inside the host cell.

en'doblast (*Zool.*). See **hypoblast.**

endocar'diac (*Zool.*). Within the heart.

endocardi'tis (*Med.*). Inflammation of the lining membrane of the heart, especially of that part covering the valves.

endocar'dium (*Zool.*). In Vertebrates, the layer of endothelium lining the cavities of the heart.

en'docarp (*Bot.*). A differentiated innermost layer of a pericarp, usually woody in texture.

endocel'lular enzyme (*Biol.*). An enzyme which functions within the cell in which it is developed.

en'docervici'tis (*Med.*). Inflammation of the mucous membrane lining the cervix uteri.

endochon'dral (*Zool.*). Situated within or taking place within cartilage; as *endochondral ossification*, which begins within the cartilage and works outwards.

en'dochondros'teo'sis (*Zool.*). Endochondral ossification.

endocoelar, —sē'lar (*Zool.*). See **splanchnopleural.**

en'docoele, —sēl (*Zool.*). In *Zoantharia*, the portion of coelenteron enclosed by each pair of mesenteries. Cf. *exocoele.*

endoconid'ium (*Bot.*). A conidium formed inside a hypha.

endocra'nium (*Zool.*). In Insects, internal processes of the skeleton of the head, serving for muscle attachment.

en'docrine (*Zool.*). Internally secreting; said of certain glands, principally in Vertebrates, which pour their secretion into the blood, and so can affect distant organs or parts of the body. See **hormone.**

en'docrinol'ogy (*Zool*). The study of the endocrine glands and their secretions.

en'docrinop'athy (*Med.*). Any disease due to disordered function of the endocrine glands.

Endocy'clica (*Zool.*). An order of *Echinoidea* in which the mouth is central, the ambulacra are not petalloid, and the anus is in the centre of the aboral surface. Regular Urchins.

en'docyst (*Zool.*). In *Polyzoa*, the soft part of the body-wall of a zooecium, consisting of ectoderm and mesoderm: in *Protozoa*, the membranous inner layer of a cyst. Cf. *ectocyst.*

en'doderm (*Zool.*). The inner layer of cells forming the wall of a gastrula and lining the archenteron: the tissues directly derived from this layer.

endoderm disc (*Zool.*). In certain *Malacostraca*, a posterior unpaired thickening on the ventral surface of the blastoderm during early development.

endoderm lamella (*Zool.*). In certain medusae, a sheet of endoderm lying in the thickness of the mesogloea, in the radial segments bounded by the circular canal, the central enteric cavity, and the radial canals.

endoder'mal pressure (*Bot.*). See **root pressure.**

endoder'mis (*Bot.*). A sheath of cells, one layer thick, at the boundary between the cortex and the stele. The radial walls of the cells develop characteristic bands of thickening (Casparian strip), and may subsequently become heavily thickened over most of their surface. There are no spaces between the cells composing the endodermis. It is thus a firmly built layer, and probably plays a part in controlling the horizontal movement of water in the root or stem.

en'dodyne (*Radio*). The same as *autoheterodyne.*

en'doen'zymes (*Chem.*). Enzymes which are endocellular, and do not leave the cell or diffuse through the cell walls. Zymase, the enzyme of alcoholic fermentation, is a typical example of an endoenzyme.

en'dogam'y, *or* en-dog'— (*Bot.*). (1) Pollination between two flowers on the same plant.—(2) The union of two sister gametes, both female.—(*Zool.*) See **inbreeding.**

endogas'tric (*Zool*). Said of spirally coiled shells in which the coil is directed on to the posterior face of the animal. Cf. *exogastric.*

en'dogen'ous, *or* en-doj' (*Bot.*). Formed inside another organ of the plant.

endogenous (*Zool.*). (In *Sporozoa*) said of forms in which sporulation is effected within the host: (in higher animals) said of metabolism which leads to the building of tissue, or to the replacement of loss by wear and tear. Cf. *exogenous.*

endogenous spore (*Bot.*). A spore formed inside a sporangium.

endogenous thallus (*Bot.*). The thallus of a lichen in which the alga predominates.

en'dognaths, —gnaths (*Zool.*). In *Crustacea*, the endopodites of the mouth-parts.

endolith'ic (*Bot.*). Growing within the substance of rocks or stones.

en'dolymph (*Zool.*). In Vertebrates, the fluid which fills the cavity of the auditory vesicle and its outgrowths (semicircular canals, etc.).

en'dolymphan'gial (*Zool.*). Situated within a lymphatic vessel.

endolymphat'ic (*Zool.*). Pertaining to the membranous labyrinth of the ear in Vertebrates, or to the fluid contained therein.

endome'trial (*Anat.*). Pertaining to, or having the character of, endometrium.

endometrio'ma (*Med.*). Adenomyoma. An endometrial tumour consisting of glandular elements and a cellular connective tissue, occurring in regions where endometrium is normally absent.

endometri'tis (*Med.*). Inflammation of the endometrium.

endome'trium (*Anat.*). The mucous membrane lining the cavity of the uterus.

en'domix'is (*Zool.*). In *Protozoa*, a process closely resembling conjugation, but taking place in solitary individuals without involving syngamy.

en'domyocardi'tis (*Med.*). Inflammation of the heart muscle and of the membrane lining the cavity of the heart.

endomys'ium (*Zool.*). The intra-muscular connective tissue which unites the fibres into bundles.

endoneu'rium (*Zool.*). Delicate connective tissue which lies between the nerve fibres of a funiculus.

endopar'asite (*Bot., Zool.*). A parasite living inside the body of its host.

en'doperid'ium (*Bot.*). The inner layer of a peridium, when distinguishable.

en'dophlebi'tis (*Med.*). Inflammation of the intima of a vein.

endophrag'mal skeleton (*Zool.*). An internal skeletal framework formed by the elaboration and combination of apodemes and serving for muscle attachment.

endophthalmi'tis (*Med.*). Inflammation of the internal structures of the eye.

endophyl'lous (*Bot.*). (1) Said of a parasite living inside a leaf.—(2) Said of a plant member developed in the shelter of a sheathing leaf.

en'dophyte (*Bot.*). A plant living inside another plant, but not necessarily parasitic on it.

endophytic mycorrhiza (*Bot.*). See **endotrophic mycorrhiza.**

en'doplasm (*Cyt.*). The granular central portion of the cytoplasm of a cell. Cf. *ectoplasm.*

endopleu'rite (*Zool.*). A lateral apodeme: an infolding of a pleurite.

endop'odite (*Zool.*). The inner ramus of a biramous arthropod appendage.

Endopterygota, —pter-i-gō'ta (*Zool.*). A subclass of *Insecta* in which wings occur, although sometimes secondarily lost; the change from young form to adult is accompanied by a sharp metamorphosis, the wings developing internally; the young form is usually a specialised larva.

endorha'chis (*Zool*). In *Vertebrata,* a layer of connective tissue which lines the canal of the vertebral column and the cavity of the skull.

endorhi'zoid (*Bot*). A rhizoid formed at the base of the seta of a Bryophyte, and penetrating the gametophyte.

endosal'pingi'tis (*Med.*) Inflammation of the lining membrane of the Fallopian tube.

en'dosarc (*Zool.*). See **endoplasm.**

en'doscope (*Med.*). A tubular instrument for inspecting the cavities of internal organs.

endoscop'ic embryology (*Bot*). The condition when the apex of the developing embryo points towards the base of the archegonium.

endosmo'sis (*Chem*). The process of osmosis in an inward direction towards the solution. See **osmosis.**

en'dosome (*Cyt*). See **karyosome.**

en'dosperm (*Bot.*). A multicellular tissue formed inside a developing seed, serving in the nutrition of the embryo, and sometimes increasing greatly, forming the bulk of the ripe seed. Many endospermous seeds are important sources of food materials, for man and other animals.

endosper'mous (*Bot*). Said of a seed having endosperm: albuminous.

en'dospore (*Bot*). (1) The innermost layer of the wall of a spore.—(2) A spore formed inside a mother cell.

endoster'nite (*Zool.*). In *Insecta,* a sternal apodeme: in *Notostraca, Apus* and some decapod *Crustacea,* a mesodermal tendinous plate lying under the anterior part of the alimentary canal: in *Arachnida,* a slightly chitinised cartilaginous plate lying between the nerve ganglia and the alimentary canal.

endos'teum (*Zool*). The periosteum lining the cavities of some kinds of bones.

en'dostyle (*Zool.*). In some *Prochordata* and in the larvae of *Cyclostomata,* a longitudinal ventral groove of the pharyngeal wall, lined by ciliated and glandular epithelium.—*adj.* **endostylar.**

endoter'gite (*Zool*). A dorsal apodeme: an infolding of a tergum.

endothe'cium (*Bot.*). (1) The inner tissues in a young sporogonium of a moss.—(2) The fibrous layer in the wall of an anther.

endothelio'ma (*Med.*). A tumour arising from the lining membrane of blood-vessels or lymph channels. The term is also applied to a tumour arising in the pleura, in the peritoneum, or in the meninges.

endothe'lium (*Zool.*). Pavement epithelium occurring on internal surfaces, such as those of the serous membranes, blood-vessels, and lymphatics.

endother'mic (*Chem.*). Accompanied by the absorption of heat.

endothermic compound (*Chem.*). A compound whose formation is endothermic; it is therefore relatively unstable.

endothi'obacte'ria (*Bacteriol.*). Bacteria which form sulphur inside their cells.

endotho'rax (*Zool.*). In *Crustacea,* the endophragmal skeleton of the thorax.

endotox'in (*Bacteriol.*). Toxin retained within the substance of a bacterium.

en'dotrache'a (*Zool.*). In *Insecta,* the chitinous innermost layer of a trachea.

endotracheitis, —ē-ī'tis (*Med.*). Inflammation of the mucous membrane of the trachea.

endotro'phic (*Zool.*). (In *Insecta*) said of the space enclosed within the peritrophic membrane.

endotrophic mycorrhiza (*Bot*). A mycorrhiza in which the fungus occurs almost entirely inside the body of the associated plant.

endozo'ic (*Bot.*). (1) Living inside an animal.—(2) Said of the method of seed dispersal in which seeds are swallowed by some animal and voided unharmed after having been carried for some distance.

endurance (*Aero*). The maximum time, or distance, that an aircraft can continue to fly without refuelling, under any agreed conditions.

endurance limit, endurance range (*Met*). See under **limiting range of stress.**

endy'sis (*Zool.*). The formation of new layers of the integument following ecdysis.

en'ema (*Med*). Fluid injected into the rectum to promote evacuation of the bowels or to convey nutrition to the body (*nutrient enema*).

energetics (*Chem*). The abstract study of the energy relations of physical and chemical changes. See **thermodynamics.**

ener'gid (*Biol.*). Any nucleus, together with the cytoplasm which it controls.

energy (*Phys.*). The capacity of a body for doing work. Mechanical energy may be of two kinds: *potential energy,* by virtue of the position of a body; or *kinetic energy,* by virtue of its motion. Both mechanical and electrical energy may be converted into heat, which is itself regarded as another form of energy. See **potential energy, kinetic energy, mechanical equivalent of heat.**

energy component (*Elec. Eng.*). See **active component.**

energy curve (*Photog*). The spectral distribution of radiated energy in a source of light, e.g. an arc, the ordinate being proportional to the energy contained in a specified small band of wavelengths.

energy density of sound (*Acous.*). In a reverberant sound field, the particle vibration energy per unit volume, averaged over the whole of the enclosure when the distribution has become stable.

energy meter (*Elec. Eng.*). An instrument which registers the amount of energy (kilowatt-hours) passing through an electric circuit. Also called a WATT-HOUR METER.

eng (*Timber*). A very durable dark reddish-brown wood from Burma, much used for house-building and for parquet flooring. Also called IN.

engaged column (*Build*). An *embedded column* (q v.) of which more than half projects.

engine (*Eng.*). Generally, a machine in which power is applied to do work: particularly, a machine for converting heat energy into mechanical work: loosely, a locomotive.

See **air—**
atmospheric—
compression-ignition—
Diesel—
gas—
high-speed—
hot-air—
internal-combustion—
marine—
radial—
reciprocating—
rotary—
steam—
wobble-plate—

engine cylinder (*Eng.*). That part of an engine in which the heat and pressure energy of the working fluid do work on the piston, and are so converted into mechanical energy. See **cylinder, cylinder barrel.**

engine friction (*Eng.*). The frictional resistance to motion offered by the various working parts of an engine. See **friction horse-power.**

engine pit (*Eng.*). (1) A hole in the floor of a garage to enable a man to work on the underside of a motor vehicle.—(2) An engine sump or crank pit; the box-like lower part of the crankcase.—(3) A large pit for giving clearance to the flywheel of a large gas engine or winding engine. See **pit.**

engine plane (*Mining*). In a coal-mine, a roadway on which tubs, trucks, or trains are hauled by means of a rope worked by an engine.

engine-sized paper (*Paper*). Paper hardened by the addition of rosin and alum to the fluid pulp.

engineer. One engaged in the science and art of engineering practice. The term is a wide one, but it is properly confined to one qualified to design and supervise the execution of mechanical, electrical, hydraulic, and other devices, public works, etc.

See **civil engineering** **marine engineering**
electrical do. **mechanical** do.
hydraulic do. **mining** do.

engineer's chain (*Surv.*). A chain having an overall length of 100 ft., so that each link is 1 ft. long; it is much used in connexion with construction works.

engineering bricks (*Build.*). A class of brick used wherever strength and appearance are essential; e.g. for the faces of abutments, piers, and arches. They are machine-made and pressed, and may have ' frogs ' on one or both of the larger sides.

engla'cial streams (*Geol*). Streams which follow courses in the ice, after having left the surface of the glacier by plunging into a swallow- or sink-hole. Cf. *subglacial drainage.*

Eng'ler distillation (*Chem.*). The determination of the boiling range of petroleum distillates, carried out in a definite prescribed manner by distilling 100 c.c. of the substance and taking the temperature after every 5 or 10 c.c. of distillate has collected. The initial and final boiling-points are also measured.

Engler flask (*Chem*). A 100 c.c. distillation flask of definite prescribed proportions used for carrying out an *Engler distillation* (q.v.).

English bond (*Build.*). The form of bond in which each course is alternately composed entirely of headers or of stretchers.

English cross bond (*Build.*). A *Dutch bond* (q.v.).

English foot (*Hosiery*). The term for a foot made in two sections, upper and lower, which are joined with a seam.

English garden-wall bond (*Build.*). The form of *garden-wall bond* (q v.) in which a course of headers alternates with three courses of stretchers. Also called SCOTCH BOND.

English pink (*Paint.*). See **Dutch pink.**

English roof truss (*Eng.*). A truss for roofs of large span in which the sloping upper and lower chords are symmetrical about the central vertical, and are connected by vertical and diagonal members.

en'gobe (*Pot.*). A coating of fine paste.

engorgement (*Med.*). Congestion of a tissue or organ with blood.

enlargement (*Bot.*). Primary growth in thickness before secondary thickening begins.

enlarger (*Photog.*). See **enlarging machine.**

enlarging (*Photog.*). The regular photographic process whereby the negative image is projected, usually enlarged, on to the positive, during printing exposure, as contrasted with *contact printing* in which the positive and negative must coincide in size.

enlarging machine or **enlarger** (*Photog.*). The apparatus for projecting a negative on to a sensitive surface for making an enlarged print.

enneandrous, en-e-an'drus (*Bot.*). Having nine stamens.

Enochkin Series (*Geol.*). The middle portion of the thick Jurassic succession of Alaska, consisting of shales, sandstones, and conglomerates; represented in N.W. Alaska by a very great thickness of plant-bearing continental strata.

e'nol form (*Chem.*). The carbinol form of a substance exhibiting keto-enol tautomerism, i.e. that form in which the mobile hydrogen atom is attached to the oxygen atom, and therefore possesses acidic properties.

enophthal'mos, enophthal'mus (*Med.*). Abnormal retraction of the eye within the orbit.

enosto'sis (*Med.*). A bony growth formed on the internal surface of a bone.

enriched water gas (*Fuels, etc.*). See **carburetted water gas.**

enrichment (*Arch., Build.*). Ornamentation applied to building features.

enrockment (*Hyd. Eng.*). The layer of stones placed over the face of a dyke or sea-embankment as a protection against the impact of the water.

ensemble, ahn^{g}-sahmbl' (*Acous.*). The quality of concerted musical sounds made by a number of musicians; implies artistic mixing of the individual sounds without any being blurred or masked.

en'siform. Shaped like the blade of a sword.

ensiform process (*Zool.*). See **xiphisternum.**

en'silage. A cattle food formed by the bacteriological breakdown, in portable or fixed silos, of vegetable matter (grasses, clovers, pea haulms, beet tops, etc.), with the admixture of diluted molasses. Also, the process of making such food.

Ensonit (*Build.*). A form of building-board which may be stained and polished.

ensor (*Lace*). A levers net made in imitation of a traverse net.

en'statite (*Min.*). An orthorhombic pyroxene, chemically a silicate of magnesium, $MgSiO_3$; it occurs as a rock-forming mineral, and also as an important constituent of other pyroxenes of more complex chemical composition.

enstyle (*Build.*). See **eustyle.**

entab'lature (*Arch.*). The whole of the parts immediately supported upon columns, consisting of an architrave, a frieze, and a cornice.—(*Eng.*) An engine framework supported by columns.

en'tamoebiasis, —mē-bī'a-sis (*Med.*). Infection with *Entamoeba histolytica.*

en'tasis (*Arch.*). The slight swelling towards the middle of the length of a column to correct for the appearance of concavity which the outline of the column would present if it had a straight taper.

entasis reverse (or **rule**) (*Masonry*). A templet cut to the profile of an entasis, for the shaping of which it is used as a reference.

entel'echy (*Zool.*). The vital element that controls and directs response to stimuli.

entep'icon'dylar (*Zool.*). In some Reptiles and Mammals, said of a foramen near the lower end of the humerus, for the radial nerve and brachial artery.

enteque, en-tā'kā (*Vet.*). A variety of haemorrhagic septicaemia of cattle, horses, and sheep in South America; osseous metaplasia commonly occurs in the chronic forms of the disease in cattle.

enter-, entero- (Greek *enteron*, intestine). A prefix used in the construction of compound terms; e.g. *enterectomy, entero-anastomosis* (qq.v.).

en'teral (*Med.*). Within, or by way of, the intestine.

enteral (*Zool*). See **parasympathetic.**

enterclose (*Build.*). A corridor separating two rooms.

enterec'tomy (*Surg.*). Surgical removal of part of the bowel.

enter'ic (*Med.*). (1) Pertaining to the intestines. —(2) Synonym for *enteric fever* (see **typhoid fever**).

entering edge (*Elec. Eng.*). The edge of the brush of an electrical machine which is first met during revolution by a point on the commutator or slip ring. Also called LEADING EDGE OR TOE OF THE BRUSH. Cf. *leaving edge.*

entering pallet (*Horol.*). The pallet upon which a tooth of the escape wheel first acts.

entering tap (*Eng.*). See **taper tap.**

enteri'tis (*Med.*). Inflammation of the small intestine.

entero-anastomo'sis (*Surg.*). The operative union of two parts of the intestine: the operation for doing this.

enterobi'asis (*Med.*). Infection by the thread- or pin-worm *Enterobius vermicularis*.

en'terocele (*Med.*). A hernia containing intestine.

enterocente'sis (*Surg.*). Operative puncture of the intestine.—(*Vet.*) The operation of puncturing the distended intestine of a horse suffering from colic, in order to liberate the gas.

en'terocoel (*Zool.*). A coelomic cavity arising by the formation and separation of a series of hollow diverticula of the archenteron.—*n.* **enterocoe'ly.** —*adj.* **enterocoe'lic.**

enterocoli'tis (*Med.*). Inflammation of the small intestine and of the colon.

enterocolos'tomy (*Surg.*). A communication, made by operation, between the small intestine and colon.

enterocys'tocele (*Med.*). Hernia containing intestine and bladder.

entero-enteros'tomy (*Surg.*). The operative formation of a communication between two separate parts of the small intestine: the operation for doing this.

entero-epip'locele (*Med.*). A hernia containing small intestine and omentum.

enterog'enous cyanosis (*Med.*). A disorder characterised by chronic cyanosis and by the presence of methaemoglobin or sulphaemoglobin in the blood; due usually to taking drugs, especially aniline derivatives.

enterohepati'tis (*Vet.*). See **trichomoniasis.**

enteroki'nase (*Chem., Zool.*). A kinase which activates trypsinogen of the pancreatic juice to trypsin.

en'terolith (*Med.*). A concretion of organic matter and lime, bismuth, or magnesium salts, formed in the intestine.

en'teron (*Zool.*). The single body cavity of *Coelenterata*; it corresponds to the archenteron of a gastrula: in higher forms, the alimentary canal. See also **archenteron.**—*adj.* **enter'ic.**

Enteropneusta, —pnūs'ta (*Zool.*). See **Hemichorda.**

enteroproc'tia (*Surg.*). The condition in which an artificial anus is formed from intestine.

enteropto'sis (*Med.*). Glénard's disease; visceroptosis. Abnormally low position of the intestines in the abdominal cavity, as a result, partly, of weakness of the abdominal and pelvic muscles.

en'terospasm (*Med.*). Spasm of the muscle of the intestine.

enteros'tomy (*Surg.*). The surgical formation of an opening in the intestine, for the purpose of draining intestinal contents.

en'terosympathet'ic (*Zool.*). Said of that part of the autonomic nervous system which supplies the alimentary tract.

enterot'omy (*Surg.*). Incision of the intestinal wall.

enthal'py (*Phys.*). The heat content of a substance per unit mass.

entire (*Bot.*). Said of the margin of a flattened organ when it is continuous, being neither toothed nor lobed.

ento- (Greek *entos*, within). A prefix used in the construction of compound terms; e.g. *entobranchiate*, having internal gills.

entobron'chia (*Zool.*). In Birds, secondary bronchi leading to the air-sacs, being diverticula of the mesobronchium.

en'tochondros'teo'sis (*Zool.*). Ossification of cartilage commencing in the interior of the cartilage, and extending in all directions.

en'toderm (*Zool.*). See **endoderm.**

entogas'tric (*Zool.*). Within the stomach or enteron.

entoglos'sal (*Zool.*). Lying within the substance of the tongue: in some Fish, an anterior extension of the hyoid copula supporting the tongue.

entoglos'sum (*Zool.*). A structure lying within the tongue; as an anterior extension of the basihyal in some Fish.

entomog'enous (*Bot.*). Living on or in insects.

entomol'ogy. The branch of Zoology which deals with the study of insects.

entomoph'agous (*Zool.*). Feeding on insects.

en'tomophi'ly (*Bot.*). Pollination by insects.—*adj.* **entomophilous.**

Entomos'traca (*Zool.*). An obsolete group of *Crustacea* which comprised the four classes *Branchiopoda*, *Copepoda*, *Ostracoda*, and *Cirripedia* (qq v.) and was distinguished by small size, variable number of body somites, situation of the excretory glands in the second maxillary segment, the absence of a gastric mill, and the presence of a simple heart and a persistent nauplius eye.

entoplas'tron (*Zool.*). In *Chelonia*, one of the plates composing the plastron, lying between the hyoplastron and the epiplastron.

Entoproc'ta (*Zool.*). A class of *Polyzoa* in which the anus is inside the circlet of tentacles; mainly marine forms.

entopterygoid, —pter'i-goid (*Zool.*). In some Fish, a paired ventral bone of the skull, adjoining the palatine.

entoster'nite (*Zool.*). See **endosternite.**

entotur'binals (*Zool.*). The shorter inner series of ethmoturbinal plates in Mammals. Cf. *ectoturbinals.*

entotympan'ic (*Zool.*). In some Mammals, a cartilage bone which lies close to and supplements the tympanic bulla.

entova'rial (*Zool.*). Within the ovary.

entozo'ic (*Bot.*). Living inside an animal.

entozo'on (*Zool.*). An animal parasite living within the body of the host.—*adj.* **entozo'ic.**

entrance lock (*Hyd. Eng.*). A lock through which vessels must pass in entering or leaving a dock, on account of difference in level between the water impounded in the dock and the external water.

entresol, en'ter-sol *or* ahn^{g}tr-sol (*Build.*). A *mezzanine* (q.v.) floor usually between the ground and first floors.

entro'pion, entro'pium (*Med.*). Rolling in or inversion of the eyelid.

en'tropy (*Phys.*). A thermodynamic conception that, if a substance undergoing a reversible change takes in a quantity of heat dQ at temperature T, its *entropy* is increased by $\frac{dQ}{T}$.

Entz booster (*Elec. Eng.*). An automatic battery booster in which the excitation is controlled automatically by a carbon rheostat, according to the load requirements.

enucleation (*Bot., Zool.*). The removal of the nucleus from a cell, by manipulation.—*adj.* and *v.* **enucleate.**

enucleation (*Surg.*). Surgical removal of any tumour or globular swelling so that it comes out whole.

enure'sis (*Med.*). Involuntary micturition.

envelope (*Aero.*). The gas-bag of a balloon, or of a non-rigid or semi-rigid airship.

envelope (*Elec. Comm.*). The variation in the amplitude of an alternating current in a communication channel, apart from its detailed waveform.

envelope (*Paper*). A covering (usually of paper folded and gummed) for a letter, etc. Envelope blanks are cut out by dies and folded by hand or by machine. Common sizes are: *commercial*, 6¼ × 3½ in.; *court*, 5½ × 4¼ in.; *foolscap*, 8¾ × 3¾ in.

envelope (*Radio*). The curve formed by joining the successive peaks of a modulated wave. In the case of perfect modulation, it is the same shape as the modulating signal.

envelope (*Thermionics*). The outer containing-vessel of a discharge tube.

envelope delay (*Elec. Comm.*). The time taken for the envelope of a signal to travel through a transmission system, without reference to the time taken by the individual components. —(*Radio*) See **group delay.**

envelope distortion (*Elec. Comm.*). The change in shape of the envelope of a transmitted signal as it passes through a transmission system, due to the differential time-delay of its component frequencies.

envelope velocity (*Radio*). See **group velocity.**

Enville Marls (*Geol.*). A thick group of red marls occurring in the English Midlands, and usually referred to the Permian System. By some authorities some underlying breccias and conglomerates are included in an *Enville Group.*

environment (*Biol.*). The sum total of the external and internal conditions which influence existence, growth, development, and activity.

en'zymes (*Chem.*). Catalysts produced by living cells. They are proteins, often conjugated and consisting of a simple protein (the carrier) joined to a relatively simple substance (the active group) which may be a metal (e.g. copper), an organo-metallic compound (e.g. haematin) or a purely organic compound (e.g. a nucleotide). They are specific, each enzyme catalysing only one reaction or type of reaction (e.g. esterase effects the hydrolysis only of esters, maltase only of α-glucosides, pepsin only of proteins). A few occur in digestive juices, etc., but most are intracellular.

E'ocene System (*Geol.*). The oldest of the Tertiary systems occurring in Britain, comprising a variable series of marine sands and clays in the eastern parts of the London Basin, but passing westwards into lagoonal, deltaic, and fluviatile deposits. The system includes the Thanet Sands, Woolwich and Reading Beds, Blackheath and Oldhaven Beds, London Clay, Claygate Beds, Bagshot Beds, and, in the Hampshire Basin, the overlying Bracklesham Beds.

E'ocreta'ceous (*Geol.*). A great thickness of unfossiliferous slates, with intercalated marine limestones, equivalent to the Trinity Series and older rocks of the Comanchean, occurring in the Mexican states of Vera Cruz and Puebla.

e'olith (*Geol.*). Literally 'dawn stone'; a term applied to the oldest-known stone implements used by early man which occur in the Stone Bed at the base of the Crag in E. Anglia and in high-level gravel deposits elsewhere. The workmanship is crude, and some authorities question their human origin, thinking it likely that the chipping has been produced by natural causes.

Eolith'ic Period (*Geol.*). The time of the primitive men who manufactured and used eoliths: the dawn of the Stone Age. Cf. *Palaeolithic Period, Neolithic Period.*

e'osin (*Chem.*). $C_{20}H_6Br_4O_5K_2$, the potassium salt of tetrabromo-fluorescein, a beautiful red dye.

eosin'ophil (*Histol.*). Any cell the protoplasmic granules of which readily stain with the dye eosin; especially a granular white cell in the blood, and one of the cells present in the pituitary gland.

eosinophil'ia (*Med.*). A pathological excess of eosinophils in the blood.

Eozo'ic (*Geol.*). A term suggested for the Pre-Cambrian System, but little used. It means the 'dawn of life,' and is comparable with *Palaeozoic, Mesozoic,* and *Cainozoic.* See also **Protozoic.**

eozo'on (*Geol.*). A banded structure found originally in certain Canadian Pre-Cambrian rocks and thought to be of organic origin; now known to be inorganic and a product of dedolomitisation, consisting of alternating bands of calcite and serpentine replacing forsterite.

epac'me (*Zool.*). The period in the history of an individual or a race when vigour is increasing: the nepionic and neanic periods in the life-history of an individual: the phylonepionic and phyloneanic periods in the history of a race. Cf. *paracme.*

ep'apoph'ysis (*Zool.*). A median process of a vertebral neural arch.

eparte'rial (*Anat.*). Situated over an artery. EPARTERIAL BRONCHUS, the first division of the right bronchus, which passes to the upper lobe of the right lung.

ep'aulettes (*Zool.*). In *Scyphozoa,* projections of the outer sides of the oral arms: in late *Echinoplutei,* four ciliated projections at the base of the postoral and posterodorsal arms.

epax'ial (*Zool.*). Above the axis, especially above the vertebral column, therefore, dorsal; as the upper of two blocks into which the myotomes of fish embryos become divided. Cf. *hypaxial.*

epaxon'ic (*Zool.*). See **epaxial.**

epeirogen'ic earth movements (*Geol.*). Continent-building movements, as distinct from mountain-building movements, involving the coastal plain and just-submerged 'continental platform' of the great land areas. Such movements include gentle uplift or depression, with gentle folding and the development of normal tensional faults.

epeirogenic folds (*Geol.*). Folds of continent-building type, as distinct from those of mountain-building type; usually anticlines, synclines, or monoclines of small amplitude, associated with normal faults in the coastal plains of the continental areas of the earth.

epenceph'alon (*Zool.*). See **cerebellum.**

epen'dyma (*Zool.*). In Vertebrates, the layer of columnar ciliated epithelium, backed by neuroglia, which lines the central canal of the spinal cord and the ventricles of the brain.—*adj.* **epen'dymal.**

ependymi'tis (*Med.*). Inflammation of the ependyma.

ependymo'ma (*Med.*). A tumour within the brain arising in or near the ventricles and containing ependyma-like cells.

ep'harmon'ic convergence (*Bot.*). A likeness in external appearance and in structure between plants which are not closely related in their systematic positions.

ephe'bic (*Zool.*). Pertaining to the period of maximum strength of an individual: adult: mature.

eph'edrine (*Chem.*). $C_{10}H_{15}ON$, an alkaloid isolated from *Ephedra vulgaris*; it is a colourless crystalline substance, m.p. 40° C., b.p. 225° C., soluble in water, alcohol, and ether. Iso-ephedrine has the constitutional formula: $HO{\cdot}CH(C_6H_5){\cdot}CH(CH_3){\cdot}NH(CH_3)$, and is therefore a derivative of an aliphatic amine.

ephemeral (*Bot.*) A plant which completes its whole life-history in a very short time.

ephemeral movement (*Bot.*). A movement of a plant member which cannot be repeated; as the opening of a bud.

ephem'eris (*Astron.*). A compilation, published at regular intervals, in which are tabulated the daily positions of the sun, moon, planets, and certain stars, with other data necessary for the navigator and observing astronomer.

Ephemerop'tera (*Zool.*). An order of *Exopterygota,* in which the adults have large membranous forewings and reduced hind wings, and the abdomen bears two or three long caudal filaments; the adult life is very short and the mouthparts are reduced and functionless; the immature stages are active aquatic forms. May-flies.

ephip'pium (*Zool.*). In *Crustacea*, the thickened cuticle of the carapace which separates from the rest at ecdysis, or in some cases (*Cladocera*) is thrown off as an egg-case: in *Vertebrates*, the pituitary fossa of the sphenoid.

epi- (Greek *epi*, upon). A prefix used in the construction of compound terms; e.g. *epicerebral*, above or upon the brain.

epi- (*Chem.*). (1) Containing a condensed double aromatic nucleus substituted in the 1,6 positions.—(2) Containing an intramolecular bridge.

epian'drium (*Zool.*). In *Arachnida*, a plate surrounding the male genital aperture.

epiascidium, —sid'i-um (*Bot.*). A funnel-shaped abnormal leaf, with the upper surface of the leaf lining the inside of the funnel.

ep'ibasal half (*Bot.*). The anterior portion of an embryo.

epiben'thos (*Ocean*.). Animals and plants found living below low-tide mark and above the hundred-fathoms line.

ep'iblast (*Bot.*). A small outgrowth, of obscure nature, from the embryo of a grass.

epiblast (*Zool.*). The outer germinal layer in the embryo of a metazoan animal, which gives rise to the ectoderm. Cf. *Hypoblast.*

epibol'ic gastrulation (*Zool.*). Gastrulation by overgrowth.

epib'oly (*Zool.*). Overgrowth; growth of one part or layer so as to cover another part or layer — *adj.* **epibol'ic.**

epibran'chial (*Zool.*). An element of a branchial arch, lying between the pharyngobranchial and the ceratobranchial.

epica'lyx (*Bot.*). (1) A group of bracts placed close underneath the calyx of a flower.—(2) A series of small sepal-like structures, alternating with the sepals, and growing out from their under sides.

epican'thus (*Anat.*). A semilunar fold of skin above, and sometimes covering, the inner angle of the eye; a normal feature of the Mongolian races.

epicar'dium (*Zool.*). In Vertebrates, the serous membrane covering the heart: in *Urochorda*, diverticula of the pharynx, which grow out and surround the digestive viscera like a perivisceral cavity.—*adj.* **epicardial.**

ep'icarp (*Bot.*). The superficial layer of the pericarp, especially when it can be stripped off as a skin.

epicen'tral (*Zool.*). Arising from, or attached to, the vertebral centra; as certain small membrane bones lying in the myosepta in bony Fish.

ep'icentre. That point on the surface of the earth lying immediately above the focus of an earthquake.

ep'ichlorhy'drin (*Chem.*). The hydrochloric ester of glycide alcohol, a liquid of chloroform odour, b.p. 117° C.

epichor'dal (*Zool.*). Above or upon the notochord; said of the upper lobe of a caudal fin.

ep'icoele, —sēl (*Zool.*). In *Craniata*, the cerebellar ventricle or cavity of the cerebellum.

epicon'dylar (*Zool.*). Above the condyle; said of a foramen of the humerus. See **ectepicondylar, entepicondylar.**

epicon'dyle (*Zool.*). The proximal part of the condyle of the humerus or femur.

epicor'acoid (*Zool.*). In *Vertebrata*, a bony or cartilaginous element uniting the ventral ends of the coracoid and the precoracoid.

epicor'mic (*Bot.*). Said of a branch formed from a dormant bud on the trunk or limb of a tree, which becomes active owing to some mutilation of the tree or other change in the conditions surrounding the tree.

epicot'yl (*Bot.*). The part of the axis of a seedling between the cotyledons and the first leaf or whorl of leaves.

epicotyl (*Zool.*). In Birds, the axis of a down-feather.

epicra'nium (*Zool.*). In Insects, the upper part of the head above and behind the frons.

epicrit'ic (*Zool.*). Pertaining to sensitivity to slight tactile stimuli.

epictesis, ep'i-te'sis (*Bot.*). That property of the living cell which enables it to accumulate soluble salts in a concentration higher than that existing in the solution from which they are diffusing into the cell.

ep'icycle (*Astron.*). The term applied in Ptolemaic or geocentric astronomy to a small circle described uniformly by the sun, moon, or planet, the centre of that circle itself describing uniformly a larger circle (the *deferent*), concentric with the earth.

epicy'clic gear (*Eng.*). A system of gears, in which one or more wheels travel round the outside or inside of another wheel whose axis is fixed. See **epicycloid.**

epicyclic train (*Eng*.). A system of epicyclic gears, in which at least one wheel axis itself revolves about another fixed axis; used for giving a large reduction ratio in small compass, and for the gear-boxes of some motor-cars.

epicycloid (*Eng.*). The path traced out by a point on the circumference of a given circle, as it rolls round the circumference of another circle.

ep'icyte (*Zool.*). The cuticular layer of the ectoplasm in some *Protozoa.*

ep'idemes, —dēmz (*Zool*.). In flying Insects, small sclerites associated with the articulation of the wings.

epidem'ic (*Med.*). An outbreak of an infectious disease spreading widely among people at the same time in any region. Also used as *adj.*

epidemic encephalitis (*Med.*). Sleepy sickness, Von Economo's disease. An acute inflammation of the brain with a filterable virus; characterised by fever and disturbances of sleep, and followed by various persisting forms of nervous disorder (e.g. Parkinsonism), or by changes in character.

epide'miol'ogy (*Med.*). That branch of medical science concerned with the study of epidemics.—*n.* **epidemiol'ogist.**

epider'mal (*Bot., Zool.*). Relating to the epidermis.

epider'mis (*Bot.*). A sheath of closely united cells forming a layer over the surface of the leaves and young stems of a plant. The layer is seldom more than one cell in thickness, and is continuous except where it is perforated by stomata.

epidermis (*Zool.*). Those layers of the integument which are of ectodermal origin: the epithelium covering the body.

epider'moid cyst (*Med.*). A wen. A cyst lined with epithelium, occurring in the scalp.

epidermol'ysis bullo'sa (*Med*.). A congenital defect of the skin, in which the slightest blow produces a blister.

epidi'ascope (*Light*). A projection lantern which may be used for transparencies or for opaque objects. See **episcope.**

ep'ididymec'tomy (*Surg.*). Operative removal of the epididymis.

epidid'ymis (*Zool.*). In the male of *Selachii*, some *Amphibia* and *Amniota*, the greatly coiled anterior end of the Wolffian duct, which serves as an outlet for the spermatozoa.

epididymi'tis (*Med.*). Inflammation of the epididymis.

epidid'ymo-orchi'tis (*Med.*). Inflammation of the epididymis and the testes.

epididymot'omy (*Surg.*). Incision into the epididymis.

epidi'orite (*Geol.*). A term for altered gabbroic and doleritic rocks in which the original pyroxene has been replaced by fibrous amphibole. Other mineral changes have also taken place, and the rock may be regarded as a first step in the conversion, by dynamothermal metamorphism, of a basic igneous rock into a green schist.

epid'osites (*Geol.*). See **epidotisation.**

ep'idote (*Min.*). A rare accessory, but common secondary, mineral in igneous rocks, covering a wide range of composition. Crystallises in the monoclinic system, in lustrous green-black to yellowish-green crystals. In composition closely related to clinozoisite but contains iron, thus being hydrated silicate of calcium, aluminium, and iron. Also called PISTACITE.

epidotisation (*Geol.*). A process of alteration, especially of basic igneous rocks in which the feldspar is albitised, with the separation of epidote and zoisite, representing the anorthite molecule of the original plagioclase. Pressure seems to be the dominant factor in this change.

epigam'ic (*Zool.*). Attractive to the opposite sex; as *epigamic colours.*

epig'amous (*Zool.*). Said of the period of acquisition of the heteronereid condition in *Polychaeta.*

epigas'tric (*Zool.*). Above or in front of the stomach; said of a vein in Birds, which represents the anterior part of the anterior abdominal vein of lower Vertebrates.

epigas'trium (*Zool.*). In *Insecta*, the sternites of the mesothorax and metathorax —*adj.* **epigastric.**

epigas'troid (*Zool*). See **epipubis.**

epige'al, epigae'ous (*Bot.*). (1) Germinating with the cotyledons appearing above the surface of the ground.—(2) Living on the surface of the soil.

epige'an (*Bot.*). Occurring on the ground.

epige'ic (*Bot.*). Said of a plant having stolons on the surface of the soil.

epigen'esis (*Biol.*). The theory, now universally accepted, that the development of an embryo consists of the gradual production and organisation of parts, as opposed to the theory of preformation, which supposed that the future animal or plant was already present complete, although in miniature, in the germ.

epigenet'ic (*Min.*) See **syngenetic.**

epiglot'tidec'tomy (*Surg.*). Excision of the epiglottis.

epiglot'tis (*Zool.*). In *Polyzoa*, the epistome: in *Insecta*, the epipharynx: in *Mammalia*, a cartilaginous flap which protects the glottis.

epigna'thous (*Zool.*). Having the upper jaw longer than the lower jaw, as in Sperm Whales.

epigna'thus (*Med.*). A foetal monstrosity in which the deformed remnants of one twin project through the mouth of the more developed twin.

epigy'nous (*Bot.*). Having the calyx, corolla, and stamens inserted on the top of the inferior ovary.

epigy'num (*Zool.*). In *Arachnida*, a plate surrounding the female genital aperture.

epihy'al (*Zool.*). An element of the hyoid arch, corresponding to the epibranchials of the branchial arches.

epila'brum (*Zool.*). In *Myriapoda*, a process at the side of the labrum.

epila'tion (*Med.*). Removal of hair by the roots.

ep'ilepsy (*Med.*). A general term for a sudden disturbance of cerebral function accompanied by loss of consciousness, with or without convulsion. See **grand mal, petit mal.**

epilep'tic (*Med.*). Pertaining to or afflicted with epilepsy: one who suffers from epilepsy.

epilep'tiform (*Med.*). Resembling epilepsy.

epilep'togen'ic (*Med.*). Exciting an attack of epilepsy.

epilith'ic (*Bot.*). Growing on the surface of rock.

epilit'toral zone (*Bot.*). A zone on the coast bordering on the ground occupied by plants which cannot withstand exposure to salt.

epiloi'a (*Med.*). A condition characterised by feeble-mindedness, epileptic fits, sclerosis of the brain, and tumours in the skin and viscera; due to a defect in development. See also **tuberose sclerosis.**

epimenorrhoe'a (*Med.*). Too frequent occurrence of menstrual periods.

ep'imere (*Zool.*). In a developing Vertebrate, the dorsal muscle-plate zone of the mesothelial wall.

epim'erite (*Zool.*). The region of the body of an Arthropod between the base of an appendage and the pleuron: the pleuron: in some *Amphipoda*, a wide lamellar expansion of the coxopodite of a thoracic leg: in some *Gregarinidea*, part of the body forming an organ of attachment.

epim'eron (*Zool.*). The posterior of two sclerites, typically composing the pleuron in Insects. See also **epimerite.**

ep'imorph (*Min.*). A natural cast of a crystal.

epimor'pha (*Zool.*). Larvae which possess the full number of segments at the time of hatching.

epimy'sium (*Zool.*). The investing connective-tissue coat of a muscle.

ep'inas'ty (*Bot*). (1) The occurrence of stronger growth on the upper than on the under side of a plant member.—(2) Excentric thickening of a more or less horizontal branch or root.

epineph'rine (*Chem.*). *Adrenaline* (q.v.).

epineph'ros (*Zool.*). See **suprarenal body.**

epineu'ral (*Zool.*). In *Echinodermata*, lying above the radial nerve: in *Vertebrata*, lying above or arising from the neural arch of a vertebra.

epineu'rium (*Zool.*). The connective tissue which invests a nerve trunk, uniting the different funiculi and joining the nerve to the surrounding and related structures.

epino'tum (*Zool.*). See **propodeon.**

epiop'ticon (*Zool.*). In Insects, the external medullary mass or middle zone of the optic lobe of the brain.

epiot'ic (*Zool.*). A bone of the auditory capsule of the Vertebrate skull, situated above and between the pro-otic and the opisthotic.

ep'iparasite (*Zool*). See **ectoparasite.**

epipet'alous (*Bot.*). Arising from the upper surface of a petal.

ep'ipharynge'al bone (*Zool.*). One of the expanded upper elements of the first four gill-arches, in Fish with a bony skeleton.

ep'iphar'ynx (*Zool.*). In *Insecta*, the membranous roof of the mouth which in some forms is produced into a chitinised median fold, and in *Diptera* is associated with the labrum, to form a piercing organ: in *Acarina*, a forward projection of the anterior face of the pharynx.—*adj.* **epipharyngeal.**

ep'iphloeodal, ep'iphloeodic, —flē'dal, —flē'dik (*Bot.*). Growing on the surface of bark.

epiph'ora (*Med.*). An overflow of the lacrimal secretion, due to obstruction of the channels which normally drain it.

ep'iphragm, —fram (*Zool.*). In *Gastropoda*, a plate of mucus and lime salts, with which the aperture of the shell is sealed during periods of dormancy.

ep'iphyl'lous (*Bot.*). Growing upon, or attached to, the upper surface of a leaf: sometimes, growing on any part of a leaf.

epiph'ysis *or* —fi'zis (*Bot.*). An upgrowth around the hilum of a seed.

epiphysis (*Zool.*). A separate terminal ossification of some bones, which only becomes united with the main bone at the attainment of maturity: the pineal body: in *Echinoidea*, one of the ossicles of Aristotle's lantern.—*adj.* **epiphys'ial.**

epiphysis cerebri (*Zool.*). See **pineal gland.**

epiph'ysi'tis (*Med.*). Inflammation of the epiphysis of a bone.

ep'iphyte (*Bot.*). A plant which grows attached to the stems of leaves of another plant, but is not a parasite, that is, it takes no material from the plant to which it is attached.—*adj.* **epiphyt'ic.**

epiphy′tism (*Ecol.*). A form of *commensalism* (q.v.) in which a sessile animal is associated with a larger motile animal, with benefit to the former but not to the latter; e.g. *Temnocephala* on various fresh-water *Crustacea*.

epiplank′ton (*Ocean.*). Plankton found in depths of less than a hundred fathoms.

ep′iplasm (*Bot.*). Residual cytoplasm left in the ascus after the ascospores have been delimited; it may play a part in the subsequent nutrition of the developing spores.

epiplas′tron (*Zool.*). In *Chelonia*, one of the plates composing the plastron, lying anterior to the entoplastron.

epipleu′ra (*Zool.*). In *Coleoptera*, the reflexed sides of the elytra: in *Aves*, the uncinate process: in bony Fish, upper ribs formed from membrane bone: in *Cephalochorda*, horizontal shelves of membrane arising from the inner sides of the metapleural folds, and forming the floor of the atrial cavity.

epip′locele (*Med.*). A hernia containing omentum (the *epiploon*) only.

epiplo′ic foramen (*Zool.*). See **Winslow's foramen.**

epiploi′tis (*Med.*). Inflammation of the omentum.

epiplo′on (*Zool.*). In Mammals, a double fold of serous membrane connecting the colon and the stomach (the great omentum): in Insects, the fat-body.—*adj.* **epiplo′ic.**

epipo′dia (*Zool.*). In some *Gastropoda*, paired lateral lobes of the foot.—*adj.* **epipo′dial.**

epip′odite (*Zool.*). In *Crustacea*, a process arising from the protopodite.

ep′ipreco′racoid (*Zool.*). In some *Amphibia* and *Reptilia*, one of a pair of small ventral cartilages of the pectoral girdle.

epipteric, ep-i-ter′ik (*Zool.*). Wing-shaped: situated above a wing.

epipterous, ep-i-ter′us (*Bot.*). Having a wing at the apex

epipterygoid, ep-i-ter′i-goid (*Zool.*). In some Reptiles, a cartilage bone lying between the pterygoid and the parietal; formed by the ossification of the ascending process of the quadrate.

epipu′bic (*Zool.*). In front of or above the pubis: pertaining to the epipubis.

epipu′bis (*Zool.*). In some *Reptilia* and *Amphibia*, the median cartilage of the pelvic symphysis, in front of the pubes, or an ossification arising from this cartilage.—*adj.* **epipu′bic.**

episcle′ra (*Anat.*). The connective tissue between the conjunctiva and the sclera.

episcleritis (*Med.*). Inflammation of the episclera, sometimes involving the sclera.

ep′iscope (*Light*). A projection lantern which is used for throwing on a screen an enlarged image of a brilliantly illuminated opaque object.

episemat′ic (*Zool.*). Serving for recognition; as *episematic colours*.

episep′alous (*Bot.*). (1) Borne on the sepals.—(2) Placed opposite to the sepals.

episi′osteno′sis (*Med.*). Narrowing of the vulvar orifice.

episiot′omy (*Surg.*). Cutting the vulvar orifice to facilitate delivery of the foetus.

epispa′dias (*Med.*). Congenital defect in the anterior or dorsal wall of the urethra, commoner in the male than in the female.

epispas′tic (*Med.*). Producing a blister: an agent which does this.

ep′isperm (*Bot.*). The outer part of the seed coat.

ep′ispore (*Bot.*). The outermost layer of a spore wall, often consisting of a deposit forming ridges, spines, or other irregularities of the surface.

epistat′ic (*Gen.*). Said of a character which is dominant to another to which it is not the allelomorph.

epistax′is (*Med.*). Bleeding from the nose.

epister′num (*Zool.*). In Insects, the anterior of two sclerites typically composing the pleuron: in *Amphibia*, the interclavicle; an anterior element of the sternum.

epistil′bite (*Min.*). A colourless zeolite, chemically similar to heulandite; hydrated silicate of calcium and aluminium, crystallising in the monoclinic system.

ep′istome (*Zool.*). In *Polyzoa* and *Phoronidea*, a ridge overhanging the mouth: in decapod *Crustacea*, the sternal region of the body in front of the mouth: in certain *Coleoptera*, the reduced fronto-clypeal region: in *Diptera*, the distal border of the face.

ep′istrophe (*Bot.*). The position of chloroplasts in diffuse light, on the periclinal walls of the palisade cells.

epistro′pheus (*Zool.*). The axis Vertebra.

ep′istyle (*Build.*). See **architrave.**

epithal′amus (*Zool.*). In the vertebrate brain, a dorsal zone of the thalamencephalon.

epithal′line (*Bot.*). Growing on a thallus.

epithal′lus (*Bot.*). The upper layer of fungal hyphae in a lichen thallus.

epithe′ca (*Bot*). The older of the two valves forming the wall of a cell of a diatom.

epithe′cium (*Bot.*). A thin coloured layer over the asci in an apothecium, particularly in lichens, formed from the tips of the paraphyses.

epithe′lial layer (*Bot.*). A layer of elongated cells set end on to the endosperm in a grain, forming the boundary of the scutellum.

epithe′lioid (*Anat*). Resembling epithelium.

epithelio′ma (*Med.*). A malignant growth derived from epithelium.

epithelioma contagiosa (*Vet*). See **fowl pox.**

epithe′lium (*Zool.*). A form of tissue characterised by the arrangement of the cells as an expansion covering a free surface, or as solid masses, by the presence of a basement membrane underlying the lowermost layer of cells, and by the small amount of intercellular matrix: the secretory substance of glands, the tissues lining the alimentary canal and blood-vessels, etc.—*adjs.* **epithe′lial, epithe′liomorph.**

ep′ithem (*Bot.*). A group of cells occurring in the mesophyll of a leaf and exuding water.

epithem hydathode (*Bot.*). A hydathode which is directly connected with the vascular system of the leaf.

epito′kous (*Zool.*). Said of the heteronereid stage in *Polychaeta*.

epitrich′ium (*Zool.*). A superficial layer of the epidermis in Mammals, which consists of greatly swollen cells and is found on parts of the body devoid of hair.—*adj.* **epitrich′ial.**

epitroch′lea (*Anat.*). The inner condyle, or bony eminence, on the inner aspect of the lower end of the humerus.

epitro′phic (*Bot.*). (1) Having buds on the upper side.—(2) Growing more on the upper than on the under side.

epituberculo′sis (*Med.*). Congestion and inflammation of the area surrounding a tuberculous focus, especially in the lung.

epixylous, —zi′lus (*Bot.*). Growing on wood.

epizo′ic (*Bot.*). (1) Growing on a living animal.—(2) Having the seeds or fruits dispersed by animals.

epizo′on (*Zool.*). An animal which lives on the skin of some other animal; it may be an *ecto-parasite* or a *commensal*.—*adj.* **epizoan.**

epizootic, —zō-ot′ik (*Vet., Zool.*). Pertaining to an epizoon: appearing as an epidemic among animals: a disease occurring epidemically among animals.

epony′chium (*Zool.*). In higher Mammals, the narrow band of cuticle which overlies the base of the nail.

epoöphoron, ep-ō-of′— (*Zool*). A rudimentary structure in the ovary of Vertebrates, homologous with the epididymis of the male.

ep′somite or **Epsom salts** (*Min.*). Hydrated magnesium sulphate, $MgSO_4 \cdot 7H_2O$; occurring in colourless orthorhombic prismatic crystals, botryoidal masses, or incrustations in gypsum mines and limestone caverns; common in solution in mineral waters. The chief source for commercial Epsom salts are the salt beds of Stassfurt.

Epstein hysteresis tester (*Elec. Eng*). An apparatus for measuring the hysteresis and eddy current losses in a sample of sheet-iron. Strips cut from the sheet are assembled in the form of a square or rectangular magnetic circuit, upon which windings are placed, and the losses are measured by means of a wattmeter. The assembly is sometimes called an EPSTEIN SQUARE.

epu′lis (*Med.*). A tumour, innocent or malignant, of the gums, growing from the periosteum of the jaw.

equal (*Bot.*). Not lop-sided.

equal-area criterion (*Elec. Eng.*). A term used in connexion with the stability of electric power systems. The stability limit occurs when two areas on the power-angle diagram, governed by the particular load conditions obtaining, are equal.

equal dichotomy (*Bot.*). Dichotomy giving two branches of the same size.

equal falling particles (*Mining*). Particles possessing equal *terminal velocities* (q.v.): the underflow, oversize product of a classifier.

equal-tempered scale (*Acous.*). See **tempered scale.**

equalisation of boundaries (*Surv.*). A method of area computation applied to plans of areas with irregular boundaries; the latter are replaced by straight *give-and-take lines* (q.v.), the area being then computed as a number of triangles.

equaliser network (*Elec. Comm.*). The same as *equalising network.*

equaliser (or **balancing**) **ring** (*Elec. Eng*). A conductor on the armature of an electrical machine which serves to connect two points that are normally at the same potential.

equaliser switch (*Elec. Eng.*). A switch for connecting the armature end of the series field winding of a compound-wound generator to an equalising bar.

equalising bar (*Elec. Eng.*). A bus-bar connecting the armature ends of the series field windings of a number of compound-wound generators operating in parallel; the series field windings are thus put in parallel and stable operation is ensured.

equalising bed (*Civ. Eng.*). The bed of fine ballast or concrete laid immediately underneath a pipe-line, e.g. in a trench, in cases where the bottom of the excavation is sound but uneven (as in rock, hard chalk, etc.). The pipe must be sufficiently cradled in the bed material to prevent any rolling or lateral movement.

equalising current (*Elec. Eng.*). The current flowing in an equaliser ring or equalising bar; it performs the necessary equalising action.

equalising network (*Elec. Comm.*). (1) A network, incorporating any inductance, capacity, or resistance, which is deliberately introduced into a transmission circuit to alter the response of the circuit in a desired way; particularly to equalise a response over a frequency range.—(2) A similar arrangement incorporated in the coupling between valves in an amplifier.

equalling (*Bot.*). The condition when the tips of several organs, or of organs of diverse kinds, are at the same level, but the lengths of the several organs differ.

equation (*Chem.*). See **chemical equation.**

equation division (*Zool.*). Division of chromosomes which results in the production of daughter chromosomes of equal size, form, and potency.

equation of maximum work (*Chem.*). See **Gibbs-Helmholtz equation.**

equation of state (*Chem.*). An equation relating the volume, pressure, and temperature of a given system; e.g. van der Waals' equation.

equation of time (*Astron.*). The difference between the right ascensions of the true and mean sun, and hence the difference between apparent and mean time. In the sense mean time minus apparent time, it has a maximum positive value of nearly 14½ minutes in February, and a negative maximum of nearly 16¼ minutes in November, and vanishes four times a year.

equation, personal. A term applied, in various sciences, to a systematic error due, as shown by analysis of a long series of similar observations, to an observer's individual peculiarity.

equator. See **celestial—** **terrestrial—**

equatorial (*Astron.*). The name given to an astronomical telescope which is so mounted that it revolves about an axis parallel to the earth's axis, and, when set on a star, will keep that star in the field of view continuously, without adjustment. It has two graduated circles reading *Right Ascension* and *Declination* respectively.

equatorial (*Cyt*). Situated or taking place in the equatorial plane; as the *equatorial furrow* which precedes division of an ovum into upper and lower blastomeres, and the *equatorial plate*, which, during mitosis, is the assembly of chromosomes on the spindle in the *equatorial plane.*

equatorial acceleration of the sun (*Astron.*). An effect, due to the non-solid constitution of the sun, by which the rate of rotation of the surface at the solar equator is more rapid than that in higher latitudes. It was deduced from the periods of rotation of sun spots.

equatorial radius of the earth. See under **Earth.**

equi- (Latin *aequus*, equal). A prefix used in the construction of compound terms; e.g. *equivalve* (q.v.).

equiangular spiral (*Geom*). A spiral in which the angle between the tangent and the radius vector is constant.

equi-axed crystals (*Met.*). Polyhedral crystals formed by spontaneous crystallisation in the interior of a mass of metal in a mould. Distinguished from *columnar crystals* and *chill crystals.*

equilabration tissues (*Zool.*). Tissues that record the position of the body, or part of it, in relation to gravity or some other constant factor.

equilateral arch (*Build.*). An arch in which the two springing points and the crown of the intrados form an equilateral triangle.

equilateral roof (*Build.*). A pitched roof having rafters of a length equal to the span.

equilibration (*Eng.*). The production of balance or equilibrium; as in the provision of balance weights for a lift or cage.

equilibration tissue (*Zool.*). Sensory epithelium connected with the perception of balance and position, such as that lining the semicircular canals of the ear.

equilibrium (*Chem.*). The state reached in a reversible reaction when the reaction velocities in the two opposing directions are equal, so that the system has no further tendency to change.

equilibrium (*Mech.*). The state of a body which is at rest or is moving with uniform velocity. A body on which forces are acting can be in equilibrium only if the resultant of the forces is zero.—NEUTRAL EQUILIBRIUM, the state of equilibrium of a body when a slight displacement does not alter its potential energy.—STABLE EQUILIBRIUM, the state of equilibrium of a body when any slight displacement increases its potential energy. A body in stable equilibrium will return to its original position after a slight displacement. —UNSTABLE EQUILIBRIUM, the state of equilibrium of a body when any slight displacement decreases its potential energy. The instability is shown by the fact that, having been slightly displaced, the body moves farther away from its position of equilibrium.

equilibrium constant (*Chem.*). The ratio, at equilibrium, of the product of the active masses of the molecules on one side of the equation representing a reversible reaction to that of the active masses of the molecules on the other side.

equilibrium diagram (*Met., Min.*). See **constitutional diagram.**

equilibrium of floating bodies. For a body which floats, partly immersed in a fluid, the weight of the body is equal to the weight of fluid which it displaces. Therefore the ratio of the volume of the body to the volume immersed equals the ratio of the density of the fluid to that of the body. See **Archimedes' principle.**

equilibrium ring (*Eng.*). A ring placed in the steam chest of large steam-engines, between the back of the slide-valve and the cover. By connecting the enclosed space to the exhaust, the force on the valve and the corresponding driving effort are much reduced.

equilibrium slide-valve (*Eng.*). A large slide-valve balanced by the use of an *equilibrium ring* (q.v.).

equinoctial (*Bot.*). Said of plants bearing flowers which open and close at definite times.

equinoctial points (*Astron.*). The two points, diametrically opposite each other, in which the celestial equator is cut by the ecliptic; called respectively the *First Point of Aries* and the *First Point of Libra*, from the signs of the Zodiac of which they are the beginning.

equinox (*Astron.*). The instant, occurring twice in each tropical year, at which the sun in its apparent annual motion crosses the celestial equator; so called because the lengths of the day and night are then equal. The calendar dates of the spring equinox and autumn equinox are respectively March 21 and September 23.

equipartition of energy (*Chem.*). See **principle of the equipartition of energy.**

equip'otent (*Zool.*). See **totipotent.**

equipotential cathode (*Thermionics*). An emitting cathode whose surface is all at the same potential, the heating current being carried in a separate heater coil in close proximity. Also called INDIRECTLY HEATED CATHODE, INDEPENDENTLY HEATED CATHODE.

equipotential surface (*Elec. Eng.*). A surface upon which there is no potential difference between any two points.

eq'uitant (*Bot.*). A term applied to the condition when a plant member folded inwards about its midrib covers the edges of another similarly folded, that covers a third, and so on; used chiefly of leaves with their bases so folded.—(*Zool.*) In spiral shells (as of *Foraminifera* or *Gastropoda*), having the whorls so arranged that each one overlaps the previous one at the sides and so hides it.

equi-tempered scale (*Acous.*). See **tempered scale.**

equivalence, coefficient of (*Met.*). A factor used in converting amounts of aluminium, iron, and manganese into equivalent amounts of zinc, in relation to their effect on the constitution of brass.

equivalence, photochemical (*Chem.*). See **Einstein's law of photochemical equivalence.**

equivalent (*Chem.*). See **equivalent weight.**

equivalent circuit (*Elec. Eng.*). An electric circuit, made up of resistances, inductances, and condensers, which behaves, so far as the current and voltage at its terminals are concerned, exactly as some other circuit or piece of apparatus; e.g. a transformer may be represented by an arrangement of resistances and inductances.

equivalent conductivity (*Chem.*). The electrical conductivity of one gram-equivalent of a substance in solution.

equivalent height of antenna (*Radio*). The height of a perfect antenna, erected over a perfectly conducting ground, which, when carrying a uniformly distributed current equal to the maximum current in the actual antenna, radiates the same amount of power.

equivalent lens (*Light*). A simple lens which, substituted for a system of lenses, would give an image of the same size and in the same position.

equivalent points of a lens (*Light*). The principal points of a lens that is used with the same medium on both sides. See **cardinal points of a lens.**

equivalent proportions (*Chem.*). See **law of equivalent** (or **reciprocal**) **proportions.**

equivalent reactance (*Elec. Eng.*). The value which the reactance of an equivalent circuit must have in order that it shall represent the system of magnetic linkages present in the actual circuit.

equivalent resistance (*Elec. Eng.*). The value which the resistance of an equivalent circuit shall have in order that the loss in it shall represent the total loss occurring in the actual circuit.

equivalent simple pendulum (*Phys.*). See **centre of oscillation.**

equivalent sine wave (*Elec. Eng.*). A sine wave which has the same frequency and the same r.m.s. value as a given wave.

equivalent T- (or π) **networks** (*Elec. Comm.*). T- (or π) networks that are equivalent in electrical properties to sections of transmission line, provided these are short in comparison with the wavelength.

equivalent weight (*Chem.*). That weight of an element or radical which combines with, displaces, or is in any way equivalent to, unit weight of hydrogen.

eq'uivalve (*Zool.*). Said of bivalves which have the two halves of the shell of equal size.

Er (*Chem.*). The symbol for *erbium*.

erasion (*Surg.*). Removal of all diseased structures from a joint by cutting and scraping.

erbium (*Chem.*). Symbol, Er. A metallic element, a member of the rare-earth group. At. no. 68, at. wt. 167·7. Found in the same minerals as dysprosium (gadolinite, fergusonite, xenotime), and in euxenite.

Erdmann float (*Chem.*). A glass float used to facilitate the reading of the liquid level in a burette.

erect (*Bot.*). Set at right-angles to the part from which it grows.—(*Zool.*) See under **erection.**

erect'ile tissue (*Zool.*). Tissue which contains baggy blood-spaces, by the distension of which with blood it can be rendered turgid.

erecting prism (*Light*). A right-angled prism used for erecting the image formed by an inverting projection system. The prism is used with its hypotenuse parallel to the beam of light incident on one of the other faces, which is totally reflected at the hypotenuse and emerges from the third face parallel to its original direction.

erecting shop (*Eng.*). That part of an engineering works where finished parts are assembled or fitted together; the term is generally applied to a fitting shop for relatively large machines.

erection (*Build.*). The assembly of the parts of a structure into their final positions.

erection (*Zool.*). The turgid condition of certain animal tissues when distended with blood : an upright or raised condition of an organ or part.—*adj.* **erect.**

erector (*Zool.*). A muscle which, by its contraction, assists in raising or erecting a part or organ.

er'emacaus'is (*Chem.*). A process of very slow oxidation without the application of heat; e.g. the decay of wood.

ere'mochaetous, —kē'tus (*Zool.*). Having the bristles or chaetae arranged according to no definite plan.

erep'sin (*Chem., Zool.*). An enzyme of the intestinal juice, acting upon casein, gelatine, and the products of peptic digestion, the end products being polypeptides and amino-acids.

er'ethism (*Med.*). Abnormal irritability of a tissue or organ.

erg (*Mech.*). The unit of work or energy in the c.g s. system of units ; equal in magnitude to the work done when the point of operation of a force of one dyne is allowed to move one centimetre in the direction of the force.

ergas'tic substance (*Cyt.*). A non-protoplasmic cell inclusion, playing a part in respiration or other metabolic activity of the cell.

ergas'toplasm (*Zool.*). See **archoplasm.**

ergatan'dromorph (*Zool.*). An ant which has the characters of the worker, combined with those of the male.

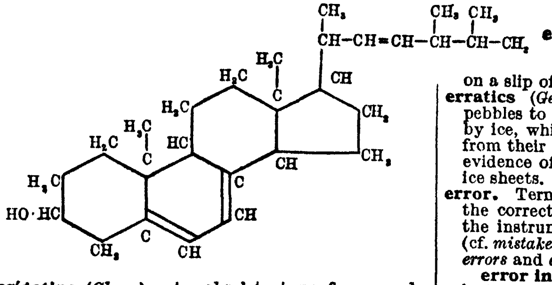
ergatan'er (*Zool.*). An apterous male ant having some of the characteristics of the worker.—*adjs.* **ergatan'drous, er'gatoid.**

er'gate (*Zool.*). A sterile female ant or worker.

ergat'ogyne, —jin (*Zool.*). An apterous queen ant.

er'gatoid (*Zool.*). Resembling a worker; said of sexually perfect but wingless adults of certain social Insects.

ergos'terol (*Chem.*). A *sterol* (q.v.) which occurs in ergot, yeast, and moulds. Traces of it are associated with cholesterol in animal tissues. On irradiation with ultra-violet light, *vitamin D* (q.v.) is produced. The constitution of ergosterol is :



er'gotine (*Chem.*). An obsolete term for a crude base obtained from ergot. See **ergotoxine.**

er'gotism (*Med.*). A condition characterised by gangrene, or by degenerative changes in the nervous system; due to eating the grains of cereals which are infected by the ergot fungus *Claviceps purpurea.*

ergotox'ine (*Chem.*). $C_{35}H_{41}O_6N_5$, an alkaloid of unknown constitution, obtained from ergot (*Claviceps purpurea*); it forms a bulky white powder, m.p. 162°-164° C., soluble in alcohol, slightly in ether. It produces all the characteristic effects of ergot, viz. contraction of the uterus and rise of blood pressure.

E'rian Stage (*Geol.*). The higher division of the Middle Devonian in N. America ; it includes the Hamilton beds, and marks the maximum extension of the Devonian sea.

erica'ceous (*Bot.*). Heather-like.

Erichsen test (*Met.*). A test in which a piece of metal sheet is pressed into a cup by means of a plunger ; used to estimate the suitability of sheet for pressing or drawing operations.

er'icoid (*Bot.*). Having very small tough leaves like those of heather.

eric'thys (*Zool.*). A larval stage of *Stomatopoda.*

Erinofort (*Plastics*). A proprietary non-flam cellulose acetate thermoplastic.

Erinoid (*Plastics*). Trade-name for a casein thermoplastic, made from the colloidal protein matter in separated milk by treatment with formaldehyde ; sp. gr. 1·32-1·39, moulding temp. 250° F., breakdown value in volts per mm. 13,000. Artificial horn.

er'iopho'rous (*Bot.*). Having a thick cottony covering of hairs.

er'kensator (*Paper*). A machine which extracts dirt, etc. from the wet pulp ; centrifugal force is used.

Er'lenmeyer flask, —mi-er (*Chem.*). A conical glass flask with a flat bottom; it is more easily washed out than an ordinary round flask.

ermine (*Furs*). The dressed skin of the stoat in its winter coat ; the fur is then white and the tail tipped with black. The black tips are removed from the tail and attached to the skins at regular intervals.

eroded, erose (*Bot.*). Appearing as if gnawed or worn irregularly.

E'ros (*Astron.*). The name given to one of the asteroids with a highly elliptical orbit. At perihelion it may be nearer the earth than the planet Mars at opposition. For this reason it was used to determine the one exact distance needed to deduce all other distances in the solar system, in particular the sun's distance.

erosion (*Geol.*). The lowering of the land surface by weathering, corrasion, and transportation, under the influence of gravity, wind, and running water.

erosion-littoral fauna (*Ecol.*). Animals living at the edges of lakes with open, wave-washed shores.

erra'ta (*Typog.*). A list of the author's or printer's errors, inserted at the beginning or end of a book, or printed on a slip of paper which is pasted in.

erratics (*Geol.*). Stones, ranging in size from pebbles to large boulders, which were transported by ice, which, on melting, left them stranded far from their original source. They furnish valuable evidence of the former extent and movements of ice sheets.

error. Term for any small residual difference from the correct value, due to unavoidable defects in the instruments or to inaccuracy of observation (cf. *mistakes*). Errors are of two kinds : *systematic errors* and *accidental errors* (qq.v.).

error in indication (*Elec. Eng.*). In indicating instruments, the difference between the indication of the instrument and the true value of the quantity being measured. It may be expressed as a percentage of the true value, and a positive value of the error means that the indication of the instrument is greater than the true value.

error, normal law of. When an observation of a quantity is made, it is subject to small accidental errors ; when these errors are equally liable to be positive or negative, and a large number of observations is made, the probability that n observations (including $n=1$) shall have an error between x and $x+dx$ is :

$$nh\epsilon^{-h^2x^2}dx/\sqrt{\pi}.$$

If r is the probable error, $hr=0{\cdot}477$.

If μ is the mean square error, $\mu h=0{\cdot}7071$.

error of closure (*Surv.*). See **closing error.**

ersaeome, er-sē-ōm (*Zool.*). See **eudoxid.**

erubes'cite (*Min.*). See **bornite.**

eru'ciform (*Zool.*). Resembling a caterpillar; said of certain insect larvae with a fleshy cylindrical body, weakly chitinised integument, and reduced antennae and thoracic legs.

eructa'tion (*Med.*). A belching of gas from the stomach through the mouth.

erum'pent (*Bot.*). Developing at first beneath the surface of the substratum, then bursting out through the substratum and spreading somewhat.

eruption (*Med.*). A breaking-out of a rash on the skin or on the mucous membranes: a rash.

eruptive rocks (*Geol.*). A term sometimes used for all igneous rocks; but carefully compare *extrusive rocks*.

erysip'elas (*Med.*). St. Anthony's fire. A spreading streptococcal infection of the lymphatics of the skin, especially of the face, neck, forearm, and hands, the inflamed area being red and shiny and the edge raised.

erysipelas, swine (*Vet.*). See **swine erysipelas.**

erysipel'atous (*Med.*). Pertaining to, or resembling, erysipelas.

erythe'ma (*Med.*). A superficial redness of the skin, due to dilatation of the capillaries.

erythema multiforme (*Med.*). A skin disease in which raised red patches appear and reappear, especially on the upper part of the body, associated with pain and swelling of the joints.

erythema nodo'sum (*Med.*). A skin disease in which red, painful, oval swellings appear, usually on the shins, associated with fever, joint pains, and sore throat.

erythema per'nio (*Med.*). Painful red swelling of the extremities; known as CHILBLAINS.

erythe'matous (*Med.*). Resembling, or of the nature of, erythema.

erythr-, erythro- (Greek *erythros*, red). A prefix used in the construction of compound terms; e.g. *erythropoiesis* (q.v.).

erythrae'mia, erythre'mia (*Med.*). Polycythaemia vera; Osler's disease; Vaquez's disease. A disease in which persistent increase in the number of red cells in the blood is associated with enlargement of the spleen.

erythras'ma (*Med.*). Infection of the horny layer of the skin with the fungus *Microsporon minutissimum*, giving rise to superficial, reddish-yellow patches, especially in the groins and armpits.

er'ythrene (*Chem.*). *Butadiene* (q.v.).

eryth'rite (*Min.*). Monoclinic arsenate of cobalt, occurring as reddish crystals or incrustations. Also called COBALT BLOOM.

eryth'roblast (*Zool.*). An embryonic cell the cytoplasm of which contains haemoglobin, and which will later give rise to an erythrocyte. See also **megaloblast.**

eryth'rocyte (*Zool.*). One of the red blood corpuscles of *Vertebrata*; flattened oval, or circular disc-like, cells (lacking a nucleus in Mammals) containing haemoglobin.

eryth'rocytol'ysis (*Zool.*). See **haemocytolysis.**

erythrocyto'sis (*Med.*). Excess in the number of red cells in the blood.

eryth'rodex'trin (*Chem.*). The most complex of all dextrins, obtained by the hydrolysis of starch. It gives a wine-red colour with iodine.

erythroedema, erythredema, —ē-dē'ma (*Med.*). Acrodynia; pink disease. A disorder of infants, characterised by swelling and redness of face, fingers, and toes, and by restlessness, weakness, and neuritis.

eryth'romelal'gia (*Med.*). A condition characterised by pain, redness, and swelling of the toes, feet, and hands, due to an affection of the arteries supplying these parts.

erythrope'nia (*Med.*). Diminution, below normal, of the number of red cells in the blood.

erythropho'bia (*Med.*). Morbid fear of blushing.

eryth'rophore (*Zool.*). A chromatophore containing a reddish pigment.

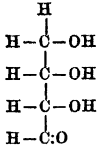
eryth'rophyll (*Bot.*). See **anthocyanin.**

eryth'ropoiesis, —poi-ē'sis (*Physiol.*). The formation of red blood corpuscles.

erythrop'sia (*Med.*). The state in which objects appear red to the observer; e.g. snow blindness.

erythrop'sin (*Zool.*). A pigment which occurs in the retinular elements of the eyes of certain night-flying Insects.

er'ythrose (*Chem.*). A tetrose of the constitution:



$$\begin{array}{c} \mathrm{H} \\ | \\ \mathrm{H-C-OH} \\ | \\ \mathrm{H-C-OH} \\ | \\ \mathrm{H-C-OH} \\ | \\ \mathrm{H-C{:}O} \end{array}$$

Esbach method (*Chem.*). A method for the quantitative estimation of albumen in the urine, based upon the precipitation of albumen with picric acid.

escalator. A conveyor for passenger-transport, consisting of a continuous series of steps carried on an endless chain, arranged either to ascend or descend, and so guided as to flatten out to a horizontal platform at the top and bottom of their run. Also called MOVING-STAIRCASE.

Escamela Limestone (*Geol.*). See **Tamasopo Limestone.**

escape (*Bot.*). A cultivated plant growing wild and holding its place more or less successfully against competition.

escape (*Build.*). A *fire escape* (q.v.).

escape motion (*Cotton Spinning*). See **box of tricks.**

escape (or **'scape) pinion** (*Horol.*). The pinion on the arbor of the escape wheel.

escape (or **'scape) wheel** (*Horol.*). The wheel of which the teeth act on the pallets.

escapement. A device for converting circular motion into reciprocating motion. Specifically (*Horol.*), in a watch or clock, it is the mechanism which transmits the power from the weight or spring to maintain the vibration of the pendulum or balance; at the same time it controls the rate at which all the wheels in the train move, the governing factor being the time of the vibration of the pendulum or balance. The ideal, which cannot be attained in practice, is a pendulum or balance vibrating without any external interference. The escapement which provides a minimum of interference is referred to as *highly detached.* Where, for a considerable period, there is contact with the escape wheel, the escapement is referred to as *frictional rest.*

Clock escapements are usually either (a) *recoil*; or (b) *dead-beat.* In the recoil type, during part of the action the pendulum pushes the escape wheel back against the power in the train, giving the 'recoil.' Although this is bad from the theoretical standpoint, in practice such an escapement gives very satisfactory results, as it is 'self-correcting'; i.e. should the arc of vibration of the pendulum tend to increase, it is checked by the greater amount of recoil. In the dead-beat type no recoil is possible as the locking faces of the pallets are arcs struck from the pallet staff centre.

Watch escapements are classified as *frictional-rest* or *detached.* The cylinder is a frictional-rest escapement, and the lever a detached escapement. The chronometer is the most highly detached of all escapements. The majority of modern watches are fitted with the club-tooth lever escapement (straight-line lever), in which the impulse is divided between the pallets and the escape wheel teeth

In the English lever escapement with ratchet tooth escape wheel, the impulse is due entirely to the pallets, whereas in the pin-pallet escapement, an escapement very much used in low-grade watches, the pallets are vertical pins, and impulse is given entirely by the teeth of the escape wheel.

escarpment (*Geol.*). A long cliff-like ridge developed by denudation where hard and soft inclined strata are interbedded, the outcrop of each hard rock forming an *escarpment*, such as those of the Chalk (Chiltern Hills, N. and S. Downs) and the Jurassic limestones (Cotteswold Hills). Generally an escarpment consists of a short steep rise (the *scarp face*) and a long gentle slope (the *dip-slope*).

eschar, es'kar (*Med.*). A dry slough produced by burning or by corrosives.

escharot'ic (*Med.*). A corrosive or caustic chemical agent.

escutcheon (*Build.*). A perforated plate around an opening, such as a key-hole plate or the plate to which a door-knob is attached.

es'erine (*Chem.*). *Physostigmine* (q v.).

esker (*Geol.*). A long winding gravel ridge, laid down by waters issuing from the front of a retreating glacier, or actually in the bed of a subglacial stream. Known in America as OS, *pl.* OSAR (from the Swedish *ås, åsar*). See **glacial action,** etc.

Esmarch's bandage (*Med.*) A rubber bandage which, applied to a limb from below upwards, expels blood from the part.

esophagus, etc. (*Zool*). See **oesophagus,** etc.

esopho'ria (*Med.*). Latent internal squint, revealed in an apparently normal person by passing a screen before the eye.

espagnolette bolt, es-pan-yol-et' (*Build.*). A long upright bolt, used to fasten a french window at both the threshold and the frame head in one operation.

espar'to (*Paper*). A paper made from a coarse grass of the name obtained from southern Spain and northern Africa.

espu'ndia (*Med.*). An ulcerative infection of the skin, and of the mucous membranes of the nose and the mouth, by the protozoal parasite *Leishmania Braziliensis*; occurs in South America.

essential element (*Bot.*). A chemical element without which a plant cannot complete its development.

essential minerals (*Geol.*). Components present, by definition, in a rock, the absence of which would automatically change the name and classification of the rock.

essential oils (*Chem.*). Ethereal oils which are contained in many plants and flowers and give them their characteristic odour. Many of them belong to the terpene group, others are related to benzene derivatives.

essential organs (*Bot.*). Stamens and carpels.

Essex board (*Build.*). A building-board made of layers of compressed wood-fibre material cemented with a fire-resisting cement.

es'sexite (*Geol.*). A coarse-grained deep-seated igneous rock, essentially an alkali-gabbro, with preponderance of soda. Named from Essex Co., Mass.

Esson coefficient (*Elec. Eng.*). See **specific torque coefficient.**

es'sonite (*Min.*). A variety of hessonite.

establishment (*Bot.*). The successful germination and subsequent growth of a plant, particularly in a new locality.

establishment (*Typog.*). A workman who receives a weekly wage is said to be *on the establishment*, in contrast to one who does piece-work. Usually abbreviated to *stab*.

establishment charges. See **on-costs.**

es'tamene (*Textiles*). A dress fabric with a rough fibrous twilled surface, made from crossbred worsted yarns. Usually of 2-and-2 twill weave.

ester (*Chem.*). Esters are derivatives of acids obtained by the exchange of the replaceable hydrogen for alkyl radicals. Many esters have a fruity smell and are used in artificial fruit essences; also used as solvents.

ester gums (*Chem.*). Rosin or gums which have been esterified with glycerine; raw material for varnishes.

ester'ifica'tion (*Chem.*). The direct action of an acid on an alcohol, resulting in the formation of esters. An equilibrium is reached between the quantities of acid and alcohol present and the quantities of ester and water formed.

esthesiometer (*Med.*). See **aesthesiometer.**

esthiomene, es'thi-om'en-e (*Med.*). A condition in which there are chronic hypertrophy and destructive ulceration of the external genitals of the female.

estimating. The operation of determining what will be the cost, inclusive of labour, materials, and overheads, of doing a certain piece of work.

estrade (*Build.*). A *dais* (q.v.).

estuarine deposition (*Geol.*). Sedimentation in the environment of an estuary. The deposits differ from those which form in a deltaic environment, chiefly in their relationship to the strata of the adjacent land, and are usually of finer grain and of more uniform composition. Both are characterised by brackish water and by their containing land-derived animal- and plant-remains.

estuarine muds (*Geol.*). So-called *estuarine muds* are, in many cases, silts admixed with sufficient true clay to give them some degree of plasticity; they are characterised by a high content of decomposed organic matter.

Estuarine Series (*Geol.*). A division of the Jurassic System in Yorkshire and parts of Scotland, equivalent to the oölitic limestones of the Cotteswold Hills. Actually misnamed, as the deposits are deltaic rather than estuarine.

estuary (*Geol*). An inlet of the sea at the mouth of a river; developed especially in areas which have recently been submerged by the sea, the lower end of the valley having been thus drowned. See **fjord** and cf. *delta*.

E.S.U. (*Elec. Eng.*). Abbrev. for *electrostatic unit*.

Et (*Chem.*). A symbol for the ethyl radical C_2H_5— .

eta patch (*Aero.*). A patch of fabric and webbing, in the shape of a fan, securing the rigging to the envelope of an airship or balloon.

etae'rio (*Bot.*). A group of achenes or of drupels.

et'alon (*Light*). An interferometer consisting of an air film enclosed between half-silvered plane parallel plates of glass or quartz having a fixed separation. It is used for studying the fine structure of spectral lines. See **Fabry and Pérot interferometer.**

etched figures or **etch-figures** (*Crystal.*). Small pits or depressions of geometrical design in the faces of crystals, due to the action of some solvent. The actual form of the figure depends upon the symmetry of the face concerned, and hence they provide invaluable evidence of the true symmetry in distorted crystals.

Etcheminian (*Geol.*). The Lower Cambrian Series of strata in the Atlantic Province of N. America.

etching (*Met.*). The process of revealing the structure of metals and alloys by attacking a highly polished surface with a reagent that has a differential effect on different crystals or different constituents.—(*Photog.*) The process of (1) dissolving, with an acid, portions of a surface, such as copper or zinc sheet, where it is not protected with a resist; (2) soaking away gelatine differentially to form a relief image.

etching pits (*Met.*). Small cavities formed on the surface of metals during etching.

etching reagent (*Met.*). See **etching.**

etching test (*Chem.*). A test used in analytical chemistry for the detection of fluorides. The substance under examination is heated with sulphuric acid in a lead vessel covered with a glass lid. If fluorides are present the glass will be etched owing to the action of hydrogen fluoride produced by the action of the acid on the fluoride.

Eternit (*Build.*). A trade-name for a form of corrugated asbestos cement roofing material.

ete'sian winds (*Meteor*). In the Mediterranean, winds which blow from the north-west for about 40 days in the summer.

ethane (*Chem.*). $H_3C{\cdot}CH_3$, a colourless, odourless gas of the paraffin series; the critical temperature is +34° C., the critical pressure is 50·2 atm, b.p. −84° C. The second member of the paraffin series of hydrocarbons.

eth'anol (*Chem.*). *Ethyl alcohol* (q.v.).

eth'ene (*Chem.*). *Ethylene* (q.v.).

eth'enoid resins (*Plastics*). Resins made from compounds containing a double bond between two carbon atoms; i.e. the acrylic, vinyl, and styrene groups of plastics.

e'theogen'esis (*Zool*). Parthenogenesis of male individuals: development of male gametes without fertilisation.

e'thers (*Chem.*). (1) Compounds derived from two molecules of an alcohol by elimination of one molecule of water. Their general formula is R·O·R'.—(2) The term is often erroneously applied to esters.

ether (*Chem.*). *Diethyl ether* (q.v.).

ether or **aether** (*Phys*). A hypothetical non-material entity supposed to fill all space whether 'empty' or occupied by matter. The ether has the property of transmitting electromagnetic waves (light, radiant heat, X-rays, etc.) and is probably concerned in gravitational attraction, but it possesses no properties in common with matter.

ether waves (*Radio*). Electromagnetic waves.

ether'ic telegraphy (*Radio*). An obsolescent name for *radiotelegraphy*.

eth'ine (*Chem.*). *Acetylene* (q.v.).

Ethiopian region (*Zool.*). One of the primary faunal regions into which the surface of the globe is divided; it includes all of Africa and Arabia south of the tropic of Cancer.

ethmo- (Greek *ethmos*, sieve). A prefix used in the construction of compound terms; e.g. *ethmopalatine*, stretching from the palatine to the ethmoid, or pertaining to the palatines and ethmoids.

eth'mohyosty'lic (*Zool.*). In some Vertebrates, having the lower jaw suspended from the ethmoid region and the hyoid bar.

eth'moid (*Zool.*). A bone of the Vertebrate skull, one of the *ethmoidalia* (q.v.).—*adj.* **ethmoidal.**

ethmoid plate (*Zool.*). A cartilage element of the developing Vertebrate skull.

ethmoida'lia (*Zool.*). A set of cartilage bones forming the anterior part of the brain-case in the Vertebrate skull.

ethmoidec'tomy (*Surg.*). Surgical removal of the ethmoid cells or of part of the ethmoid bone.

ethmoidi'tis (*Med.*). Inflammation of the ethmoid cells.

ethmotur'binal (*Zool.*). In Vertebrates, a paired bone or cartilage of the nose, which supports the folds of the olfactory mucous membrane.

ethox'yl group (*Chem.*). The group $-O{\cdot}C_2H_5$.

ethyl group, ĕ'thil *or* eth'il (*Chem.*). The monovalent radical $-C_2H_5$.

ethyl (*Chem.*). See **lead tetraethyl.**

ethyl acetate (*Chem.*). Acetic ether, $CH_3COO{-}C_2H_5$, m.p. −82° C., b.p. 77° C.; colourless liquid of fruity odour, used as a lacquer solvent and in medicine.

ethyl alcohol (*Chem.*). Ethanol, C_2H_5OH, m.p. −114° C., b.p. 78·4° C.; a colourless liquid, of vinous odour, miscible with water and most organic solvents, sp. gr. 0·789; formed by the hydrolysis of ethyl chloride or of ethyl hydrogen sulphate; it may be obtained by absorption of ethylene in fuming sulphuric acid at 160° C., followed by hydrolysis with water, by reduction of acetaldehyde, or by direct synthesis from ethylene and water at high temperatures in the presence of a catalyst. It is prepared technically by the alcoholic fermentation of sugar. It forms alcoholates with sodium and potassium.

ethyl mercaptan (*Chem.*). See **mercaptan.**

eth'ylamine, —mĕn' (*Chem.*). $C_2H_5{\cdot}NH_2$, b.p. 19° C., a liquid or gas of ammoniacal odour, which dissolves in water, and forms salts; it dissolves $Al(OH)_3$.

eth'ylene (*Chem.*). Ethene, $H_2C{:}CH_2$, m.p. −169° C., b p. −103° C., a gas of the olefine series, contained in illuminating gas and in gases obtained from the cracking of petroleum. Used for synthetic purposes, and for maturing fruit in storage.

ethylene glycol (*Chem.*). Glycol, $HO{\cdot}CH_2{\cdot}CH_2{\cdot}OH$, b.p. 197·5° C., sp. gr. 1·125, a colourless, syrupy, hygroscopic liquid, miscible with water and alcohol. Prepared from ethylene dibromide or ethylene chlorhydrin by hydrolysing with caustic soda. Intermediate for glycol esters, which are solvents and plasticisers for lacquers; used in the textile industry, for printing-inks, foodstuffs, anti-freezing mixtures, and for de-icing aeroplane wings.

ethylene oxide (*Chem.*). C_2H_4O, b.p. 13·5° C., a mobile colourless liquid of ethereal odour, obtained by distilling glycol chlorhydrin with concentrated caustic potash.

et'iola'tion (*Bot.*). The condition of a green plant which has not received sufficient light; the stems are weak, with abnormally long internodes, the leaves are small, yellowish or whitish, and the vascular strands are deficient in xylem.—*adj.* **etiolated.**

etiology (*Med.*). See **aetiology.**

Etruria Marls (*Geol.*). A thick series of red marls developed high up in the coal measures of some of the Midland coalfields in England; used extensively in the pottery industry. Named from one of the pottery towns in N. Staffordshire.

eu- (Greek *eu*, well, good). A prefix used in the construction of compound terms; e.g. *eucephalous*, having a well-developed head.

Eu (*Chem.*). The symbol for *europium*.

euapogam'y, ū-ap'— (*Bot.*). The development of the sporophyte from a cell or cells of the gametophyte, not from a zygote resulting from gametic fusion; the sporophyte is diploid.

euap'ospo'ry (*Bot.*). Complete failure on the part of a plant to form spores.

eucalyp'tole (*Chem*). *Cineole* (q.v.).

Eucar'ida (*Zool.*). A subclass of *Malacostraca* in which there are six abdominal somites and the thoracic limbs have a two-jointed protopodite; the carapace coalesces dorsally with all the thoracic somites, and the protopodite of the antenna may be one- or two-jointed.

eucar'pic (*Bot.*). Having both vegetative and reproductive organs, separate and functioning at the same time.

euceph'alous (*Zool.*). Having a well-developed head; applied to certain dipterous larvae which possess a head (as Mosquitoes), in contradistinction to the majority of dipterous larvae, which have the head much reduced. Cf. *acephalous, hemicephalous.*

euchlo'rine (*Chem.*). A mixture of chlorine with chlorine peroxide in varying proportions.

euchro'mocentre (*Cyt.*). A portion of a chromosome which stains very deeply and does not loosen out to form part of the reticulum.

euchro′mosome (*Cyt.*). A typical chromosome, as opposed to a sex-chromosome; an autosome.

eu′clase (*Min.*). A monoclinic member of the datolite group of minerals, occurring as prismatic, usually colourless, crystals. Chemically it is hydrated silicate of beryllium and aluminium.

eucoil′iform (*Zool.*). Resembling *Eucoila*; said of a larval type of certain *Hymenoptera* which possesses three pairs of long thoracic appendages.

eucone, ū-kōn (*Zool.*). (Of Insects) having compound eyes in which each ommatidium contains a true crystalline cone.

Eucopep′oda (*Zool*). A subclass of *Copepoda* in which paired compound eyes are absent, the genital openings occur on the seventh trunk somite, and the thoracic limbs lack a flagellum; includes parasitic forms such as the Sea Lice and Gill Maggots which occur on many food fish, as well as free-living forms.

eu′crite (*Geol.*). A coarse-grained, usually ophitic, deep-seated basic igneous rock, containing plagioclase near bytownite in composition, both ortho- and clino-pyroxenes, together with olivine. Eucrite is an important rock type in the Tertiary complexes of Scotland.

eucy′clic (*Bot*). Said of a flower made up of successive whorls, all with the same number of members.

eudiom′eter (*Chem.*). An apparatus for determining the composition of gases by observing the volume changes which occur on sparking them in a confined space, generally over mercury.

eudox′id, eudox′ome (*Zool*). In some *Siphonophora*, a free-swimming monogastric stage, without a special nectocalyx.—*pl.* **eudoxia.**

eugam′ic (*Zool.*). Pertaining to the period of maturity.

eu′genol (*Chem.*). $C_6H_3(OH)(OCH_3)(CH_2{\cdot}CH{:}CH_2)$, a phenol homologue, the chief constituent of oil of cloves and cinnamon leaf oil, b.p. 252° C., sp. gr. 1·07; used for manufacturing *vanillin* (q.v.).

Eugle′na (*Zool.*). A plant-like flagellate which gives its name to a peculiar type of movement (*euglenoid movement*), in which it indulges when for any reason its flagellum is ineffective.

eugle′noid (*Zool.*). Pertaining to or resembling *Euglena*; as *euglenoid movement.*

Eugle′noidi′na (*Zool.*). An order of *Phytomastigina*, comprising forms generally with one flagellum; green or colourless; with a gullet but without a transverse groove; having food-reserves of paramylum, and sometimes also of oil; with a contractile vacuole, e.g. *Euglena.*

eugonid′ium (*Bot.*). A bright-green algal cell forming part of the thallus of a lichen, and belonging to the *Chlorophyceae.*

euhe′dral crystals (*Geol.*). See **idiomorphic crystals.**

euhyme′nial (*Bot.*). Having a hymenium in which all the basidia are formed nearly at the same time.

Eu′lamel′libran′chia (*Zool.*). An order of *Pelecypoda*, in which the branchial axis of the gill is united to the body throughout its length, and bears parallel, ventrally directed and reflected filaments, which are joined to one another by vascular junctions; similarly, the lamellae of each gill are united by vascular junctions; the byssus gland is variable; ciliary feeders. True Oysters, Cockles, River and Pond Mussels, Clams, Zebra Mussels, and Shipworms.

Euler's formula, oi′ler (*Civ. Eng.*). A formula giving the collapsing load for a long, thin column of given sizes. It states that

$$P=\frac{\pi^2EI}{L^2},$$

where P=the collapsing load; E=Young's modulus; I=the least moment of inertia; L= the length of the pin-jointed column.

Eumal′acos′traca (*Zool.*). An obsolete group of *Crustacea*, which comprised the four subclasses *Syncarida*, *Peracarida*, *Eucarida*, and *Hoplocarida* (see these articles), and was distinguished by the possession of six abdominal somites, the absence of movable furcal rami and of adductor muscles, and the presence of pediform thoracic limbs, with a protopodite of two segments.

eu′merism (*Zool.*). An aggregation of similar parts.

eumer′ogen′esis (*Zool*). A form of segmentation in which the parts produced are alike (although dissimilarity may arise later).

eumito′sis (*Cyt*). Typical normal mitosis, in which the chromosomes separate distinctly and clearly divide longitudinally. Cf. *cryptomitosis*, *paramitosis.*

Eumyce′tes (*Bot*). The higher fungi, with many thousand species. The group includes the *Ascomycetes* and the *Basidiomycetes*, as well as the *Fungi imperfecti.* The mycelium is usually strongly developed, and consists of branching, septate hyphae.

eupep′tic (*Med*). Possessing a good digestion.

Euphausia′cea (*Zool.*). An order of *Eucarida* in which the caridoid facies are retained; none of the thoracic limbs are modified as maxillipedes; many kinds possess luminous organs; in Arctic and Antarctic waters they occur in huge shoals in the surface waters and are known as *kril*; they form the chief food of some kinds of whales.

Euphon quilt, Chance's (*Acous.*). An acoustic absorbing quilt made of matted layers of glass silk threads supported between layers of paper or canvas.

eupho′ria, eu′phory (*Med.*). A feeling of well-being, not necessarily indicative of good health.

eupho′tomet′ric (*Bot.*). Said of a leaf which occupies a fixed position with its lamina perpendicular to the direction of the strongest diffuse light to which it is exposed.

euploid′y (*Cyt.*). Polyploidy in which the chromosome number is an exact multiple of the haploid number; organisms showing this condition are *euploid.*

eupot′amous (*Ecol.*). Normally living in rivers and streams. Cf. *tychopotamous.*

eupy′rene (*Zool.*). (Of spermatozoa) normal, typical. Cf. *oligopyrene*, *apyrene.*

Eureka Black Shale (*Geol.*). A diachronous shale deposit forming the transgressive basal member of the Mississippian in Arkansas, Missouri, etc.

Eureka wire (*Elec. Eng*). Wire made of an alloy of copper and nickel. It has a very small temperature coefficient and does not deteriorate at high temperatures. Used for winding resistance coils.

euro′pium (*Chem.*). Symbol, Eu. A rare metallic element, a member of the rare-earth group. At. no. 63, at. wt. 152. Behaves as a divalent and trivalent element. Contained in black monazite, gadolinite, samarskite, xenotime.

euryba′thic (*Ecol.*). Tolerant of a wide range of depth.

euryha′line (*Ecol.*). Normally inhabiting salt water, but adaptable to a wide range of salinity. Cf. *stenohaline.*

Euryp′terid Series (*Geol.*). A little-used name; synonymous with *Temeside Shales*, in the Downtonian Stage of the Devonian System.

Eurypter′ida (*Geol.*). An order of *Crustaceans* occurring first in the Silurian and Devonian rocks of Britain, and represented by such types as *Eurypterus* and *Stylonurus*, the latter reaching 6 ft. in length.

euryp′ylous (*Zool.*). (In *Porifera*) said of a type of canal system in which the flagellated chambers open directly into the ex-current canals by apopyles.

euryther′mous (*Ecol.*). Tolerant of a wide range of temperature.

Euselachii, —lak'i-i (*Zool.*). A subclass of *Selachii* characterised by the possession of a spiracle and five or more gill-clefts, which open separately to the exterior. Sharks and Rays.

eusporan'giate fern (*Bot.*). A fern in which the sporangia are developed each from a group of cells.

Eusta'chian tube (*Zool.*). In land Vertebrates, a slender duct connecting the tympanic cavity with the pharynx.

Eustachian valve (*Zool.*). In Mammals, a rudimentary valve separating the openings of the superior venae cavae from that of the inferior vena cava.

eustatic movements (*Geol.*). Changes of sea-level, constant over wide areas, due probably to alterations in the volumes of the seas resulting from the formation or melting of ice-caps.

euster'num (*Zool.*). In Insects, a ventral sclerite of a thoracic segment, lying in front of the sternellum.

eusto'matous (*Zool.*). With a well-defined mouth or opening.

eustyle (*Build.*). A colonnade in which the space between the columns is equal to two and a quarter times the lower diameter of the columns.

Eutaw Group, ū'taw (*Geol.*). A subdivision of the Cretaceous System in the southern U.S.A., lying between the Tuscaloosan, which it overlaps northwards, and the overlying Selma Chalk. The Tombigbee Sand occurs at the top of the group.

eutec'tic (*Chem.*). Relating to a mixture of two or more substances having a minimum melting-point. Such a mixture behaves in some respects like a pure compound.

eutectic change (*Met.*). The transformation from the liquid to the solid state in a eutectic alloy. It involves the simultaneous crystallisation of two constituents in a binary system and of three in a ternary system.

eutectic point (*Met.*, *Min.*). The point in the binary or ternary constitutional diagram indicating the composition of the eutectic alloy, or mixture of minerals, and the temperature at which it solidifies.

eutectic structure (*Met.*). The particular arrangement of the constituents in a eutectic alloy which arises from their simultaneous crystallisation from the melt. See **graphic texture** (*Min.*).

eutectic system (*Met.*). A binary or ternary alloy system in which one particular alloy solidifies at a constant temperature which is lower than the beginning of solidification in any other alloy.

eutectoid (*Met.*). Similar to a eutectic except that it involves the simultaneous formation of two or three constituents from another solid constituent instead of from a melt. *Eutectoid point* and *eutectoid structure* have similar meanings to those given for *eutectic*.

eutectoid steel (*Met.*). Steel having the same composition as the eutectoid point in the iron-carbon system (0·87% C.), and which therefore consists entirely of the eutectoid at temperatures below 710° C. See **pearlite.**

euthana'sia (*Med.*). Easy or painless death: the action of procuring this.

Euthe'ria (*Zool.*). A subclass of viviparous *Mammalia* in which the young are born in an advanced stage of development; there is no marsupial pouch; an allantoic placenta occurs; the scrotal sac is behind the penis, the angle of the lower jaw is not inflexed and the palate is imperforate. Also called PLACENTALIA, MONODELPHIA.

Euthyneu'ra (*Zool.*). A subclass of hermaphrodite *Gastropoda*, in which the visceral mass and commissure show detorsion, and there are usually two pairs of cephalic tentacles. Sea Slugs, True Snails, Land Slugs, etc.

euthyneural, euthyneurous (*Zool.*). Having a symmetrical nervous system; said especially of certain *Gastropoda* in which the visceral nerve loop is untwisted.

eutro'phic (*Ecol.*). Said of a type of lake-habitat with gently sloping shores, and a wide belt of littoral vegetation.

eutrop'ic series (*Chem.*). An arrangement of substances in which crystalline form and physical constants show a regular variation.

eu'tropy (*Chem.*). The regular variation of the crystalline form of a series of compounds with the atomic number of the element.

eux'enite (*Min.*). An uncommon mineral containing rare elements; a niobate and titanate of yttrium, erbium, cerium, and uranium, and valuable on this account. Commonly massive and brownish-black in colour; rarely, crystalline (orthorhombic prismatic forms).

evag'inate (*Bot.*, *Zool.*). Not having a sheath.

evagination (*Med.*). The turning inside out of an organ.

evagination (*Zool.*). Withdrawal from a sheath: the development of an outgrowth: eversion of a hollow ingrowth: an outgrowth: an everted hollow ingrowth. Cf. *invagination*, *evaginate*.

evaporation (*Phys.*). The conversion of a liquid into vapour, at temperatures below the boiling-point. The rate of evaporation increases with rise of temperature, since it depends on the saturated vapour pressure of the liquid, which rises until it is equal to the atmospheric pressure at the boiling-point. Evaporation is used to concentrate a solution.

evaporation, natural (*Meteor.*). The evaporation that takes place at the surface of ponds, rivers, etc. which are exposed to the weather; it depends on the relative humidity, and also, to some extent, on the strength of the wind.

evaporative cooling (*I.C. Engs.*). An engine cooling system which consists in allowing the cooling liquid to boil, condensing it, and returning it to the cylinder jackets, thus dispersing the heat by means of the latent heat of evaporation.

evaporator (*Chem.*). A still designed to evaporate moisture or solvents in order to obtain the dried product. An example is the preparation of milk powder from milk.

evaporim'eter (*Meteor.*). An instrument used for measuring the rate of natural evaporation.

evection (*Astron.*). The second of the four principal periodic inequalities in the mathematical expression of the moon's orbital motion; due to the variable eccentricity of the moon's orbit, with a maximum value of 1° 16′ and a period of 31·81 days.

even (*Bot.*). Having a smooth surface.

even pages (*Typog.*). The left-hand pages of a book, i.e. those which bear the even page-numbers.

even pitch (*Eng.*). In screw cutting in the lathe, the thread cut is said to be of *even pitch* if its threads per inch are equal to, or a multiple of, the threads of the lead screw.

even small caps (*Typog.*). Small capitals set up without capitals. Sometimes called LEVEL SMALL CAPS.

evening star (*Astron.*). The name given in popular language to a planet, generally Venus or Mercury, seen in the western sky at or just after sunset.

eventration (*Med.*). Protrusion of the abdominal contents outside the abdomen; e.g. through the diaphragm into the thorax.

ever-bearer, ever-bloomer (*Bot.*). A plant which vegetates and flowers for a long period of the growing season, and often bears flowers and fruits at the same time. The flowering of ever-bloomers does not seem to be significantly affected by the duration of the periods of light to which they are exposed, during the ordinary alternation of day and night.

eversporting race (*Bot.*). A race of plants which does not breed true, and gives mixed progenies.

Everest theodolite (*Surv.*). A form of theodolite differing from the transit in that reversal of the line of sight is effected by removing the telescope from its trunnion supports and turning it end for end.

Everite (*Build.*). A proprietary form of asbestos-cement material used for roofing, eaves, gutters, rain-water pipes, etc.

everted (*Bot.*). Turned outwards abruptly.

evident plasmolysis (*Bot.*). The stage in plasmolysis when the protoplast can be seen to have shrunken away from the cell wall.

evisceration (*Surg.*). Disembowelment: operative removal of thoracic and abdominal contents from the foetus in obstructed labour: operative removal of a structure (e.g. the eye) from its cavity.

e'volute (*Biol.*). Having the margins rolled outwards.

evolute (*Geom.*). See **involute.**

evolution (*Biol.*). The gradual development of more complex organisms from simpler forms: the development of organs from other organs, or from simpler organs of the same type.

evol'vate (*Bot.*). Lacking a volva.

Evos door (*Build.*). A trade-name for a form of finished door and door-case supplied ready to be put in place.

evulsion (*Surg.*). Plucking out by force.

Ewing curve tracer (*Elec. Eng.*). An instrument for throwing a curve representing the hysteresis loop of a sample of iron on to a screen. A mirror is deflected horizontally in proportion to the magnetising force and vertically in proportion to the flux produced.

Ewing permeability bridge (*Elec. Eng.*). A measuring device in which the flux produced in a sample of iron is balanced against that produced in a standard bar of the same dimensions. The magnetising force on the bar under test is varied until balance is obtained, and from the value of the force so found the permeability can be estimated.

E.W.T. (*Build., Civ. Eng.*). Abbrev. for *elsewhere taken.*

ex- or **e-** (Latin *ex*, out of). Prefixes used in the construction of compound terms; e.g. *excystation*, emergence from encystment; *Edentata* (q.v.). Variant forms are **ef-** and **es-**.

ex. & ct. (*Build., Civ. Eng.*). Abbrev. for *excavate and cart away.*

ex. sur. tr. & ct. (*Build., Civ. Eng.*). Abbrev. for *excavate surface trenches and cart away.*

exacerba'tion, eks-as— (*Med.*). An increase in the severity of a disease, or of its manifestations.

exalbu'minous (*Bot.*). Lacking endosperm; exendospermous.

exaltation (*Chem.*). The abnormal increase in the molecular refractivity of a compound produced by the presence of conjugated double bonds ($>C=CH-CH=C<$).

examiner (*Mining*). See **fireman (2).**

exan'nulate (*Bot.*). Said of a fern sporangium which has no annulus.

exanthe'ma, exan'them (*Med.*). An eruption on the surface of the body.

exanthema, coital (*Vet.*). A vesicular eruption on the external genital organs of cattle and horses, rarely of sheep and swine; transmitted through coitus.

exanthema, infectious (*Vet.*). See **pox.**

exanthema, vesicular (*Vet.*). See **exanthema (coital),** also **foot-and-mouth disease.**

exanthe'mata (*Med.*). *Pl.* of *exanthema.* The term is used of infectious diseases characterised by an exanthem.

exanthemat'ic fever (*Vet.*). An infectious disease of dogs due to a protozoan *Hepatozoan canis*, which is transmitted by the 'brown' tick *Rhipicephalus appendiculatus.*

exar'ate (*Zool.*). Said of pupae in which the wings and legs are free, and which are therefore capable of a limited degree of movement.

exarch, eks'ark (*Bot.*). Said of a xylem strand having the protoxylem on the edge remote from the centre of the axis.

exasperate (*Bot.*). Having the surface rough, with hard short points projecting from it.

ex'calated (*Zool.*). In metameric animals, said of somites which are represented in the embryo, but which atrophy and disappear, leaving no trace in the adult.

excavation (*Civ. Eng.*). The operation of digging material out from the solid mass and depositing it elsewhere.

excavation (*Med.*). The process of hollowing out: a part hollowed out.

excavator (*Civ. Eng.*). A power-driven machine for digging away or excavating earth. See **dredger excavator, grabbing crane, power drag line, power shovel** (or **navvy**).

exceeding (*Bot.*). Projecting beyond a neighbouring member.

excentric (*Bot.*). (1) See **eccentric.**—(2) Said of a pileus in which the stipe is not inserted in the centre.

excess pressure (*Acous.*). See **sound pressure.**

excess voltage (*Elec. Eng.*). See under **overvoltage protective device.**

exchange (*Teleph.*). The location of all apparatus and operators for interconnecting the various lines from subscribers and other exchanges.

See **automatic telephone—**
discriminating satellite—
private automatic branch—
private branch—
radio—
satellite—
toll—
trunk—

exchange area (*Teleph.*). The area covering the subscribers connected to a local exchange.

exchange hold (*Teleph.*). The retention of the connexion to the exchange, without the facility of conversation from a main telephone, while the latter can converse with an extension telephone.

exchange line (*Teleph.*). A line from a subscriber to his local exchange.

excip'ient (*Med.*). The inert ingredient in a medicine which takes up and holds together the other ingredients.

ex'ciple, excip'ulum (*Bot.*). The outer layer of the wall of an apothecium or of a perithecium, especially when it is well developed and distinct.

excipu'liform (*Bot.*). Cup-shaped.

excision (*Surg.*). The action of cutting a part out or off: the surgical removal of a part.

excitable tissue (*Zool.*). Tissue which responds to stimulation by activity.

excitant (*Elec. Eng.*). A term occasionally used to denote the electrolyte in a primary cell.

excitation (*Bot.*). The action of a stimulus on a plant or a plant organ.

excitation (*Elec. Eng.*). The magnetomotive force producing the flux in the field system of an electric machine or in an electromagnet.

excitation (*Zool.*). The setting of a metabolic process into activity or acceleration; cf. *inhibition.*—*adj.* **exci'tatory.**

excitation loss (*Elec. Eng.*). The ohmic loss (I^2R) in the field or exciting windings of an electric machine excited by direct current.

excitatory cells (*Zool.*). Motor nerve-cells of the autonomic nervous system.

exciter (*Elec. Eng.*). A small machine for producing the current, usually d.c., necessary for supplying the exciting winding of a larger machine. It is frequently mounted on the shaft of the machine which it is exciting. See **a.c. exciter.**

exciter (*Radio*). The original source of high-frequency oscillations in an independent drive transmitter, comprising the master oscillator and its immediately subsequent amplifying stages. Also called DRIVER UNIT. *

exciter field rheostat (*Elec. Eng*). A rheostat in the field of an exciter whereby the voltage of the exciter, and therefore the excitation on the main machine, can be controlled.

exciter lamp (*Cinema.*). The electric lamp for providing the light to be modulated for recording sound photographically on a sound-track, or the light-source for modulation by the sound-track in the sound-head of a projector.

exciter set (*Elec. Eng.*). An assembly of one or more exciters with a prime-mover or electric driving motor.

exciting circuit (*Elec. Eng.*). The complete circuit through which flows the current for exciting an electric machine. It comprises the exciter, the windings of the main machine, and possibly a field rheostat and measuring instruments.

exciting coil (*Elec. Eng.*). A coil on a field magnet, or any other electromagnet, which carries the current for producing the magnetic field.

exciting winding (*Elec. Eng*). The winding which produces the m.m.f. to set up the flux in an electric machine or other apparatus

exci'tor (*Zool.*). Stimulating into activity, as a motor nerve or neurone.

exclusive species (*Bot.*). A species which is confined to a definite plant community.

ex-conjugant (*Zool.*). An animal which has regained its independence after conjugation.

excoria'tion (*Med.*). Superficial loss of skin.

excres'cence (*Med.*). Any abnormal outgrowth of tissue.

excre'ta (*Zool.*). Poisonous or waste substances eliminated from a cell, tissue, or organism.—*adjs.* **excrete, excreted.**—*n.* **excretion.**

excreting cell (*Bot*). A cell in which the secretion is exuded from the cell.

excurrent (*Bot.*). Said of a vein which runs out beyond the lamina of the leaf.

excurrent (*Zool*). Carrying an outgoing current; said of ducts, and, in certain *Porifera*, of canals leading from the apopyles of the flagellated chambers to the exterior or to the paragaster.

exei'resis, exer'esis (*Surg.*). Operative evulsion of a part, especially of a nerve.

exen'dosper'mous (*Bot*). Said of a seed lacking endosperm: exalbuminous.

exentera'tion (*Surg.*). Disembowelment: complete removal of the contents of a cavity.

exer'esis (*Surg.*). See **exeiresis.**

exflagella'tion (*Zool.*). The formation of microgametes, in some *Haemosporidia*.

exfoliation. The process of falling away in flakes, layers, or scales, as (*Bot.*) some bark.—(*Geol.*) The splitting off of thin folia or sheets of rock from surfaces exposed to the atmosphere, particularly in regions of wide temperature variation. It is one of the processes involved in spheroidal weathering.

exha'lant (*Zool*). Emitting or carrying outwards a gas or fluid; as the *exhalant siphon* in some *Mollusca*.

exhaust (*Eng.*). (1) The working fluid discharged from an engine cylinder after expansion.—(2) That period of the cycle occupied by the discharge of the used fluid.

exhaust fan (*Eng.*). A fan used in artificial draught systems; placed in the smoke uptake of a boiler to draw air through the furnace and exhaust the flue gases.

exhaust gas (*Eng.*). The gaseous exhaust products of an internal-combustion engine, containing in general CO_2, CO, O_2, N_2, and water-vapour.

exhaust gas analyser (*I.C. Engs.*). An instrument which records continuously the mixture strength supplied to a petrol engine by automatic electrical measurement of the thermal conductivity of the exhaust gas. See also **CO_2 recorder, Orsat apparatus.**

exhaust lap (*Eng.*). (Of a slide-valve) the distance moved by the valve from mid-position on the port face, before uncovering the steam port to exhaust; sometimes called INSIDE LAP.

exhaust line (*Eng.*). The lower line of the enclosed area of an indicator diagram, showing the back pressure on the piston during the exhaust stroke of a steam engine.

exhaust pipe (*Eng.*). The pipe through which the exhaust products of an engine are discharged.

exhaust port (*Eng.*). In an engine cylinder, the port or opening through which a valve allows egress of the exhaust steam or gas.

exhaust shaft (*Build.*). A ventilating passage used to convey vitiated air away from rooms.

exhaust silencer (*Automobiles, etc.*). An expansion chamber fitted in the exhaust pipe of an internal-combustion engine, which reduces the noise level of the exhaust by drilled baffles or other means.

exhaust steam (*Eng.*). See **live steam.**

exhaust stroke (*Eng.*). In a reciprocating engine, the piston stroke during which the expanded working substance, steam or exhaust gas, is ejected from the cylinder; sometimes called the SCAVENGING STROKE.

exhauster, gas (*Eng.*). See **gas exhauster.**

exhausting fan (*Eng.*). A fan used to exhaust foul air, fumes, etc. from a workshop or mine. See **fan, induced draught fan.**

exhaustive methylation (*Chem.*). The process of converting bases into their quaternary ammonium salts and subsequent distillation with alkalis, resulting in the formation of simpler unsaturated compounds which can be reduced to known saturated compounds. This method is used for testing the stability of ring compounds and is of particular value for investigating the constitution of alkaloids and other complicated ring systems.

exhibit (*Med.*). To give as a remedy.

exhibitionism (*Psycho-path.*). The act of displaying parts of the body, normally clothed, in public, accompanied by sexual gratification; often unconscious.

exindu'siate (*Bot.*). Having no indusium.

ex'ine (*Bot.*). The outermost layer of the wall of a pollen grain or of the spore of a moss.

exin'guinal (*Zool*). In *Arachnida*, the second joint of a walking leg: in land Vertebrates, outside the groin.

exit papilla, exit tube (*Bot.*). A short, or a longer, outgrowth from a zoosporangium, through which the zoospores escape into the surrounding water.

exit pupil (*Light*). An imaginary aperture for a telescope or microscope, limiting the emergent beam of light where its cross-sectional area is least. It is usually the image of the objective formed by the eyepiece, and is at the position which should be occupied by the eye of the observer.

exites, eks'its (*Zool.*). In some *Arthropoda*, lobes on the outer side of a limb: especially, in *Crustacea*, lobes on the outer side of a phyllopodium.

Exmet (*Build.*). A proprietary expanded metal specially suitable for reinforcing brickwork, concrete-block work, etc.; manufactured from 24, 22, and 20 gauge mild steel.

exo- (Greek *exo*, without). A prefix used in the construction of compound terms; e.g. *exocardiac* (q.v.).

exocar'diac (*Zool.*). Outside the heart.

ex'ocarp (*Bot.*). See **epicarp.**

exoccipital, —ok-sip'— (*Zool.*). A paired lateral cartilage bone of the Vertebrate skull, forming the side-wall of the brain-case posteriorly.

exocho'mophyte (*Bot.*). A plant which forms a dense mat, and occurs on rocky ledges bearing much detritus.

exocoelar, —sē'lar (*Zool.*). See **somatopleural.**

ex'ocoele, —sēl (*Zool.*). In *Zoantharia*, the portion of coelenteron between each pair of mesenteries. Cf. *endocoele.*

exocoelom, —sē'lom (*Zool.*). The extra-embryonic coelom of a developing Bird, Reptile, or Selachian.

ex'ocone (*Zool.*). (In *Insecta*) said of compound eyes in which the crystalline cone is replaced by a conical ingrowth from the cornea.

ex'ocrine (*Zool.*). Said of glands the secretion of which is poured into some cavity of the body, or on to the external surface of the body by ducts. Cf. *endocrine.*

ex'oderm (*Zool.*). In *Porifera*, the outer or dermal cell layer.

exoder'mis (*Bot.*). A more or less cuticularised layer formed from the outer cells of the cortex of a root, and constituting a temporary protective sheath.

exodon'tia. See under **dentistry.**

ex'ogam'ete (*Zool.*). A gamete which unites with one from another parent.

ex'ogam'y *or* —og'am-i (*Bot., Zool.*). Union between gametes which are not closely related: the mating or conjugation of organisms having different parental stock Cf. *endogamy.*

exogas'tric (*Zool.*). Said of spirally coiled shells in which the coil is directed on to the anterior face of the animal. Cf. *endogastric.*

exogas'trula (*Zool.*). An abnormal echinoid larva, induced artificially, having an evaginated archenteron.

ex'ogen'ous *or* —oj'en-us (*Bot.*). (1) Produced on the outside of another plant member.—(2) Developed from superficial tissues.—(3) Increasing in thickness by the addition of new layers on the outside.

exogenous (*Zool.*). (In *Sporozoa*) said of forms in which sporulation is effected after the cyst has left the host; (in higher animals) said of metabolism which leads to the production of energy for activity. Cf. *endogenous.*

exogenous spore (*Bot.*). A spore formed on the end of a hypha, not inside a sporangium.

exogenous thallus (*Bot.*). The thallus of a lichen in which the fungus predominates.

ex'ogy'nous (*Bot.*). Having the style projecting beyond the corolla.

exomph'alos (*Med.*). A hernia formed by the protrusion of abdominal contents into the umbilicus.

ex'operid'ium (*Bot.*). The outer layer of the peridium.

exopho'ria (*Med.*). Latent external squint revealed in an apparently normal person by passing a screen before the eye.

exophthal'mic goitre (*Med.*). See **Basedow's disease.**

exophthal'mos, exophthal'mus (*Med.*). Protrusion of the eyeball, often associated with goitre.

ex'oplasm (*Zool.*). See **ectoplasm.**

exop'odite (*Zool.*). The outer ramus of a biramous arthropod appendage.

Ex'opterygo'ta (*Zool.*). A subclass of *Insecta* in which wings occur, although sometimes secondarily lost; the change from young form to adult is gradual, the wings developing externally; the young form is usually a generalised nymph.

exoscop'ic embryology (*Bot.*). The condition when the apex of the embryo is turned towards the neck of the archegonium.

exoskel'eton (*Zool.*). Hard supporting or protective structures that are external to and secreted by the ectoderm—e.g. in Vertebrates, scales, scutes, nails, and feathers; in Invertebrates, the carapace, sclerites, etc.

exosmo'sis (*Chem.*). The process of *osmosis* (q.v.) in an outward direction.

ex'ospore (*Bot.*). (1) The outer layer of the wall of a spore.—(2) A sheath of epiplasm which forms round a young ascospore and plays a part in the formation of the spore wall.—(3) A wall formed around some oospores from periplasm.

exospo'rous (*Bot.*). Having exogenous spores.

exosto'sis (*Med.*). A bony tumour growing outwards from a bone.

exothe'cal (*Zool.*). See **extrathecal.**

exothe'cium (*Bot.*). The outer layer in the wall of a moss capsule, and of the microsporangium in Gymnosperms.

exother'mic (*Chem.*). Accompanied by the evolution of heat.

exothermic compound (*Chem.*). A compound whose formation is exothermic; it is therefore relatively stable.

exot'ic (*Zool.*). Ecdemic.

exotox'in (*Bacteriol.*). The toxin produced by a bacterium or micro-organism in the medium in which it grows.

ex'otype (*Zool.*). A category of individuals dependent on the recognition that a given form is non-heritable

Expamet (*Build., Civ. Eng.*). A proprietary expanded metal obtainable in steel, brass, copper, etc.

expanded (*Bot.*). Flattening out and becoming less concave as development proceeds.

expanded concrete (*Build.*). See **light-weight concrete.**

expanded metal (*Build., Civ. Eng.*). A metal network formed by suitably stamping or cutting sheet-metal and stretching it to form open meshes. It is used as a reinforcing medium in concrete construction, as lathing for plasterwork, and for various other purposes. Cf. *B.R.C. fabric.*

expander (*Elec. Eng.*). An inert material, such as carbon or barium sulphate, added to the active material in accumulator plates in order to prevent shrinkage of the mixture.

expanding bit (*Carp., etc.*). A boring-bit carrying a cutter on a radial arm, the position of the cutter being adjustable so that holes of different sizes may be cut.

expanding mandrel (*Eng.*). See under **mandrel** (1).

expanding metals (*Met.*). Alloys of bismuth, which expand on cooling and solidifying; e.g. 2 parts antimony to 1 part bismuth.

expanding plug (*San. Eng.*). A *bag plug* (q.v.).

expanding reamer (*Eng.*). A *reamer* (q.v.) partially slit longitudinally, and capable of slight adjustment in diameter by a coned internal plug.

expandor (*Elec. Comm.*). The amplifying apparatus for automatically increasing the contrast in speech modulation, particularly after reception of speech which has had its contrast compressed by a *compressor* (q.v.).

expansion. Increase in one or more of the dimensions of a body, caused usually by a rise of temperature or a decrease of pressure.

expansion (*Eng.*). (1) The increase in the volume of working fluid in an engine cylinder.—(2) The piston stroke during which such expansion occurs.

expansion, adiabatic (*Heat*). See **adiabatic change.**

expansion circuit-breaker (*Elec. Eng.*). A circuit-breaker in which arc extinction takes place as a result of the rapid cooling produced by the expansion of steam or of gases; these result from the arc which arises between the contacts in water or in a small quantity of oil.

expansion, coefficient of (*Heat*). The fractional expansion (that is, the expansion of unit length, area, or volume) per degree rise of temperature. Calling the coefficients of linear, superficial, and cubical expansion of a substance α, β, and γ respectively, β is approximately twice and γ three times α.

expansion curve (or line) (*Eng.*). The line on an indicator diagram which shows the pressure of the working fluid during the expansion stroke.

expansion engine (*Eng.*). An engine which utilises the working fluid expansively.

expansion gear (*Eng.*). That part of a steam-engine valve gear through which the degree of expansion can be varied.

expansion joint (*Civ. Eng., Rail.*). A joint arranged between two parts to allow these parts to expand with temperature rise, without distorting laterally; e.g. the gap left between successive lengths of rail, or the joint made between successive sections of carriageway in road construction.—(*Eng.*) A special pipe joint used in long pipe-lines to allow for expansion; e.g. a horseshoe bend, a corrugated pipe acting as a bellows, a sliding socket joint with a stuffing box.

expansion line (*Eng.*). See **expansion curve.**

expansion pipe (*Build.*). In a domestic system of heating, a pipe carried up from the hot-water tank to a point above the level of the cold-water tank, where its open end is bent over, so that, if the water boils, it may discharge into the latter tank any water or steam forced out.

expansion rollers (*Eng.*). Rollers on which one end of a large girder or bridge is often carried, to allow of movement resulting from expansion; the other end of the girder, etc. is fixed.

expansion tank (*Build.*). In a hot-water system, the tank connected to, and above, the hot-water cylinder to allow of expansion of the water on heating; often the cold-water feed tank is so used. See **expansion pipe.**

expansion valve (*Eng.*). An auxiliary valve working on the back of the main slide-valve of some steam-engines, in order to provide an independent control of the point of cut-off.

expansive working (*Eng.*). The use of a working fluid expansively in an engine; an essential feature of every efficient working cycle.

expe'dor phase advancer (*Elec. Eng.*). A phase advancer which injects into the secondary circuit of an induction motor an e.m.f. which is a function of the secondary current. Cf. ***susceptor phase advancer.***

experimental embryology (*Zool.*). The experimental study of the physiology and mechanics of development.

experimental mean pitch (*Aero.*). The distance of travel of an airscrew along its own axis, while making one complete revolution, assuming the condition of its giving no thrust.

expiration (*Zool., etc.*). The expulsion of air or water from the respiratory organs.

ex'planate (*Bot.*). Spread out on a surface.

explantation (*Zool.*). In experimental zoology, the culture, in an artificial medium, of a part or organ removed from a living individual: tissue-culture; cf. *interplantation.*—*n.* **explant.**

ex'pletive (*Masonry*). A stone used as a filling for a cavity.

exploder (*Mining*). An appliance for firing electrically the explosives used in mining and shaft sinking.

exploitation (*Mining*). The operations involved in winning or obtaining ore from a mine.

exploring brush (*Elec. Eng.*). A small brush fitted to a d.c. machine for experimental purposes; it can be moved round the commutator to investigate the distribution of potential around it.

exploring coil (*Elec. Eng.*). A small coil used for measuring the flux in a magnetic field. Also called a SEARCH COIL.

explosion (*Chem.*). A rapid increase of pressure in a confined space. Explosions are generally caused by the occurrence of exothermic chemical reactions in which gases are produced in relatively large amount.

explosion engine (*Eng.*). An obsolete term for *internal-combustion engine.*

explosion-proof or **flame-proof** (*Elec. Eng.*). Said of electrical apparatus so designed that an explosion of inflammable gas inside the enclosure will not ignite inflammable gas outside. Such apparatus is used in mines or other places having an explosive atmosphere.

explosion pot (*Elec. Eng.*). A strong metal container surrounding the contacts of an oil circuit-breaker; the high pressure set up inside the pot when an arc occurs assists in the extinction of the arc.

explosive. A generic term which embraces all materials that can be either exploded or detonated. See **high explosive, detonator.**—(*Mining*) There are two main classes—'permitted' and 'non-permitted,' i.e. those which are safe for use in coal-mines and those which are not. Ammonium nitrate mixtures are mostly used in coal-mines; nitro-glycerine derivatives in metal-mines. Detonators and fuses are also included under the Coal Mines Acts.

exponential baffle (*Acous.*). A baffle approximating to a short section of an exponential horn.

exponential horn (*Acous.*). A horn for coupling a diaphragm with the outer air, arranged so that the area progressively increases as an exponential function of the distance of the area from the throat.

exposure (*Meteor.*). The method by which an instrument is exposed to the elements. The exposure in meteorological stations is standardised in order that records from different stations may be comparable.

exposure (*Photog.*). The act and duration of permitting light to fall from an object on to a photographically sensitive emulsion. The exposure is determined by the time, the stop, and the brightness of the object, and is measured in candle-metre-seconds. See also **double exposure.**

exposure meter (*Photog.*). An indicating meter which is operated by the illumination falling on its light-sensitive element, thereby giving information which determines the photographic exposure to be given to an emulsion under the prevailing conditions.

expulsion fuse (*Elec. Eng.*). An enclosed fuse-link in which the arc occurring when the link melts is extinguished by the lengthening of the break due to expulsion of part of the fusible material through a vent in the container.

expulsion gap (*Elec. Eng.*). A special form of expulsion fuse connected in series with a gap and placed across insulator strings on an overhead transmission line; a voltage surge breaks down the gap and the resulting arc is quickly broken by the fuse, so that no interruption to the supply need take place.

exscu'tellate (*Zool.*). Without a scutellum.

exser'ted. Stretched out; protruded.—(*Bot.*) Said of stamens which project beyond the corolla of a flower.

exsicca'tion (*Geog.*). The draining away of water of precipitation as a result of human activity; e.g. the cutting down (in Africa and elsewhere) of forests, the debris of which retain moisture, the draining of swampy ground, such as the Fens, and the continued ploughing of lands unprotected from winds, which consequently blow the topsoil away and turn the area into a desert. See **desiccation.**

exstip'ulate (*Bot.*). Without stipules.

ex'strophy, ex'trophy (*Med*). A turning inside out of a hollow organ (especially the bladder).

extender (*Paint.*). A substance, generally an inert material, which is added to paint to give it extra body, key, opacity, or to serve as an adulterating medium.

extension (*Acous.*). The use of one long rank of pipes in an organ for a number of stops of the same class but of different pitches. The extension principle economises in pipes, but volume is lost on thick chords because one pipe can be blown once only.

extension (*Photog.*). The facility for varying the distance between the lens and the photosensitive surface and for bringing the image into focus on the surface, for which purpose fine adjustments are provided in most cameras.

extension coefficient (*Elec. Eng.*). A coefficient applied to the length of the air gap of an electric machine in order to allow for the effect of the teeth when calculating the m.m.f. required for the magnetic circuit. It is greater than unity and therefore increases the effective gap length. Cf. *contraction coefficient.*

extension telephone (*Teleph.*). A telephone which is connected in parallel with a main telephone, or to a subscriber's switchboard.

extensom'eter (*Met.*). An instrument used, in the testing of metals, for measuring small values of strain.

exten'sor (*Zool.*). A muscle which by its contraction straightens a limb, or a part of the body. Cf. *flexor.*

external characteristic (*Elec. Eng.*). A curve showing the relation between the terminal voltage of an electric generator and the current delivered by it.

external circuit (*Elec. Eng.*). The circuit to which current is supplied from a generator, battery, or other source of electrical energy.

external compensation (*Chem.*). Neutralisation of optical activity by the mixture or loose molecular combination of equal quantities of two enantiomorphous molecules.

external conductor (*Elec. Eng.*). The outer earthed conductor of an earthed concentric wiring system.

external digestion (*Zool.*). A method of feeding, adopted by some *Coelenterata, Turbellaria, Oligochaeta, Insecta,* and *Araneida,* in which digestive juices are poured on to food outside the body and imbibed when they have dissolved some or all of the food.

external firing (*Eng.*). The practice of heating a boiler or pan by a furnace outside the shell; all modern boilers have internal furnaces and flues.

external hazard (*Build.*). A fire risk in connexion with a building, arising from adjacent buildings.

external indicator (*Chem.*). An indicator to which are added drops of the solution in which the main reaction is taking place, away from the bulk of the solution.

external screw-thread (*Eng.*). A screw-thread cut on the outside of a cylindrical bar. Also called a MALE THREAD.

external secretion (*Zool.*). A secretion which is discharged to the exterior, or to some cavity of the body communicating with the exterior. Cf. *internal secretion.*

ex'terocep'tor (*Zool.*). A sensory nerve-ending, receiving impressions from outside the body. Cf. *interoceptor.*

extinction coefficient (*Chem.*). A measure of the absorption of light by a dissolved substance. It is given by the formula $\varepsilon = \frac{I}{cd} \cdot \log \frac{I_0}{I}$, where I_0 and I are the intensities of the incident and transmitted light respectively, in a solution d cms. thick of molar concentration c.

extinction meter (*Photog.*). An exposure meter in which the reading is found by attenuating the light from the object until an image superimposed on it just becomes indistinguishable.

ex'tine (*Bot.*). The outer wall-layers of a pollen grain.

extra-, extr- (Latin *extra,* outside). A prefix used in the construction of compound terms; e.g. *extranuclear,* outside the nucleus.

extra (*Cinema.*). In motion-picture production, an artist who is engaged by the day for small parts or crowd scenes.

extra (*Typog.*). A charge on work extra to the estimated price. Author's corrections in excess of a certain allowance come under this head.

extras (*Build., Civ. Eng.*). All works the inclusion of which is not expressed or implied in the original contract price. Also called VARIATIONS.

extra-heavy (*Plumb.*). Said of pipe which is of greater thickness than the standard pipe.

extra-high voltages (*Elec. Eng.*). A term used in official regulations for voltages above 3·3 kV; but more commonly employed to denote voltages of the order of 100 kV or more.

extra material (*Weaving*). The name indicating extra threads, warp or weft, for producing a figured effect on a fabric.

extra thirds (*Paper*). A standard size of cut card, 1⅞ × 3 in.

extra-axillary (*Bot.*). Said of a bud which is formed elsewhere than in an axil.

extracellular digestion (*Bot.*). The digestion of material by enzymes secreted from the cell and acting outside it.

ex'tracolumel'la (*Zool.*). The distal element of the auditory ossicles of all land Vertebrates except *Gymniophiona, Urodela,* and *Mammalia.*

extract (*Woollen*). A material made from rags composed of cotton and wool from which the former has been extracted by a chemical process.

extract ventilator (*Build.*). A cowl-like appliance fitted to the top of a ventilating shaft in a building, in order to induce in it an up-draught.

extraction (*Chem.*). A process for dissolving certain constituents of a mixture by means of a liquid with solvent properties for one of the components only. Substances can be extracted from solids, e.g. grease from fabrics with petrol; or from liquids, e.g. extraction of an aqueous solution with ether, the efficiency of which is governed by the partition coefficient of the particular substance between the two solvents.

extraction (*Met.*). The processes used in obtaining metals from their ores. They usually involve decomposition of a compound containing the metal, and the separation of this from the gangue minerals. See **refining, smelting.**

extraction turbine (*Eng.*). A steam-turbine from which steam for process work is tapped at a suitable stage in the expansion, the remainder expanding down to condenser pressure.

extra'dos (*Build., Civ. Eng.*). The back or top surface of an arch. See **intrados.**

extradu'ral (*Anat.*). Situated outside the dura mater.

extra-embryonic (*Zool.*). (In embryos developed from eggs containing a great deal of yolk, as those of Birds) pertaining to that part of the germinal area beyond the limits of the embryo.

extra-floral (or extra-nuptial) nectary (*Bot.*). A nectary occurring on or in some part of a plant other than a flower.

extra-galactic nebula (*Astron.*). A *nebula* (q.v.) external to the Galaxy.

extramat'rical (*Bot.*). Said of a fungus which has the greater part of its thallus, and especially the reproductive organs, outside the host cell, or on the surface of the substratum.

extra-nuptial nectary (*Bot.*). See **extra-floral nectary.**

extrasys'tole (*Med.*). A premature contraction of the heart interrupting the normal rhythm, the origin of the impulse to contraction being abnormally situated.

extrathe'cal (*Zool.*). (In Corals) outside the theca.

extra-uterine (*Anat.*). Situated or happening outside the uterus.

extravasa'tion (*Med.*, *Zool.*). The abnormal escape of fluids, as blood or lymph, from the vessels which contain them.—*v.* **extrav'asate.**

extravas'cular (*Anat.*). Placed or happening outside a blood-vessel.

ex'travert (*Psychol.*). An individual preoccupied mainly with external things and events; well adapted to the outside world and to other people. Examples are the soldier, business man, actor, etc. Cf. *introvert.*

extrin'sic (*Zool.*) Said of appendicular muscles of Vertebrates which run from the trunk to the girdle, or the base of the limb. Cf. *intrinsic.*

ex'trophy (*Med.*). See **exstrophy.**

extrorse' (*Bot.*). (1) Said of the manner of dehiscence when an anther opens towards the periphery of the flower.—(2) Turned so as to face away from the centre of the axis.

extrorse (*Zool.*). Directed or bent outwards.

ex'trovate (*Zool.*). The substance which flows out of a punctured cell.

extroversion (*Med.*). (1) See **exstrophy.**—(2) The turning of interest to objects outside the person.

extrusion (*Met.*). The operation of producing rods, tubes, and various solid and hollow sections, by forcing hot metal through a suitable die by means of a ram. Applied to numerous non-ferrous metals, alloys, and other substances.

extrusive rocks (*Geol.*). Rocks formed by the consolidation of magma on the surface of the ground, as distinct from *intrusive rocks* which consolidate below ground. Commonly referred to as LAVA FLOWS; normally of fine grain or even glassy.

ex'udate (*Med.*). The fluid which has escaped from the blood-vessels into the tissues or the cavities of the body as a result of inflammation; it contains protein and many cells, and clots outside the body.

exudation (*Bot.*). The liberation of liquid water or sap from special pores in the plant.

exudation (*Med.*). The escape of fluid from the blood-vessels into the tissues, as a result of inflammation.

exudation cone (*Zool.*). A cone of clear protoplasm which, after fertilisation, protrudes from some types of ovum.

exudation pressure (*Bot.*). See **root pressure.**

exudation theory (*Zool.*). The theory that caste in *Isoptera* depends upon the exudations produced by the nymphs.

exumbrel'la (*Zool.*). The upper convex surface of a medusa.—*adj.* **exumbrellar.**

exu'viae (*Zool.*). The layers of the integument cast off in ecdysis.

exu'vial (*Zool.*). Pertaining to, or facilitating, ecdysis.

eye (*Build.*). (1) The circular opening in the top of a dome.—(2) A circular or oval window.

eye (*Eng.*). (1) A loop formed at the end of a steel wire or bolt. See **eye bolt.**—(2) The central inlet passage of the impeller of a centrifugal compressor or pump.

eye (*Glass*). The hole in the centre (or elsewhere) of the floor of a pot furnace up which the combustible gases rise as flame to heat the furnace.

eye (*Join.*). The circular centre of a volute scroll.

eye (*Meteor.*). The central calm area of a cyclone or hurricane, which advances as an integral part of the disturbed system.

eye (*Mining*). The mouth or entrance to a pit shaft.

eye (*San. Eng.*). A short branch off a drain-pipe, useful for inspection or clearing purposes.

eye (*Zool.*). The sense-organ which receives visual impressions.

eye-and-object correction (*Surv.*). A correction applied in precise work to the average angle of elevation read on the vertical circle, in order to compensate for the vertical axis of the theodolite not being truly vertical. The correction is

$$+\frac{\Sigma o-\Sigma e}{4}\cdot\theta,$$

where o=object-end reading of the altitude level; e=eye-end reading of the altitude level; θ=angular value of 1 division of the altitude level.

eye bolt (*Eng.*). A bolt carrying an eye instead of the normal head; fitted to heavy machines and other parts for lifting purposes.

eye-ground (*Anat.*). The fundus; that part of the cavity of the eyeball which can be seen through the pupil with an ophthalmoscope.

eyepiece (*Phys.*, *etc.*). In an optical instrument, the lens or lens system to which the observer applies his eye in using the instrument.

See **Huyghens— Ramsden— terrestrial—***

eye spot (*Bot.*, *Zool.*). A small mass of light-sensitive pigment found in some lower animals and plants.

eyed gneiss, īd nīs (*Geol.*). See **augen-gneiss.**

eyra, ā'ra (*Furs*). The dressed skin of a wild-cat of S. America, of brownish-grey colour. Also called JAGUARONDI.

Eyring formula, ī'ring (*Acous.*). A formula proposed for the period of reverberation of an enclosure, taking into account the time required for waves to travel between successive reflections.

Eytelwein's formula, ī'tel-vin (*Hyd.*). An expression giving the velocity of flow in a pipe as:

$$V=\sqrt{11704.m.i+0{\cdot}01698}-0{\cdot}1303,$$

where V=velocity in ft. per second; m=hydraulic mean depth in feet; i=virtual slope.

f (*Chem.*). A symbol for (1) activity coefficient, for molar concentration; (2) partition function.

f-number, f-system (*Photog.*). The measurement of lens aperture by reference to focal-length of the lens; e.g. *f*/2·8 means that the focal length is 2·8 times the diameter of the circular aperture determining the maximum area of the centre of the lens used by light passing through it.

F (*Biol.*). An abbrev. for *filial generation* in work on inheritance; usually distinguished by the addition of a number, thus: F_1, first filial generation; F_2, second filial generation, etc. Cf. *P*, P_1, P_2, etc.

F. (*Build.*). The abbrev. for *face* or *flat*.

F (*Chem.*). The symbol for *fluorine*.

F (*Chem.*). A symbol for *Faraday's constant*.

[F] (*Light*). A Fraunhofer line in the blue of the solar spectrum of wavelength 4861·527 A. It is the second line in the Balmer hydrogen series, known also as H_β.

F. (*Phys.*). The symbol used, following a temperature (e.g. 41° F.), to indicate the *Fahrenheit scale* (q.v.).

F-layer (*Radio*). The upper ionised layer in the ionosphere resulting from the ultra-violet radiation from the sun. At a regular height of 300 km. during the night, it falls to about 200 km. during the day. During some seasons, this remains as the F_1 layer while an extra F_2 layer rises to a maximum of 400 km. at noon. Considerable variations are possible during particle bombardment from the sun, the layer rising to great heights or vanishing. See **D-layer.**

fabel'la (*Zool.*). In Vertebrates, a small isolated bone situated in the angle of the knee.

fabric (*Build.*). A general term applied to the walls, floors, and roof of a building.

Fabry and Pérot interferometer, fab-ri, pā-rō (*Light*). An instrument in which circular interference fringes are produced by the passage of monochromatic light through a pair of plane, parallel, half-silvered glass plates, of which one is fixed while the other may be moved by an accurately calibrated screw. By observing the fringes while changing the plate separation by means of the screw, the wavelength of the light may be measured.

façade, fa-sahd' (*Build.*). The front elevation of a building.

face. The outer, upper, or more important surface of any object. For specific senses, see below.

face (*Bot.*). In general, the upper side of an organ when it has two well-marked sides.

face (*Build.*). (1) The front of a wall or building.—(2) The exposed vertical surface of an arch.

face (*Crystal.*). See **crystal face.**

face (*Eng.*). The working surface of any part; as the sole of a carpenter's plane, the striking surface of a hammer, the surface of a slide-valve, or the surface of the steam chest on which it slides, the seating surface of a valve, the flank of a gear-tooth, etc.

face (*Horol.*). The dial of a watch or clock.

face (*Masonry*). The exposed front surface of a building-stone or ashlar when it is built into a wall.

face (*Mining*). The exposed surface of coal or other mineral deposit in the working place where mining, winning, or getting is proceeding.

face (*Zool.*). In Mammals, the portion of the skull anterior to the junction of the presphenoid and the mesethmoid: the fleshy structures overlying this portion of the skull.—*adj.* **facial.**

face-airing (*Mining*). The operation of directing the air current along the face of a working place.

face-centred cubic structure (*Met.*). An arrangement of atoms in crystals which may be imitated by packing spheres and is characteristic of many metals. The atomic centres are disposed in space in such a way that they may be supposed to be situated at the corners and the middle of the faces of a set of cubic cells.

face chuck or **face plate** (*Eng.*). A large disc which may be screwed to the mandrel of a lathe and is provided with slots and holes for securing work of a flat or irregular shape.

face-hammer (*Tools*). A hammer having a peen which is flat rather than pointed or edged.

face joint (*Masonry*). A joint between adjacent stones which is visible on the face of the wall.

face lathe (*Eng.*). A lathe designed for work of large diameter but short length (e.g. large wheels or discs).

face left and **face right** (*Surv.*). Expressions referring to the pointing of a theodolite telescope when the vertical circle is respectively *left* and *right* of the telescope, as seen from the eyepiece end.

face mark (*Carp., Join.*). A distinguishing mark made on one face of a piece of wood to show that it was used as the basis for truing the other surfaces.

face mix (*Build.*). A mixture of cement and stone dust used for facing concrete blocks in imitation of real stone.

face mould (*Build.*). A templet used as a reference for shaping the face of wood, stone, etc.

face plate (*Eng.*). (1) See **face chuck.**—(2) A *surface plate* (q.v.).

faceplate breaker controller (*Elec. Eng.*). A faceplate controller having a separate contactor for breaking the circuit.

faceplate breaker starter (*Elec. Eng.*). A faceplate starter having a separate interlocked contactor for breaking the circuit.

faceplate controller (*Elec. Eng.*). See **faceplate starter.**

faceplate coupling (*Eng.*). See **flange coupling.**

faceplate starter (*Elec. Eng.*). An electric motor starter in which a contact lever moves over a number of contacts arranged upon a plane surface. Also called a FACEPLATE CONTROLLER.

face right (*Surv.*). See **face left.**

face side (*Carp., Join.*). The side of a piece of wood bearing the face mark.

face-wall (*Build.*). The front wall.

facel'lite (*Min.*). See **kaliophilite.**

facet, fas'et (*Arch.*). A *facette* (q.v.).

facet (*Zool.*). One of the corneal elements of a compound eye: a small articulatory surface.

facets (*Jewel.*). (1) The flat sides of a crystal.—(2) The flat surfaces of varying shapes and sizes cut on precious stones.

facette (*Arch.*). A projecting flat surface between adjacent flutes in a column. Also called a LISTEL.

facia, fash'i-a (*Arch.*). A flat banded projection from the face of a member.

fa'cial (*Zool.*). Pertaining to or situated on the face: the seventh cranial nerve of Vertebrates, supplying the facial muscles and tongue of higher forms, the neuromast organs of the head and snout in lower forms, and the palate in both.

facies, fā'sēz (*Bot.*). The general form and appearance of a plant.

facies (*Geol.*). The sum of the lithological and faunal characters of a sediment is its *facies*. Lithological facies involves composition, grain-size, texture, colour, as well as such mass characters as current bedding, nature of stratification, ripple-marks, etc. Similarly, metamorphic facies involves the degree of crystallisation and the mineral assemblage in a group of metamorphic rocks.

facing (*Civ. Eng., Masonry, etc.*). An outer covering applied to the exposed face of sea-walls, embankments, brick walls, etc.

facing (*Eng.*). (1) The operation of turning a flat face on a piece of work in the lathe.—(2) A raised machined surface to which another part is to be attached.

facing (*Mining*). A front cleat or face slip: situated opposite a back cleat. See **cleat.**

facing bar (*Textiles*). A strip of metal which forms a background to the fabric as it leaves the points in a lace machine. Also called WORK BAR.

facing bond (*Build.*). A general term for any bond consisting mainly of stretchers.

facing bricks (*Build.*). A class of brick used for ordinary facing work; of better quality and appearance than common bricks, but not made to withstand heavy loads, as are engineering bricks.

facing gauge (*Eng.*). An instrument for measuring the total head of a stream of fluid; it consists of a small tube which faces upstream in the pipe carrying the fluid and is attached to a manometer. See **Pitot tube.**

facing paviors (*Build.*). A name given to a class of hard-burnt bricks used as facing bricks in high-class work.

facing sand (*Foundry*). Moulding sand, containing a proportion of finely powdered coal dust, rammed round the faces of a pattern to give a smoother surface to the casting.

facio- (Latin *facies*, face). A prefix used in the construction of compound terms; e.g. *faciolingual*, pertaining to the face and tongue.

fa'cioplas'ty (*Surg.*). Plastic surgery of the face.

facsimile radio, fak-sim'il-e (*Radio*). The transmission of a still picture by means of a radio link.

facsimile telegraphy (*Teleg.*). The transmission of still pictures over telegraph circuits by scanning, modulating a carrier, and consequent reconstruction of the picture by synchronous scanning. A radio link may be included in the transmission circuit.

factable (*Build.*). A *coping* (q.v.).

fac'tice (*Rubber*). A substance produced by vulcanising vegetable oils with sulphur or sulphur chloride; originally used as a rubber substitute but now employed as a compounding ingredient in rubber manufacture; e.g. in the production of rubber-proofed fabrics.

factor (*Elec. Eng., Illum.*).

See **absorption—**
amplitude—
copper—
crest—
damping—
daylight—
decay—
demand—
diffuse reflection—
diffuse transmission—
diversity—
duty cycle—
form—
fusing—
impedance—
load—
luminosity—
operating—
peak—
plant load—
power—
reactive—
reduction—
reflection—
regular reflection—
regular transmission—
space—
spherical reduction—
spread—
transmission—
utilisation—
waste light—
winding—

factor, filter (*Photog.*). See **filter factor.**

factor of merit (*Elec. Eng.*). (Of reflecting galvanometers) the deflection, in millimetres, produced on a scale at a distance of one metre by a current of 1 micro-ampere, the deflection being corrected for coil-resistance and time of swing. Also called NORMAL SENSITIVITY.

factor of safety (*Build., Civ. Eng., etc.*). The ratio, allowed for in design, between the breaking load on a member or structure and the safe permissible load on it.

factor of the habitat (*Bot.*). Anything in the environment which affects, directly or indirectly, the life of a plant.

factor-symbols (*Zool.*). Letters in a genotypic formula which designate separate characters.

factorial development (*Photog.*). The time procedure of development, in which the time taken for the image to appear is multiplied by a factor, depending on the temperature and the type and dilution of the developer, to obtain the time after which the development is stopped.

factory-fitting (*Illum.*). An electric-light fitting in which the lamp is housed in a strong protecting glass globe. Also called a MILL-FITTING.

fac'ulae (*Astron.*). The name given to small bright patches seen on the surface of the sun, generally in the neighbourhood of sun spots, but also seen without the latter and believed to be independent phenomena.

fac'ultative (*Zool.*). Optional: able to live under different conditions, as a *facultative parasite* which can live either as a parasite or as a free-living form. Cf. *obligate*.

facultative anaerobe (*Bot.*). A plant which normally uses free oxygen but can live with little or none of it.

facultative gamete (*Bot.*). A zoospore which can function as a gamete.

facultative parasite (*Bot.*). A saprophyte which may become a parasite under special conditions.

facultative saprophyte (*Bot.*). A parasite which can live as a saprophyte under special conditions. Also HEMIPARASITE, HEMISAPROPHYTE.

fade (*Cinema.*). The gradual appearance or disappearance of an image during projection of a motion picture.

See **chemical—** **cross—**

fade-in (*Cinema.*). The operation of the iris of a cinematograph camera to obtain the gradual appearance of the image in the final projected motion-picture.

fade-out (*Cinema.*). The operation of slowly closing the iris of a cinematograph camera so as to effect the gradual disappearance of the image in the resulting positive print.

fader (*Cinema.*). In a cinematograph camera, the device for making fades; often operated automatically by the driving mechanism.

fader (*Elec. Comm.*). A potentiometer device or variable attenuator; used, in a communication channel, for varying the modulation level continuously from zero to maximum, or vice versa.

fading (*Photog.*). The diminution of contrast in a print after long exposure to light or from incomplete fixing or washing.

fading (*Radio*). The phenomenon represented by more or less periodic reductions in the strength of the field of a distant station; produced by variations in the nature of the atmospheric path followed by the waves.

fadom'eter (*Chem.*). An instrument used to determine the resistance of a dye or pigment to fading.

faeces, fē'sēz (*Zool.*). The indigestible residues remaining in the alimentary canal after digestion and absorption of food-materials.

faggot (*Civ. Eng.*). A bundle of brushwood. See **fascine.**

faggot or **fagot** (*Met.*). Made by forming a box with four long flat bars of wrought-iron and filling the interior with scrap and short lengths of bar.

faggoted (or **fagoted**) **iron** (*Met.*). Wrought-iron bar made by heating a faggot to welding heat and rolling down to a solid bar. If the process is repeated *double-faggoted iron* is obtained.

fag'opy'rism (*Vet*). Poisoning of white-skinned animals and birds which have eaten and become sensitised to a fluorescent substance in certain *Polygonaceae* (particularly buckwheat, *Fagopyrum esculentum*) and have been exposed to sunlight. Usually the poisoning is manifested as an inflammation of the unpigmented skin.

fagot, fagoted. See **faggot, faggoted.**

fahlerz, fah'lerts (*Min.*). The grey-copper ore *tetrahedrite* (q v.).

Fahrenheit scale, fah'ren-hit (*Heat*). The method of graduating a thermometer widely used in English-speaking countries. The lower and upper fixed points are marked respectively 32° F. and 212° F., the fundamental interval being therefore 180 degrees. To convert from the Fahrenheit scale to the Centigrade, subtract 32 and multiply by $\frac{5}{9}$.

F.A.I. (*San. Eng.*). Abbrev. for *fresh-air inlet*.

faïence, fă-yahngs (*Build.*). Glazed terra-cotta blocks used as facings for buildings.—(*Pot.*) Glazed earthenware of a superior kind. Also called FAYANCE, FAYENCE.

faikes or **fakes** (*Mining*). Shaly sandstone. See **blaes.**

fair cutting (*Build.*). The operation of cutting brickwork to the finished face of the work.

fair ends (*Masonry*). Projecting masonry ends requiring to be dressed to a finished surface.

fairing (*Aero.*). A covering to any aircraft structure, for the purpose of reducing it to the form having the least possible head resistance.

fairing (*Ship Constr.*). The process of ensuring that the lines of intersection of all planes with a true ship form are *fair*; the resulting lines are known as *quarter lines* (q.v.).

Fairlight Clay (*Geol.*). An impersistent clay band varying in thickness from nearly 400 ft. to nothing, occurring in E. Kent at the base of the Ashdown Sands in the Wealden Series of Lower Cretaceous age.

fairy ring (*Bot.*). A ring of strongly growing dark-green vegetation, often with a ring of dead plants inside it, the middle being occupied by vegetation more or less normal in appearance. The condition is caused by the spreading, in the soil, of a fungal mycelium which releases compounds of nitrogen at its active edge, and forms a dense mass of hypha just behind that edge. The nitrogenous compounds stimulate the growth of the higher plants, but behind this zone of stimulation the dense mycelium in the soil upsets water movements, so that the plants above it may die of drought. In autumn, the fruit bodies of the fungus may appear at the periphery of the ring.

fakes (*Mining*). See **faikes.**

faking (*Cinema.*). *Trick photography* (q.v.).

fal'ciform, fal'cate (*Bot., Zool.*). Flattened and curved like a sickle; sickle-shaped.

falciform ligament (*Zool.*). In higher Vertebrates, a peritoneal fold attaching the liver to the diaphragm.

falciform process (*Zool.*). In the eyes of many Fish, a muscular and highly vascular structure which enters the retinal cup at the chorioid fissure and extends across to the lens, where it expands into the campanula Halleri; it is believed to be a means of accommodation.

falciform young (*Zool.*). The sickle-shaped sporozoites of some *Eugregarinaria.*

Falco'nifor'mes (*Zool.*). An order of *Pelargomorphae* characterised by the possession of a powerful hooked beak, strong talons, and a desmognathous palate; rapacious carnivorous forms; birds of prey. Hawks, Eagles, Falcons, Kites, Buzzards, Vultures, Secretary-birds, and Harriers.

falcu'la (*Zool.*). A sharp curved claw.—*adj.* **falculate.**

Falk rail-joint (*Elec. Eng*). A joint for tramway rails, made by the cast-welding process.

fall (*Civ. Eng., etc*). The inclination of rivers, streams, ditches, drains, etc. quoted as a fall of so much in a given distance. See **cross fall*.**

fall (*Eng.*). A hoisting rope.

fall (*Mining*). (1) The collapse of the roof of a level or tunnel, or of a flat working place or stall: the collapse of the hanging wall of an inclined working place or stope.—(2) A mass of stone which has fallen from the roof, or sides of an underground roadway, or from the roof of a working place.—(3) To blast, wedge, or in any other way to break down coal from the face of a working place.

fall bar (*Join*). The part of a latch which pivots on a plate screwed to the inner face of a door, and drops into a hook on the frame.

fall-of-potential test (*Elec. Eng.*). A test for locating a fault in an insulated conductor; the voltage-drop along a known length of the conductor is compared with the voltage drop between one end of the conductor and the fault. Also called DROP TEST, CONDUCTIVITY TEST.

fall of the leaf (*Bot.*). The organised shedding of leaves by deciduous plants in autumn or as a dry season comes on. The plant is thereby rid of a large potential transpiring area, and is less likely to suffer from excessive loss of water during periods of physiological drought or of actual drought. Evergreen leaves fall when they become old.

fall pipe (*Build.*). A *downpipe* (q.v.).

fall-ridder (*Mining*). See **bordroom-man.**

fall table (*Mining*). A hinged shaft-cover.

fallen wool (*Textiles*). (1) Wool procured from sheep that have died.—(2) Fibres that have become detached from the fleece before shearing.

fallers (*Mining*). Movable supports for a cage or bond. See **keps.**

falling mould (*Join.*). The development in elevation of the centre line of a handrail.

falling starch (*Bot.*). See **statolith.**

falling stile (*Join.*). The shutting stile of a gate, especially of a gate so hung that the bottom of the shutting stile falls as the gate closes.

falling weight test (*Eng.*). See **drop test.**

Fallo'pian tube (*Zool.*). In Mammals, the anterior portion of the Müllerian duct; the oviduct.

false amethyst, etc. (*Min.*). In naming gemstones those engaged in the trade are guided by the colour of the gem rather than by its composition and physical characters. Thus, to them, all mauve stones are amethyst. Yet many minerals, when quite pure, are without colour; the addition of a minute amount of impurity of the right composition will impart to any of them a mauve tint. Unless the mauve stone is pure silica, it is incorrect to call it *amethyst*. For example, some specimens of corundum are mauve; these are known in the trade as *oriental amethyst* —one type of *false amethyst.*

false amnion (*Zool.*). See **chorion.**

false annual ring (*Bot.*). A second ring of xylem formed in one season, following the defoliation of the tree by the attacks of insects or other accident; oaks are liable to this, as they may be completely stripped of leaves by the oak tortrix.

false axis (*Bot.*). A monochasium which looks like one axis but really consists of a number of successive lateral branches running more or less in a line.

false bearing (*Build.*). A beam, such as a sill, when not supported under its entire length, is said to have a *false bearing*.

false bedding planes (*Geol.*). Minor planes of stratification inclined at an angle to the major bedding planes; due to changes in the direction and velocity of currents. Characteristic of sedimentation under deltaic and aeolian conditions.

false berry (*Bot.*). A fleshy fruit, looking like a berry, but with some of the flesh developed from the receptacle of the flower.

false bottom (*Eng.*) A removable bottom placed in a vessel to facilitate cleaning: a casting placed in a grate to raise the fire bars and reduce the size of the fire.

false ceiling (*Build.*). A lower dummy ceiling formed to provide covered accommodation for wires, conduits, etc.

false core (*Eng.*). See **drawback.**

false cow-pox (*Vet.*). See **impetigo (bovine).**

false diamond (*Min.*). Several natural minerals are sometimes completely colourless and, when cut and polished, make brilliant gems. These include zircon, white sapphire, and white topaz. All three, however, are birefringent and can be easily distinguished from true diamond by optical and other physical tests. See **false amethyst.**

false dichotomy (*Bot.*). Branching in which two lateral branches arise on opposite sides of the main stem and overtop it.

false dissepiment (*Bot.*). A wall which divides the loculus of an ovary into two compartments, but is an ingrowth from the carpel wall and not a wall between one carpel and its neighbour.

false ellipse (*Build.*). An approximate ellipse, composed of circular arcs.

false fruit (*Bot.*). A fruit formed from other parts of the flower in addition to the gynaeceum.

false galena (*Min.*). An obsolete term for *blende* (q.v.).

false germination (*Bot.*). An appearance of germination in a dead seed due to swelling of the embryo as it takes up water.

false gilding (*Jewel.*). Transparent yellow lacquer over bright silver or tinfoil.

false header (*Build.*). A half-length brick, sometimes used in Flemish bond.

false hybrid (*Bot.*). A plant developed after cross-fertilisation, but possessing characters from one parent only.

false key (*Eng.*). A circular key for attaching a hub to a shaft; it is driven into a hole which is parallel with the shaft axis and has been drilled half in the hub and half in the shaft.

false pile (*Civ. Eng.*). A length added to a pile which has been driven.

false ribs (*Zool.*). In higher Vertebrates, ribs which do not reach the sternum.

false roof (*Carp.*). The space between the roof-covering and the ceilings of the upper rooms.

false ruby (*Min.*). Some species of garnet (*Cape ruby*) and some species of spinel (*Balas ruby* and *ruby spinel*) possess the colour of ruby, but have neither the chemical composition nor the physical attributes of true ruby. See **false amethyst.**

false septum (*Bot.*). See **spurious dissepiment.**

false station (*Surv.*). A point at which a ranging rod is fixed when setting out the skeleton, but from which it is later removed to a more suitable point to mark a true station.

false tissue (*Bot.*). See **pseudoparenchyma.**

false topaz (*Min.*). A trade name applied to yellow quartz. See **citrine.**

falsework (*Civ. Eng.*). The temporary work known as *centring* (q.v.)—scaffolding, or other supports used in construction.

false zero test (*Elec. Eng.*). A test, made on a bridge or potentiometer, in which a balance is obtained, not with zero galvanometer reading, but with some definite value caused by a constant extraneous current.

falx (*Zool.*). Any sickle-shaped structure.—*adjs.* **falciform, falcate.**

falx cerebri (*Zool.*). A strong fold of the dura mater, lying in the longitudinal fissure between the two cerebral hemispheres.

famat'inite (*Min.*). An orthorhombic sulphide of copper and antimony, Cu_3SbS_4, occurring in the Famatina Mts. (Argentina) and in Peru.

family (*Biol.*). A group of individuals within an order or suborder.

fan (*Eng.*). (1) A device for delivering or exhausting large volumes of air or gas with but a low pressure increase. It consists either of a rotating paddle-wheel or an airscrew. See **propeller fan, centrifugal fan.**—(2) A small vane to keep the wheel of a wind pump at right-angles to the wind.

fan (*Horol.*). A wheel whose velocity is regulated by air resistance; used in some clocks

fan (*San. Eng.*). A metal plate serving to spread the flush in a W C pan.

fan (*Soap*). A paddle used in soap-boiling kettles.

fan (*Zool.*). Any fan-shaped structure, as the tail feathers of a Bird, and certain types of coelenterate colony (e.g. *Gorgonia*).

fan antenna (*Radio*). An antenna in which a number of vertically inclined wires are arranged in a fanwise formation, the apex being at the lowest point.

fan cooling (*Automobiles*). The use of an engine-driven fan to induce a greater air-flow through the radiator at low speeds than would result from the forward motion of the vehicle.

fan drift (*Mining*). The passage or duct for the intake of a ventilating fan on a mine.

fan-guard (*Build.*). A protective parapet formed of boarding secured around the platforms of builders' stagings or gantries, when the platforms are to be used for receiving and distributing materials.

fanlight (*Join.*). A glazed sash, often semicircular, located above a door.

fan shaft (*Mining*). The shaft or pit on a mine at the top of which a ventilating fan is placed, not the shaft of the fan impeller.

fan structure (*Geol.*). A complicated arrangement of folds in which the axial planes converge like the ribs of a fan; the normal arrangement of folds in an anticlinorium.

fantail burner (*Eng.*). A pulverised-coal burner which discharges the fuel and primary air vertically downwards into the furnace in a thin flat stream, to meet heated secondary air which is discharged horizontally from the walls.

fancy (*Woollen*). One of the rollers of a carding machine which lifts the carded material on to the swift, to facilitate removal by the doffer.

fancy yarns (*Textiles*). Yarns made for decorative purposes. The ornamentation of the thread may be due to a variety of reasons, such as (*a*) colour; (*b*) the combination of threads of different types; (*c*) the production of thick and thin places; (*d*) the production of loops, slubs, knops, etc., at suitable intervals. The majority of these fancy yarns are *folded yarns*, two or more threads being combined in some special way in order to produce the desired effect. Special types of ring doubling machines are usually used for their production. The yarns are of many types, e.g. *bead, bouclé, bourette, chenille, cloud, crêpe, curl, diamond, flake, gimp, grandrelle, knickerbocker,* *knop*, *loop*, *marl*, *mottle*, *ondé*, *reany*, *slub*, and *spiral*.

fang (*Build.*). The part of an iron railing which is embedded in the wall.

fang (*Mining*). An air course along the side of an adit or shaft.

fang (*Zool.*). The grooved or perforate poison-tooth of a venomous serpent: one of the cuspidate teeth of carnivorous animals, especially the canine or carnassial.

fangs (*Mining*). See **keps.**

fang bolt (*Eng.*). A bolt having a nut which carries pointed teeth for gripping the wood through which the bolt passes, so preventing the nut from rotating when the bolt is tightened.

fanging (*Mining*). See **brattice.**

fanion (*Surv.*). A small *flag* (q.v.).

fanners (*Mining*). Hand-operated ventilating fans.

fant'asy (*Psychol.*). See **phantasy.**

far-end cross-talk (*Teleph.*). Cross-talk heard by a listener, and caused by a speaker at the distant end of the parallelism.

farad (*Elec. Eng.*). The practical unit of electrostatic capacitance, defined as that capacitance which, when charged to a potential of one volt, carries a charge of one coulomb. Equal to 10^9 electromagnetic units and 9×10^{11} electrostatic units. See **micro-farad.**

faraday (*Chem.*, *Elec.*). The quantity of electricity associated with one gram-equivalent of chemical change, i.e. 96,500 coulombs.

Faraday cage (*Elec. Eng.*). An earthed wire screen completely surrounding a piece of equipment in order to shield it from external electric fields.

Faraday effect (*Light*). The rotation of the plane of polarisation produced when plane-polarised light is passed through a substance in a magnetic field, the light travelling in a direction parallel to the lines of force. For a given substance, the rotation is proportional to the thickness traversed by the light and to the magnetic field strength. See **Verdet's constant.**

Faraday tube (*Elec. Eng.*). A tube of force in an electric field, of such magnitude that unit charge gives rise to one tube.

Faraday's constant (*Chem.*). See **faraday.**

Faraday's disc (*Elec. Eng.*). A disc used in elementary experiments on electromagnetism. It is made to rotate between the poles of a magnet and currents are induced in it.

Faraday's ice-pail experiment (*Elec. Eng.*). A classical experiment which consists in lowering a charged body into a metal pail connected to an electroscope, in order to show that charges reside only on the outside surface of conductors.

Faraday's law of induction (*Elec. Eng.*). A principle arising from Faraday's discovery of electromagnetic induction. It states that the induced e.m.f. in any circuit is proportional to the rate of change of the number of lines of force linked with the circuit.

Faraday's laws of electrolysis (*Chem.*). (1) The amount of chemical change produced by a current is proportional to the quantity of electricity passed.—(2) The amounts of different substances liberated or deposited by a given quantity of electricity are proportional to the chemical equivalent weights of those substances.

faradic currents (*Med.*). Currents obtained from an induction coil and used for curative purposes.

faradise (*Med.*). To stimulate the muscles or nerves of a living subject with faradic currents.

faradism (*Med.*). The treatment of disease by the use of an interrupted current obtained from an induction coil, the wave-form being very peaky.

farc'tate (*Bot.*). See **stuffed.**

farcy (*Med.*, *Vet.*). Chronic *glanders* (q.v.).

fardel-bound (*Vet.*). Said of cattle affected by impaction of the omasum.

Fareham reds (*Build.*). A form of hand-moulded, sand-faced, red facing bricks.

Farewell Rock (*Geol.*). The highest division of the so-called Millstone Grit of S. Wales, lying immediately beneath the productive Coal Measures.

farina (*Textiles*). The name still used in the cotton industry for potato starch; used for sizing warp yarns.

farina'ceous (*Bot.*). (1) Having a surface covered with particles looking like meal.—(2) Of mealy character.

Faringdon Sponge Bed (*Geol.*). The local representative of the Lower Greensand, of Lower Cretaceous age, at Faringdon, Wilts.; it consists of sandy gravel rich in the remains of fossil sponges such as *Barroisia* and *Rhaphidonema*.

far'inose (*Bot.*). Covered with whitish, very short hairs, which are easily detached as whitish dust.

-fa'rious. A suffix meaning *arranged in so many rows*.

Farleigh Down stone (*Build.*). A fine-grained, even-textured, warm cream-coloured Bath oölite; used for building purposes, but weathers poorly.

Farmer's reducer (*Photog.*). A reducing bath for photographic images made by the addition of ferri-cyanide to hypo.

Farotex (*Build.*). A proprietary bituminous material having waterproofing and plastic properties.

Fars Series (*Geol.*). Lagoonal deposits more than 3000 ft. thick, associated with massive gypsum and salt beds; of Miocene age in part, and occurring in the oil-fields of Persia.

fascia, fash'i-a *or* fas'i-a (*Arch.*, *Build.*). (1) A wide flat member in an entablature.—(2) A board carrying a gutter around the eaves of a building.—(3) The broad flat surface over a shop front or below a cornice.

fascia (*Automobiles*). The instrument-board of an automobile.

fascia (*Zool.*). Any band-like structure; especially the connective-tissue bands which unite the fasciculi of a muscle.—*adj.* **fascial.**

fasciation (*Bot.*). An abnormal condition usually shown by marked flattening, and brought about by the union of a number of members, usually all of the same kind, side by side as they develop.

fas'cicle (*Bot.*). (1) A tuft of leaves crowded on a short stem.—(2) A close tuft of branches all arising from about the same place.—*adj.* **fascicled.**

fascic'ular cambium (*Bot.*). The flat strand of cambium between xylem and phloem in a vascular bundle.

fascic'ulate (*Bot.*). In bunches or bundles consisting of a number of members all of the same kind.

fascic'ulus (*Zool.*). A small bundle, as of muscle or nerve fibres.

fasciitis, fascitis, fash-(i-)ī'tis (*Med.*). Inflammation of fascia.

fascine, fa-sēn' (*Civ. Eng.*). A bundle of brushwood used to help make a foundation on marshy ground, or to make a wall to protect a shore against erosion by sea or river, or to accumulate sand and silt on the bed of an estuary.

fascine building (*Build.*). A building constructed with logs and boards.

fascio'la (*Zool.*). A narrow band of colour: a delicate lamina in the Vertebrate brain.

fas'ciole (*Zool.*). In *Spatangoidea*, a tract of ciliated spines (clavulae) which create a current of water.

fascioli'asis (*Med.*, *Vet.*). Infection of Man and other animals with the liver fluke *Fasciola hepatica*.

fasciot'omy (*Surg.*). Surgical incision of fascia.

fast (*Mining*). (1) A heading or working place which is driven in the solid coal, in advance of the open places, said to be in the *fast*.—(2) A hole in coal which has had insufficient explosive used in it, or which has required undercutting.

fast (*Paint.*). Said of colours which are not affected by the conditions of use (i.e. light, heat, chemical action, damp, etc.) to which they are subjected.—*n.* **fastness.**

fast coupling (*Eng*). A coupling which permanently connects two shafts; it consists of flanges formed integral with the shafts.

fast-end (*Mining*) A stall which has a 'rib' of coal at one end and has its face line in advance of the adjoining stall is said to have a *fast-end*.

fast head (*Eng.*). The fixed headstock of a lathe.

fast needle surveying (*Surv.*). See **fixed needle surveying.**

fast pulley (*Eng.*). A pulley fixed to a shaft by a key or set bolt, as distinct from a *loose pulley* (q.v.) which can revolve freely on the shaft.

fast reed loom (*Weaving*). A loom with a fixed reed; used for weaving heavy fabrics or those in which weft threads are closely packed.

fast sheet (*Build.*). See **stand sheet.**

fast (*Photog.*). Contributing to reduction of time of exposure; said of an emulsion or lens.

fast-acting relay (*Auto. Teleph.*). A relay designed to act with minimum delay after the application of voltage, usually by increasing the resistance of the circuit in comparison with the inductance, and by minimising moving masses.

fastener, fastening (*Build.*). A device such as a nail, screw, dowel, dog, etc. for securing two parts together.

fastigiate, —tij'i-āt (*Bot.*) Having the branches more or less erect and all more or less parallel, giving an effect like a slender broom.

fastig'ium (*Build.*). (1) The pediment above a portico.—(2) A roof ridge.

fastigium (*Med.*). The highest point of temperature in a fever.

fastness (*Paint*). See **fast** (*Paint.*).

fat. See **adipose tissue.**

fat (*Build.*). Part of a cement mortar mix containing a higher proportion of cement than the rest.

fats (*Chem.*). An important group of naturally occurring substances consisting of the glycerides of higher fatty acids; e g. palmitic acid, stearic acid, oleic acid. See Supplement, also **human fat.**

fat board (*Build.*). A board on which the bricklayer collects the fat during the process of pointing.

fat-body (*Zool.*). In Insects, a mesodermal tissue of fatty appearance, the cells of which contain reserves of fat and other materials and play an important part in the metabolism of the animal: in *Amphibia*, highly vascular masses of fatty tissue associated with the gonads.

fat boys or **fatters** (*Mining*). Boys or men employed to lubricate axles of tubs or wagons and rollers of haulage gear.

fat coals (*Mining*). Coals which contain plenty of volatile matter (gas-forming constituents).

fat colour (*Paint.*). Paint which, as a result of exposure to the air, has become greasy and sticky.

fat edges (*Paint.*). A defect in paintwork, characterised by the formation of ripples at edges and in angles; due to excess of paint.

fat lime (*Build.*). *Lime* (q.v.) made by burning a pure, or very nearly pure, limestone, such as chalk.

fat liquor (*Leather*). An emulsion consisting of oil, soap, and water, which is added to warm water for drumming skins, before drying.

fat-necrosis (*Med.*). The splitting of fat, due to the escape of a fat-splitting enzyme from the pancreas into the abdominal cavity, with death of the fat-containing cells so affected.

fata morgan'a (*Meteor.*). A complicated mirage caused by the existence of several layers of varying refractive index, resulting in multiple images, possibly elongated. Especially characteristic of the Strait of Messina and Arctic Regions.

father of the chapel (*Typog.*). A person elected by the associated employees of a printing department to represent them and to watch their interests.

fathom. A unit of measurement. Generally, a nautical measurement of depth = 6 ft. Specific senses follow.

fathom (*Mining*). In general mining, the volume of a 6-ft. cube: in gold mining, often a volume 6 ft. by 6 ft. by the thickness of the reef: in lead mining, sometimes a volume 6 ft. by 6 ft. by 2 ft. It is the unit of performance of a rock drill—' fathoms per shift.'

fathom (*Timber*). A timber measure = 216 cu. ft. = 6 ft. by 6 ft. by 6 ft.

fatigue (*Zool.*). The condition of an excitable cell or tissue which, as a result of activity, is less ready to respond to further stimulation until it has had time to recover.

fatigue, colour (*Optics*). See **colour fatigue.**

fatigue, elastic (*Eng.*). See **elastic fatigue.**

fatigue limit (*Met.*). The upper limit of the range of stress that a metal can withstand indefinitely. If this limit is exceeded, failure will eventually occur.

fatigue of metals (*Met*). The phenomenon of the failure of metals under the repeated application of a cycle of stress. Three factors are involved: (1) the range of stress; (2) the mean stress; (3) the number of cycles.

fatigue test (*Eng., Met.*). A test made on a material to determine the range of alternating stress to which it may be subjected without risk of ultimate failure. By subjecting a series of specimens to different ranges of stress, while the mean stress is constant, a stress-number curve is obtained.

fatigue-testing machine (*Eng., Met.*). A machine for subjecting a test piece to rapidly alternating or fluctuating stress, in order to determine its fatigue limit. See **Wöhler test, Haig fatigue-testing machine.**

fat'iscent (*Bot.*). Cracking and falling apart.

fats (*Chem.*). See above under **fat.**

fatters (*Mining*). See **fat boys.**

fatty acids (*Chem.*). A term for the whole group of saturated and unsaturated monobasic aliphatic carboxylic acids. The lower members of the series are liquids of pungent odour and corrosive action, soluble in water; the intermediate members are oily liquids of unpleasant smell, slightly soluble in water. The higher members, from C_{10} upwards, are solids, insoluble in water, but soluble in alcohol and in ether.

fatty degeneration (*Med.*). Degeneration of the cell substance, accompanied by the appearance in it of droplets of fat, due to the action of poisons, lack of oxygen, or interference with the nerve supply.

fatty heart (*Med.*). (1) A heart the muscle of which has undergone fatty degeneration.—(2) An increase of fat in parts of the heart where it is normally present, associated with general adiposity.

fauces, faw'sēz (*Zool.*). In Vertebrates, the pharynx: in spirally coiled shells, the aperture.

faucet (*Plumb.*). (1) A small tap or cock.—(2) The enlarged or socket end of a pipe at a *spigot-and-socket joint* (q.v.).

faucet ear (*Plumb.*). A projection from the socket of a pipe by means of which the pipe may be nailed to a wall.

faulding (or **folding**) **boards** (*Mining*). Catches in a mine shaft to facilitate the stopping of the cage at intermediate coal-seams.

faulschlamm, fowl'shlam (*Ecol.*). A type of lake-bottom deposit composed of organic detritus covered by mineral deposits, which is characterised by the absence of *sediment transporters* (q.v) and in which anaerobic decomposition takes place.

fault. A defect in a mechanism or piece of work such that normal function or operation is impaired; e.g. a defect in any piece of electrical apparatus or in an electrical conductor.

fault (*Geol., Mining*). A fracture in rocks along which some displacement (the *throw* of the fault) has taken place. The displacement may vary from a fraction of an inch to thousands of feet. Movement along faults is the common cause of earthquakes. A fault causes the displacement of mineral veins, reefs, lodes, or coal-seams.

See **compound—**
dip—
horst—
normal—
overthrust—
reversed—
trough—
step—
strike—
downthrow
upcast.

fault-breccia (*Geol.*). A fragmental rock of breccia type resulting from shattering during the development of a fault.

fault current (*Elec. Eng.*). The current flowing, on account of a fault, from a conductor to earth or to another conductor.

fault resistance (*Elec. Eng*). A term sometimes used to denote insulation resistance, but more commonly the resistance of an actual fault; e.g. an arc between a conductor and earth.

fauna, faw'na (*Zool.*). A collective term denoting the animals occurring in a particular region or period.—*pl.* **faunas** or **faunae.**—*adj.* **faunal.**

faunal region (*Zool.*). An area of the earth's surface characterised by the presence of certain species of animals.

Faure accumulator, fawr (*Elec. Eng.*). An accumulator having Faure (pasted) plates.

Faure plate (*Elec. Eng.*). See **pasted plate.**

fauton, faw'ton (*Build.*). A metal rod which is embedded in concrete.

fa'veolate, fa'vose (*Bot., Zool*). Resembling a honeycomb in appearance.—FAVOUS, said of a surface pitted like a honeycomb.—FAVUS, a hexagonal pit or plate.

fa'vus (*Med.*). A contagious skin disease, especially of the scalp, due to infection with the fungus *Achorion Schonleinii.*

favus, avian (*Vet.*). A contagious disease (usually of the skin of the head) of birds due to infection by a fungus *Lophophyton gallinae.*

fay'alite or **iron-olivine** (*Min.*). A silicate of iron, Fe_2SiO_4, crystallising in the orthorhombic system, discovered originally at Fayal in the Azores, probably in a slag carried to the island as ballast; but found subsequently in igneous rocks, chiefly of acid composition, including pitchstone, obsidian, quartz-porphyry, and rhyolite.

fayance, fayence. See **faïence.**

faying face (or **surface**) (*Eng.*). That part of a surface of wood or metal specially prepared to fit an adjoining part.

F.C. (*Build.*). Abbrev. for *fair cutting.*

fd. (*Build.*). Abbrev. for *framed.*

Fe (*Chem.*). The symbol for *iron.*

Fear process (*Cinema.*). The use of optical rotation lenses to register cinematograph images along the length of standard film instead of across, which is normal, and so to allow of wider projected pictures.

fearnought (*Woollen*). A machine which opens and mixes woollen material, preparatory to carding.

feather (*Carp.*). A thin tongue along the edge of a board, fitting into a corresponding groove in the edge of another board. See **matched boards.**

feather (*Eng.*). (1) A rectangular key sunk into a shaft to permit a wheel to slide axially, while preventing relative rotation.—(2) Iron slips for reducing the friction between a wedge and an object to be split.

feather (*Masonry*). A steel wedge driven in between a pair of semi-cylindrical plugs placed in a drilled hole in a mass of stone, as a means of splitting the stone.

feathers (*Zool.*). Epidermal outgrowths forming the body-covering of Birds; distinguished from scales and hair, to which they are closely allied, by their complex structure, and by the possession of a vascular core which at first projects from the surface.

feather eating (*Vet.*). A vice, acquired by birds, characterised by pecking, plucking, or eating their own plumage or that of other birds. The vice may develop into *cannibalism.*

feather-edge brick (*Build.*). A brick similar to a compass brick, used especially for arches.

feather-edged board (*Join*). A weathered-board of tapered thickness, the thick edge being always placed downwards.

feather-edged coping (*Masonry*). A coping-stone sloping in one direction on its top surface.

feather edging (*Furn.*). A thin, bevelled, feather-like edging or cresting to chairs, etc.

feather joint (*Join.*). A *ploughed-and-tongued joint* (q.v.).

feather ore (*Min.*). A plumose or acicular form of the orthorhombic sulphide of lead and antimony, occurring in the Harz Mts. and elsewhere. Also called JAMESONITE.

feather-perforating mite disease (*Vet.*). An infection of the plumage and skin of pigeons due to the feather-perforating mite, *Falculifer rostratus.*

feather rot (*Vet.*). See **itch (depluming).**

feather tongue (*Join.*). A wooden tongue for a *ploughed-and-tongued-joint* (q.v.), cut so that the grain is diagonal to the grooves.

feather twills (*Weaving*). See **herring-bone twills.**

featherweight paper (*Paper*). A very light antique book paper. It is made from loosely woven esparto, and often three-quarters of its bulk is air space.

feathering (*Pot.*). Feather-like figures appearing in defective glazes.

feathering airscrew (*Aero.*). An airscrew with blades so mounted that they turn on their own axes, automatically, while the airscrew is rotating, to any desired setting—usually that of maximum thrust for the particular rotational speed.

feathering paddles (*Eng.*). Paddle-wheels so controlled that the floats enter and leave the water at right-angles to the surface.

feathering screw (*Eng.*). A marine screw-propeller whose blades could be turned parallel with the shaft to reduce resistance when the vessel was under sail. (Obsolete.)

feathery (*Bot.*). Covered with long branching hairs.

feature film (*Cinema.*). A long fictional film, forming the basis of most programmes.

feb'rifuge, —fūj (*Med.*). Against fever: a remedy which reduces fever.

feb'rile (*Med.*). Pertaining to, produced by, or affected with fever.

Fechner's constant (*Illum.*). See **Fechner's law.**

Fechner's fraction (*Illum.*). See **Fechner's law.**

Fechner's law (*Illum.*). A physiological law stating that the eye can distinguish differences in illumination which are a constant fraction of the total illumination, the value of the constant being about 0·01 (called *Fechner's constant* or *Fechner's fraction*).

Federal hearth (*Met.*). A modified Scotch hearth, in which rabbling and shovelling are done mechanically.

fee-junction circuit (*Teleph.*). A junction between two exchanges which entails more than the charge of a unit fee when used for connecting two subscribers.

feebly hydraulic lime (*Build.*). *Lime* (q.v.) made by burning a limestone containing 5-12% clay.

feed (*Eng.*). (1) The rate at which the cutting tool of a machine is advanced.—(2) Fluid pumped into a vessel; e.g. feed water to a boiler.—(3) Mechanism for advancing material into a machine for processing.

feed-back (*Acous.*). See **acoustic feed-back.**—(*Radio*) See **back-coupling, negative feed-back, positive feed-back*, stabilised feed-back amplifier.**

feed-check valve (*Eng.*). Non-return valve in the delivery pipe between feed-water pump and boiler.

feed-cistern (*Build.*). A cold-water tank connected to the town pressure main through a ball-cock, and supplying cold water to the boiler in a hot-water system.

feed current (*Radio, Thermionics*). The direct-current component of the anode current of a thermionic valve, especially when it is separated from the alternating components.

feed mechanism (*Illum.*). The mechanism which causes the carbons of an arc lamp to move gradually towards the arc at the speed necessary to compensate for the rate at which they burn away, thereby keeping the arc length constant.

feed pipe (*Eng.*). The pipe carrying feed water from the feed pump to a boiler.

feed reel (*Cinema.*). The reel of film which is being unwound as the film is taken off to pass through the gate in a camera, printer, or projector.

feed screw (*Eng.*). A screw used for supplying motion to the feed mechanism of a machine tool.

feed water (*Eng.*). The water, previously treated to remove air and impurities, which is supplied to a boiler for evaporation.

feed-water heater (*Eng.*). An arrangement for heating boiler feed-water by means of steam which has done work in an engine or turbine. It is similar in principle to a steam condenser of either the surface or the jet type.

feeder (*Cables*). An overhead or underground cable, of large current-carrying capacity, used in the transmission of electric power; it serves to interconnect generating stations, substations, and feeding points, without intermediate connexions.

See **dead-ended—**
duplicate—
incoming—
independent—
interconnecting—
mutiple—
negative—
outgoing—
positive—
radial—
return—
trunk—

feeder (*Foundry, etc.*). The runner or riser hole of a mould, containing sufficient molten metal to feed the casting and so compensate for contraction of the solidifying metal.

feeder (*Hyd. Eng.*). A natural or artificial channel supplying water to a reservoir or canal.

feeder (*Mining*). A mechanical appliance for supplying broken rock or crushed ore, at a predetermined rate, to some form of crusher or concentrator.

feeder (*Radio*). The conductor, or system of conductors, connecting the radiating portion of an antenna to the transmitter or receiver.

feeder (*Typog.*). (1) One who passes paper, sheet by sheet, into the machine during printing.—(2) A mechanical device used for this purpose.

feeder-box (*Elec. Eng.*). See **junction-box.**

feeder bus-bars (*Elec. Eng.*). In a generating station or main substation, bus-bars to which the outgoing feeders are connected.

feeder ear (*Elec. Eng.*). A type of ear for attaching an overhead contact wire of a tramway system to the supporting wire; it serves also to lead current to the contact wire.

feeder-fed bottle machines (*Glass*). See **bottle-making machines.**

feeder head (*Met.*). See **hot top.**

feeder mains (*Cables*). See **feeder.**

feeder panel (*Elec. Eng.*). A switchboard panel on which are mounted the switch-gear and instruments for controlling one or more feeders.

feeder pillar (*Elec. Eng.*). A pillar containing switches, links, and fuses, for connecting the feeders of an electric power distributing system with the distributors.

feeding head (*Foundry*). An extension to the upper part of a casting, provided to act as a feeder to the main part during cooling.

feeding-point (*Elec. Eng.*). The junction point between a feeder and a distribution system. Also called a DISTRIBUTING POINT.

feeding rod (*Foundry*). A heated iron rod inserted in the feeder of a mould, and worked with a pumping motion to assist feeding during the cooling of the molten metal.

feeding-up (*Paint.*). Thickening of varnish in the can.

feel (*Textiles*). The term used to describe the character of a cloth when handled.

See **boardy—** **full—** **thin—**

feeler (*Weaving*). A device which is used with an automatic weft replenishing motion to determine when replenishment is necessary

feeler switch (*Elec. Eng.*). A switch sometimes forming part of the equipment of an auto-reclose circuit-breaker; after the circuit-breaker has opened on a fault, the feeler switch closes a test circuit to determine whether or not the fault has cleared itself, and, if not, it prevents the circuit-breaker from reclosing.

feeling (*Psychol.*). An affective experience, essentially of pleasantness-unpleasantness or of some degree between.

feet-switch (*Elec. Eng.*). See **tropical switch.**

Fehling's solution, fā′ling (*Chem.*). A solution of cupric sulphate and potassium sodium tartrate (Rochelle salt) in alkali, used as an oxidising agent. It is an important analytical reagent for aldehydes, glucose, fructose, etc., which reduce it to cuprous oxide.

feigh, fā (*Mining*). Refuse or dirt from ore or coal.

feldspar or **felspar** (*Min.*). A most important group of rock-forming silicates of aluminium, together with sodium, potassium, calcium, and barium, crystallising in closely similar forms in the monoclinic and triclinic systems. The chief members are *orthoclase* and *microcline* (*potash feldspar*); *albite* and *barbierite* (*soda feldspar*); and the *plagioclases* (*soda-lime feldspar*). The form *felspar*, though still commonly used, perpetuates a false derivation from the German *fels* (rock); actually it is from the Swedish *feldt* (field).

feldspathic sandstone (*Geol.*). See **arkose.**

feld′spathoids (*Min.*). A group of rock-forming minerals chemically related to the feldspars, but undersaturated with regard to silica content, and therefore incapable of free existence in the presence of magmatic silica. The chief members of the group are *haüynite, leucite, nepheline, nosean,* and *sodalite* (qq.v.).

fell. A skin or hide.

fellmonger (*Leather*). A dealer in hides and skins, who prepares them for the tanner by removing the hair or wool.

fell (*Weaving*). The edge of a cloth in the loom, to which the weft yarn is placed during weaving.

fell railway (*Civ. Eng.*). A form of mountain railway in which a central, elevated, double-headed rail, laid on its side, is gripped by horizontal wheels on both sides, thus increasing adhesion.

felling marks (*Woollen*) Material of a different kind or colour, forming lines across both ends of a length of cloth.

felling subsere (*Bot.*). A developmental series of communities started by the felling of a wood.

felloe (*Carp., etc.*). (1) The outer part of the framing for a centre.—(2) A segment of the rim of a wooden wheel, about which a tyre is usually shrunk. The term is sometimes applied to the whole rim.

felon or **fellon** (*Med*). See **paronychia.**—(*Vet.*) Suppurative arthritis of cattle; commonly associated with mastitis.

felsite (*Geol.*). An 'omnibus term' for fine-grained igneous rocks of acid composition, occurring as lavas or minor intrusions, and characterised by the felsitic texture—a fine patchy mosaic of quartz and feldspar, resulting from the devitrification of an originally glassy matrix.

felspar (*Min.*). See **feldspar.**

felstone (*Geol.*). An obsolete term for *felsite.*

felt (*Build*). A fibrous material, treated so as to be rendered watertight, used as underlining for roofs, etc.

felt (*Paper*). A blanket which carries the web of paper and squeezes the moisture from it.

felt (*Textiles*). (1) A densely matted fabric of wool or hair that has passed through a felting process.—(2) A heavily milled woven fabric with fibrous surface.—(3) An imitation felt consisting of wool waste and wood pulp.

felt-grain (*Timber*). Grain following the direction from pith to bark.

felting (*Paper*). The binding together of fibres in paper-making.—(*Woollen*) The matting together of wool fibres.

female (*Bot.*). A flower having carpels and no stamens.—(*Zool*) An individual the gonads of which produce ova.

female (*Eng.*). See **male and female**; also **internal screw-thread.**

female gauge (*Eng.*). See **ring gauge.**

female screw (*Eng.*). An *internal screw-thread* (q.v.).

fem'erell (*Carp.*). A roof lantern having louvres for ventilation.

fem'ic constituents (*Geol.*). Those minerals which are contrasted with the salic constituents in determining the systematic position of a rock in the American C I P W. scheme of classification. Note that these are the *calculated* components of the 'norm'; the corresponding *actual* minerals in the 'mode' are said to be *mafic*, i.e. rich in magnesium and iron.

femmer (*Mining*). Slender, weak, as in the case of a thin shaly section of roof.

fe'mora. *Pl.* of *femur.*

fe'moral (*Zool.*). See **femur.**

fe'mur (*Arch.*). See **meros.**

femur (*Zool.*). The proximal region of the hind limb in land Vertebrates: the bone supporting that region: the third joint of the leg in *Insecta*, *Myriapoda*, and some *Arachnida.*—*adj.* **femoral.**

fen. Low, marshy land; bog or morass.

fence (*Eng.*). (1) A guard or stop to limit motion.—(2) A guide for material, as in a circular saw or planing machine.

fence (*Mining*). A protection round the mouth of a shaft, or at the entrance to a dangerous or unsafe tunnel or level.

fence (*Tools*). An adjustable grinding edge or plate directing or limiting the movement of one piece with respect to another.

fencing (*Build.*). A construction placed along the boundary of a property or elsewhere, to divide one area from another.

fender (*Carp.*). A timber baulk which is laid as a temporary kerb beside the sleeper supporting a gantry constructed over a public footway.

fender (*Civ. Eng.*). A timber, bag of old rope, or other object, placed against the edge of a pier, dock, etc., to take the impact from a vessel drawing up alongside.

fender (*Elec. Eng.*). A metal cover attached to the end of the frame of an electric machine in such a way as to prevent accidental contact with live or moving parts. It does not carry a bearing. Also called a PROTECTION CAP.

fender pile (*Civ. Eng.*). An upright timber serving as a *fender* (q.v.) protecting the edge of a dock-wall or wharf.

fender post (*Civ. Eng.*). A protective post on a street refuge to take the impact of a vehicle leaving the road.

fender wall (*Build*). A dwarf brick wall supporting the hearthstone to a ground-floor fireplace.

fenes'tra (*Build.*). A window or other opening in the outer walls of a building.—*pl.* **fenestrae.**

fenestra (*Zool.*). An aperture in a bone or cartilage, or an opening between two or more bones: in some *Orthoptera*, one of the pale spots on the head, believed to represent ocelli: a transparent spot on an insect wing which is otherwise opaque.—*adj.* **fenestrate.**

fenestra metot'ica (*Zool.*). In a typical chondrocranium, an opening behind the auditory capsule, through which pass the ninth and tenth cranial nerves and the internal jugular vein.

fenestra ova'lis (*Zool.*). In Vertebrates in which the middle-ear is developed, the upper of two openings in the skeletal wall of the ear. Cf. *fenestra rotunda.*

fenestra pro-ot'ica (*Zool.*). In a typical chondrocranium, an opening in front of the auditory capsule, through which pass the fifth, sixth, and seventh cranial nerves.

fenestra rotunda (*Zool.*). In Vertebrates in which the middle-ear is developed, the lower of two openings in the skeletal wall of the ear. Cf. *fenestra ovalis.*

fenestra tym'pani (*Zool.*). See **fenestra rotunda.**

fenestra vestib'uli (*Zool.*). See **fenestra ovalis.**

fenestral (*Build.*). A window-opening covered with oiled paper or cloth instead of being glazed.

fenestrate, fenestrated (*Bot.*). Perforated and divided into compartments, remotely suggesting a window.

fenestration (*Build.*). The arrangement of window and other openings in the outer walls of a building.

fent (*Textiles*). A damaged piece of cloth cut from a length, or a short piece of material; usually sold by weight.

fe'ral (*Bot., Zool.*). Wild: not cultivated: savage.

fer'berite (*Min.*). A member of the wolframite group of minerals; theoretically pure tungstate of iron, but usually some of the iron is replaced by manganese.

fer'gusonite (*Min.*). A rare mineral occurring in pegmatites; it consists of columbate and tantalate of yttrium, which may be partially replaced by iron, cerium, calcium, etc.

Fermat's principle of least time, fer'ma (*Light*). The path of a ray of light from one point to another is always such that the time taken by the light to traverse it is a minimum.

ferment (*Chem., etc.*). A substance inducing *fermentation* (q.v.).

fermentation (*Chem.*). A slow decomposition process of organic substances induced by microorganisms, or by complex nitrogenous organic substances (*enzymes*, q.v.) of vegetable or animal origin. Fermentation is usually accompanied by evolution of heat and gas. Important fermentation processes are the alcoholic fermentation of sugar and starch, and the lactic fermentation.

fermentation amyl alcohol (*Chem.*). A synonym for *iso*amyl alcohol, the chief constituent of fusel oil.

Fernie Shales (*Geol.*). Marine Jurassic strata consisting chiefly of black shales associated with some sandstones and limestones in British Columbia.

Ferran'ti effect (*Elec. Eng.*). The rise in voltage which takes place at the end of a long transmission line when the load is thrown off; it is due to the charging current flowing through the inductance of the line.

Ferranti-Hawkins protective system (*Elec. Eng.*). A discriminative protective system for feeders; core balance transformers are placed at each end, with their secondary windings connected to each other through pilot wires.

Ferranti meter (*Elec. Eng.*). A name often given to the mercury-motor type of supply meter invented by Ferranti.

Ferranti rectifier (*Elec. Eng.*). An old type of rectifier employed in conjunction with constant-current transformers for arc lighting; it consists of a synchronously driven commutator.

Ferrar'is instruments (*Elec. Eng.*). A name sometimes given to induction-type electrical measuring instruments as originally developed by Ferraris.

Ferraris motor (*Elec. Eng.*). An early type of two-phase induction motor.

ferri-, ferro- (Latin *ferrum*, iron). Prefixes used in the construction of compound terms; e.g. *ferri-silicon*, *ferro-chromium* (qq v.).

ferri-silicon paint (*Paint.*) A combination of iron and other oxides with silicates, which, incorporated with a special enamel oil, produces a paint closely resembling enamel, but with a very tough and elastic surface, making it specially suitable for use as a preservative for ironwork, woodwork, and all exposed surfaces.

ferricyanide, potassium (*Chem.*). See **potassium ferricyanide.**

ferrimolybdite (*Min.*). See **molybdite.**

ferric oxide (*Chem.*). Fe_2O_3. An oxide of iron.

ferric sulphate (*Chem*). $Fe_2(SO_4)_3$. A yellowish-white powder which dissolves slowly in water.

ferrite (*Met.*). Originally, substantially pure α-iron occurring in iron-carbon alloys. The term is now extended to any solid solution based on α-iron as distinct from those based on γ-iron, i.e. austenite.

ferro-. Prefix. See **ferri-.**

Ferrocart (*Radio*). A registered trade-name for a ferromagnetic material which is suitable for use at high frequencies on account of its small hysteresis and eddy current losses, achieved by subdivision of the material into fine particles.

ferro-chromium (*Met.*). An alloy of iron and chromium (60-72% chromium) used in making additions of chromium to steel and cast-iron.

ferro-concrete (*Civ. Eng.*). *Reinforced concrete* (q.v.).

Ferrocrete (*Build., Civ. Eng.*). A trade-name for a variety of rapid-hardening Portland cement.

Ferrodur (*Build., Civ. Eng.*). A proprietary waterproofing agent for concrete.

Ferro-glass (*Build.*). A patented form of *pavement lights* (q.v.).

Ferrolithic (*Build.*). A proprietary water-, dust-, and oil-proofing preparation for concrete floors.

ferromagnetic (*Elec. Eng.*). Said of materials having a permeability which is considerably greater than unity, and which varies with the flux density. Iron or steel are the most common ferromagnetic materials.

ferro-manganese (*Met.*). An alloy of iron and manganese (80% manganese) used in making additions of manganese to steel or cast-iron.

ferro-molybdenum (*Met.*). An alloy of iron and molybdenum (55-65% molybdenum) used in adding molybdenum to steel and cast-iron.

ferro-nickel (*Met.*). Alloys of iron and nickel containing more than 30% of nickel. Lower nickel alloys are known as nickel steel. See **Elinvar, Invar, Mu-metal, Permalloy.**

ferro-prussiate paper (*Paper*). A paper specially made for the production of blue-prints. It is treated with a sensitising solution mixed with gum.

ferro-resonance (*Elec. Eng.*). A special condition of resonance occasionally set up in armoured cables; caused by the changing inductance resulting from the flux in the armouring.

ferro-silicon (*Met.*). An alloy of iron and silicon (15% silicon) used in making additions of silicon to steel and cast-iron.

fer'rotype (*Photog.*). The wet collodion process in which varnished iron plates are used as supports.

ferrous oxide (*Chem.*). FeO. An oxide of iron.

ferrous sulphate (*Chem.*). $FeSO_4$. See also **copperas.**

ferroxyl indicator (*Chem.*). A little potassium ferricyanide and phenolphthalein, together with a corroding solution, e g. of sodium chloride, made into a jelly with agar. It is used to show the positive and negative parts of a piece of iron.

ferru'ginous, ferrugin'eous (*Bot.*). Reddish-brown, the colour of rusty iron.

ferruginous clay (*Geol.*). An impure clay rock, with an admixture of iron compounds.

ferruginous deposits (*Geol*). Sedimentary rocks containing sufficient iron to justify exploitation as iron ore. The iron is present, in different cases, in silicate, carbonate, or oxide form, occurring as the minerals chamosite, thuringite, siderite, haematite, limonite, etc. The ferruginous material may have formed contemporaneously with the accompanying sediment, if any, or may have been introduced later.

ferrule (*Cables*). A slotted metal tube into the ends of which the conductors of a joint are inserted. The whole is soldered solid. When the conductors are oval, the ferrule is in two parts to allow for the fact that the major axes of the oval sections may not coincide.

ferrule (*Carp.*) The brass ring round the handle of a chisel, or similar tool, at the end where the tang enters.

ferrule (*Eng.*). (1) A short length of tube.—(2) A circular gland nut used for making the joint between tubes and tube-plates in a *surface condenser* (q.v.).

ferrule (*Horol.*). A small grooved pulley around which is wrapped the string of a bow, to give rotary motion.

ferrule (*Plumb.*). A side opening in a pipe; it is fitted with a screwed plug giving access for inspection and cleaning.

Ferry (*Elec. Eng.*). A nickel-copper alloy (44% nickel) used for low-temperature resistances; the wire runs at a black heat.

fertile (*Bot.*). Able to produce spores or seeds.

fertile flower (*Bot.*). A pistillate flower.

fertilisation (*Biol.*). The union of two sexually differentiated gametes to form a zygote.

fertilisation cone (*Zool.*). A conical projection of protoplasm arising from the surface of an ovum and giving rise to a filamentous process which adheres to a spermatozoon-head and then retracts, dragging the spermatozoon into the cytoplasm of the ovum.

fertilisation tube (*Bot.*). See **conjugation tube.**

fertili'sin (*Zool.*). A substance which is present in the cortex of an ovum and assists in the activation of the ovum.

F.E.S. (*Build.*). Abbrev. for *feather-edged springer*.

Fessenden detector (*Radio*). An early form of electrolytic detector, comprising two polarised electrodes immersed in an electrolyte.

festination (*Med.*). Involuntary quick walking with short steps, occurring in certain diseases of the nervous system, e.g. in paralysis agitans.

festoon (*Build.*). An ornamental feature representing usually a hanging garland of flowers or leaves.

festoon lighting (*Elec. Eng.*). Lighting, usually for decorative purposes, in which a number of lamps are arranged at intervals along a suspended cable.

fetch (*Civ. Eng.*). The distance of the nearest coast in the direction of the strongest and most prevalent winds on a harbour site.

fet'ishism (*Psycho-path.*). A pathological condition or sexual perversion in which sexual attraction and gratification is obtained from various non-genital eroticised areas of the body, or from any object which has become similarly emotionally charged.

fetlock (*Vet.*). The metacarpophalangeal and metatarsophalangeal regions of the horse.

fettler (*Woollen*). An operative who clears away the fibrous material and dirt from the card of carding machines.

fettling (*Foundry*). See **dressing-off.**—(*Met*) The preparation of the hearth of an open-hearth or reverberatory furnace, to make it capable of holding a charge of molten metal.

fever (*Med.*). The complex reaction of the body to infection, associated with a rise in temperature. Less accurately, a rise of the temperature of the body above normal.

F.H.P. (*Eng.*). *Friction horse-power* (q.v.).

fiber. A variant spelling of *fibre*

Fiberlic (*Build.*). Trade-name for a particular type of building-board.

fibre (*Bot.*). (1) A very narrow, elongated, thick-walled cell, tapering to a sharp point at both ends.—(2) A very delicate root.

fibre (*Met*). Any arrangement of the constituents of metals parallel to the direction of working. It is applied to the elongation of the crystals in severely cold-worked metals, to the elongation and stringing out of the inclusions in hot-worked metal, and to preferred orientations.

fibre (*Textiles*). The name for any type of filament, of animal, vegetable, or mineral origin, from which yarns and fabrics are manufactured.

fibre board (*Build.*). A form of building-board made from fibrous material such as wood pulp.

fibre tracheide (*Bot.*). An elongated cell found in wood, which has thicker walls with fewer pits than a tracheide, and thinner walls with more pits than a fibre.

fi'bril, fibril'la (*Bot.*). (1) A small fibre.—(2) A tiny fibre-like branch.—(*Zool.*) Any minute thread-like structure, as the longitudinal contractile elements of a muscle fibre.—*adjs.* **fi'brillar, fibrillate.**

fibrillation (*Med.*). (1) Twitching of individual muscle fibres, or bundles of fibres, in certain nervous diseases.—(2) Inco-ordinate contraction of individual muscle fibres of the heart, giving rise to an irregular and inefficient action of the heart; especially, *auricular fibrillation.*

fibrillose (*Bot.*). (1) Covered with a loose fibrous coating.—(2) Appearing as if made up of fibres.

fi'brin (*Chem., Zool.*). An insoluble proteid substance which is precipitated in the form of a meshwork of fibres when blood coagulates.

fibrin'ogen (*Chem., Zool.*). A protein contained in the plasma of blood. The coagulation of fibrinogen is responsible for the clotting of blood and the production of fibrin.

fibrino-purulent (*Med.*). Containing fibrin and pus.

fi'bro-adenoma (*Med.*). An adenoma in which there is an overgrowth of fibrous tissue.

fibroblasts (*Zool.*). Flattened connective-tissue cells of irregular form, believed to be responsible for the secretion of the white fibres: lamellar cells.

fibrocar'tilage (*Zool*). A form of cartilage which has white or yellow fibres embedded in the matrix.

fibrocys'tic disease (*Med.*). Osteitis fibrosa. A condition in which there may be (1) a single cyst in a bone, or (2) cysts in many bones; the latter (generalised osteitis fibrosa; Von Recklinghausen's disease of bone) is due to loss of calcium salts from the bone, and is associated with a tumour of the parathyroid glands.

fibrolipo'ma (*Med.*). A tumour composed of fibrous and fatty tissue.

fibromyec'tomy (*Surg.*). Surgical removal of a fibromyoma.

fibromyo'ma (*Med.*). Fibroid. A tumour composed of fibrous tissue and unstriped muscle fibres, commonly found in the uterus.

fibromyosi'tis (*Med*). Inflammation (usually rheumatic) of fibrous tissue in muscle and in the muscle fibres adjacent to it.

fibro-vascular bundle (*Bot.*). A vascular bundle accompanied, usually on its outer side, by a strand of sclerenchyma.

fibroid (*Med.*). Resembling fibrous tissue: a fibromyoma.

fibroid phthisis (*Med.*). Chronic pulmonary tuberculosis, in which there is an overgrowth of fibrous tissue in the lung.

fi'brolite or **sil'limanite** (*Min.*). One of three crystalline forms of aluminium silicate, Al_2SiO_5, the others being andalusite (low temperature) and kyanite (high pressure). Sillimanite occurs commonly as felted aggregates of exceedingly thin fibrous crystals (hence the name *fibrolite*) in contact metamorphosed aluminous sediments such as mudstones, shales, etc. Crystals of a pale sapphire blue are used as gems.

fibro'ma (*Med.*). A tumour composed of fibrous tissue.

fibrose (*Med*). To form fibrous tissue.

fibro'sis (*Med.*). The formation of fibrous tissue as a result of injury or inflammation of a part, or of interference with its blood supply.

fibrosi'tis (*Med.*). Inflammation (especially rheumatic) of fibrous tissue.

fibrot'ic (*Med.*). Pertaining to fibrosis.

fi'brotile (*Build.*). A corrugated tile, 4 ft. by 3 ft. 10 in., of asbestos cement.

fibrous concrete (*Build.*). Concrete in which fibrous aggregate, such as asbestos, saw-dust, etc, are incorporated either as alternative or additional to the sand and gravel.

fibrous filler (*Acous.*). The most commonly used filler in gramophone discs, generally of cotton flock. Chosen because of its properties of reducing the brittleness associated with the shellac, and of taking up strains during the shrinkage which occurs during cooling, after pressing.

fibrous layer (*Bot.*). A layer of cells having their walls thickened irregularly by thin bands of material, occurring in the wall of an anther. The walls shrink unevenly as they dry, a strain is set up, and the wall of the anther is torn, releasing the pollen.

fibrous plaster (*Build.*). Prepared plaster slabs formed of canvas stretched across a wooden frame and coated with a thin layer of gypsum plaster.

fibrous tissue (*Zool.*). A form of connective-tissue consisting mainly of bundles of white fibres: any tissue containing a large number of fibres.

fib'ula (*Masonry*). A bent iron bar, used to fasten together adjacent stones.

fibula (*Zool*). In land Vertebrates, the post-axial bone of the crus.

fibular'e (*Zool.*). A bone of the proximal row of the tarsus, in line with the fibula.

fictile (*Pot.*). Said of all thrown, modelled, moulded, and carved clay work.

fidelity (*Elec. Comm*). The measure of the performance of a reproducing system, in which the output signal or wave-form is compared with the input wave-form. Sometimes restricted to the frequency-response of the system for the frequencies likely to be in the signal wave-form.

Fidler's gear (*Build., Civ. Eng.*). Hoisting and lowering apparatus adapted to lowering large masonry blocks at any required angle.

fidu'cial (*Surv., etc*). Said of a line or point assumed as a fixed basis of reference.

fiducial temperature (*Meteor.*). The temperature at which a sensitive barometer reads correctly, the maker's calibration holding for latitude 45° at the temperature 285° Absolute only.

field (*Auto. Teleph*).

See **cross-connexion—**
jumper—
translation—

field (*Elec. Eng.*). More properly called a *vectorial field*. The region of space in which the phenomenon characterising the field, e.g. electric, magnetic, or gravitational, is representable by a vector. Field frequently means *intensity of field*.

See **commutating—**
compensating—
cross—
electric—
magnetic—
main—
residual—
reversing—
rotating—
series—
shunt—
stray—

field (*Phys.*). The region in which the forces being considered are appreciable: the area over which objects are visible, as in the *field of view* (q.v.) of a telescope.

field (*Surv.*). A term denoting the scene of operation of the surveyor

field ampere-turns (*Elec. Eng*) The ampere-turns producing the magnetic field of an electric machine.

field book or **chain book** (*Surv.*). A book in which the surveyor records field measurements made in the course of a chain survey.

field-breaking resistance (*Elec. Eng.*). See **field-discharge resistance.**

field-breaking switch (*Elec. Eng.*). See **field-discharge switch.**

field coil (*Elec. Eng.*). The coil which carries the current for producing the magnetomotive force to set up the flux in an electric machine; occasionally called a FIELD SPOOL. See also **magnetising coil.**

field-control (*Elec. Eng.*). A method of controlling the speed of a d.c. motor by varying the exciting flux, either by the use of a shunt field rheostat, a field diverter rheostat, or tappings on a series field winding, or by some other suitable means.

field copper (*Elec. Eng.*). A term used in the design of electrical machines to denote the total quantity of copper used in the field windings of a machine.

field current (*Elec. Eng.*). The current in the field winding of an electric machine.

field, curvature of (*Photog.*). See **curvature of the field.**

field-discharge resistance (*Elec. Eng.*). A discharge resistance used for connecting across the terminals of the shunt or separately excited field winding of an electric machine, to prevent high induced voltages when interrupting the field circuit. Also called a FIELD-BREAKING RESISTANCE.

field-discharge switch (*Elec. Eng.*). A switch for controlling the field circuit of a generator. It is provided with special contacts, so that a discharge resistance is connected across the winding at the moment of breaking the field circuit. Also called a FIELD-BREAKING SWITCH.

field diverter rheostat (*Elec. Eng.*). A rheostat connected in parallel with the series field winding or the compole winding of a d.c. machine, in order to give control of the m.m.f. produced by the winding, independently of the current flowing through the main circuit.

field drains (*Civ. Eng*). Brick clay or terra-cotta pipes laid end-to-end in a trench to drain fields.

field form (*Elec. Eng*). A curve showing the value of the flux density at all points in the air-gap of an electric machine.

field-form factor (*Elec. Eng*). A factor used in electric machine design to give the ratio of the average value of the flux density in the air-gap of a machine to the maximum value.

field intensity (*Elec. Eng*). *Field strength* (q.v.).

field magnet (*Elec. Eng.*). The permanent or electro-magnet which provides the m.m.f. for setting up the flux in an electric machine. See **rotating field magnet.**

field of view (*Light*). The area over which the image is visible in the eyepiece of an optical instrument. It is usually limited by a circular stop in the focal plane of the eye-lens. See **sagittal field*, tangential field*.**

field plates (*Elec. Eng.*). The conductors used in some forms of electrostatic machine for inducing charges on the carriers.

field rheostat (*Elec. Eng.*). A variable resistance (rheostat) connected in series or parallel with the field winding of an electrical machine for the purpose of varying the current in the winding. Also called a FIELD REGULATOR.

See **balancer—**
exciter—
potentiometer-type—
reversible potentiometer-type—
shunt—
field diverter rheostat.

field rivet (*Struct.*). A rivet which is put in when the work is on the site. Also called SITE RIVET.

field spider (*Elec. Eng.*). The portion of an electric machine which supports the revolving magnet poles.

field-splitting switch (*Elec. Eng.*). A switch sometimes used for subdividing the field winding of a rotary convertor into a number of groups, in order to prevent excessive induced voltages during the starting period.

field spool (*Elec. Eng.*). A spool or bobbin upon which a field coil may be carried. Occasionally used also to denote a *field coil*.

field strength (*Elec. Eng.*). See **electric field strength, magnetic field strength.**—(*Radio*) The intensity of an electromagnetic wave, expressed as the e.m.f. which it induces in an antenna of unit effective height (one metre).

field suppressor (*Elec. Eng.*). An arrangement for automatically reducing the field current of a generator when a short-circuit or other fault occurs on the machine or its adjacent connexions.

field tube (*Eng.*). A special form of boiler tube, consisting of an outer tube which is closed at its lower end and contains a second concentric tube, down which the water passes to return up the annular space between the two.

field winding (*Elec. Eng.*). The winding placed on the field magnets of an electric machine and producing the m.m.f. necessary to set up the exciting flux.

field work (*Surv.*). That part of a surveyor's work which is done in the *field* (q.v.) as distinct from that done in the office.

Field's siphon flush tank (*San. Eng.*). A tank used for automatically flushing sewers and drains by a siphoning method.

fielded panel (*Join.*). A panel which is moulded, sunk, or raised, or is divided into smaller panels.

fiery mine (*Mining*). A mine containing coal-gas in its atmosphere: one in which there is a possibility of explosion from gas or coal-dust.

figure (*Timber*). The natural markings produced by grain or colour on the surface of timber.

figure-eight wire (*Elec. Eng.*). Wire used for the overhead contact wire of a traction system; it has a cross-section resembling a figure eight, the object being to provide a groove whereby it can be supported from the ears attached to the supporting wires.

figure of loss (*Elec. Eng.*). A term occasionally used in connexion with transformers to denote the energy loss per lb. of material (iron or copper).

figure of merit (*Elec. Eng.*). See **sensitivity.**

figure of the earth (*Surv.*). The shape that the earth would have if it were entirely covered by water.

figure sheet (*Textiles*). The form into which a lace pattern draft is converted, to simplify manufacture in a Levers machine.

figured twills (*Textiles*). Fabrics having simple figure effects, combined with the diagonal twill lines.

filament (*Bot.*). (1) A chain of cells set end to end.—(2) The stalk of a stamen.

filament (*Elec. Eng., Illum.*). A fine wire of high resistance, which is heated to incandescence by the passage of an electric current. In an electric filament lamp it acts as the source of light, and in thermionic tubes it acts as an emitter of electrons.

See **carbon—**
castellated—
coiled-coil—
colloidal—
drawn-wire—
graphitised—
helion—
horseshoe—
looped—
metal—
metallic—
metallised—
oxide-coated—
pasted—
ring—
squirted—
straight-up-and-down—
thoriated—
wreath—

filament (*Textiles*). The fibre produced by the silkworm for spinning the cocoon.

filament (*Thermionics*). A metallic wire heated by the passage of a current to such a temperature that electrons are emitted copiously from its surface. Also called DIRECTLY HEATED CATHODE.

filament (*Zool.*). Any fine thread-like structure: the axis of a down-feather.

filament current (*Thermionics*). The current used to heat the filament.

filament efficiency (*Thermionics*). The ratio of the current emitted from a filament to that used to heat it.

filament electrometer (*Elec. Eng.*). A type of electrometer in which the moving part consists of a fine wire filament, the deflection of which is observed through a microscope.

filament-lamp (*Illum.*). An electric lamp in which a filament in a glass bulb, evacuated or filled with inert gas, is raised to incandescence by the passage through it of an electric current.

See **carbon—**
gas-filled—
projector-type—
vacuum—

filament limitation (*Thermionics*). The limitation of anode current in a thermionic tube by the finite emission from the filament, as distinct from *space-charge limitation*. Also called FILAMENT SATURATION.

filament saturation (*Thermionics*). The condition of a thermionic tube when all the electrons emitted from the filament are drawn to the other electrodes. Also called EMISSION LIMITATION. See also *field limitation*.

filamen'tous. Thread-like.

filaria'sis (*Med., Vet.*). Infestation with nematode worms of the family *Filariidae*, which inhabit the lymphatic channels, often causing elephantiasis.

Filarioidea, —ō-id'e-a (*Zool.*). A class of *Nematoda*, comprising a number of parasitic forms in which an intermediate host is probably always necessary for development; paired lateral lips may occur, and the oesophagus is without a bulb; the eggs hatch in utero or contain embryos when laid.

file (*Eng.*). A hand metal-cutting tool, blade, or rod of hardened cast-steel on which small teeth have been cut. The file section may be flat, round, triangular, half-round, etc., and either parallel or taper; the degree of fineness of the teeth is specified as *rough, middle, bastard, second-cut, smooth*, and *dead-smooth*, corresponding to a range of from about 12 to 120 teeth per inch. See also **float, rasp.**

filial generation (*Gen.*). The offspring of a cross mating, the first filial generation being the direct off-spring of the first filial generation inbred, and so on.

Filibran'chia (*Zool.*). An order of *Pelecypoda*, in which the branchial axis of the gill is united to the body throughout its length and bears parallel, ventrally directed, and reflected filaments, which are joined to one another by interlocking cilia; there is a well-developed byssus gland; ciliary feeders. Sea Mussels, Scallops, Pearl Oysters, Thorn Oysters, Hammer Oysters, Wing Shells, etc.

Filicales, Filices, —kā'lēz, fil'i-sēz (*Bot.*). The ferns. A large group belonging to the *Pteridophyta*, with large, often highly compound leaves, bearing the sporangia. They occur chiefly in damp shady places. The ferns show a well-marked alternation of generations, a small inconspicuous gametophyte bearing the sexual organs, and a large sporophyte (the ordinary fern plant) producing the spores.

filicin'ean (*Bot.*). Relating to ferns.

fil'iform (*Bot., Zool.*). Thread-like; as *filiform antennae*.

fil'igree (*Jewel.*). Ornament formed with precious metal wires and grains.

filing block (*Eng.*). A wooden block which is held in the vice, and to which light flat work is secured for filing.

filings coherer (*Radio*). An early detector, comprising two electrodes placed end to end in a glass tube and almost touching, the inter-electrode space being partially filled with metallic filings. The inter-electrode resistance remains high until the arrival of a signal, when it falls to a much lower value.

filipen'dulous (*Bot.*). Having swellings of considerable size along, or at the ends of, thin roots.

Filippi's glands (*Zool.*). In lepidopterous larvae, a pair of accessory glands associated with the silk-glands.

filled cloth (*Textiles*). A cloth to which sizing material has been added to increase the weight or improve the appearance.

filled gold. Gold plating, the sheet gold being backed on base metal.

filler (*Acous.*). The inert fine-grained material which is added to the binding material of the normal gramophone record to give weight and colour. Examples are carbon black and pigments. See also **fibrous filler.**

filler (*Boots and Shoes*). Material forming a pad between the outer and the inner sole.

filler (*Civ. Eng.*). A finely divided substance added to bituminous material for road surfacing, in order to reduce it to a suitable consistency.

filler (*Dec.*). (1) A material used to fill in the pores of, or any holes in, wood, plaster, etc. which is to be painted, varnished, or otherwise decorated.—(2) An *extender* (q.v.).

filler (*Plastics*). Material, such as wood meal, paper pulp, or mineral powder, added to a moulding composition to give strength and good working properties to the product.

filler and drawer (*Mining*). A man who fills tubs at the coal face and pushes them to the main haulage road.

filler joist floor (*Build.*). A type of fire-resisting floor, consisting of main steel joists supporting small 'filler' joists at intervals, the panels between filler joists being filled, and all steelwork encased in concrete.

filler-rod (*Elec. Eng.*). See **welding-rod.**

fillet (*Arch.*). (1) A flat and narrow surface separating or strengthening curved mouldings.—(2) A *listel*. See **facette.**

fillet (*Bind.*). A band or line of gold leaf, or a plain band or line, on a cover.

fillet (*Carp.*). A thin strip of wood fixed into the angle between two surfaces, to a wall as a shelf support, to a floor as a door stop, etc.

fillet (*Eng.*). (1) A narrow strip of metal raised above the general level of a surface.—(2) A radius provided, for increased strength, at the intersection of two surfaces.

fillet ground (*Textiles*). A square ground-mesh of lace.

filleting (*Build.*). See **cement fillet, fillet** (*Arch.*, *Carp.*).

filling (*Mining*). (1) The loading of tubs or trucks with coal, ore, or waste.—(2) The filling-up of worked-out areas in a metal-mine.

filling (*Paint.*). The part of the wall surface included between the dado and the frieze.

filling (*Textiles*). (1) The name used in America for *weft*.—(2) Size that is added to cloth, either during dyeing and finishing or subsequently.

filling-in (*Masonry*). The operation of building in the middle part of a wall, between the face and the back.

filling-in piece (*Carp.*). A timber of shorter length than its fellows; e.g. a jack-rafter at the hip of a roof.

filling pile (*Hyd. Eng.*). A pile serving to retain the sheeting of a coffer-dam.

filling post (*Join.*). A middle post in a timber frame.

filling-up (*Dec.*). The operation of levelling surfaces by stopping hollows in the work with putty, plastic wood, etc.

fillister (*Carp.*, *Join.*). (1) A groove in the edge of a sash bar, to receive the glass and putty.—(2) A rabbeting plane having a movable stop to regulate depth of cut.

fillister-head screw (*Eng.*). A cheese-head screw with a flat or slightly rounded or cambered upper surface.

film (*Chem.*). A thin layer of a substance, at the most a few molecules thick, generally differing in properties from other layers in contact with it.

film (*Cinema, Photog.*). (1) A sensitive emulsion on a flexible base (usually celluloid).—(2) Abbrev. for *sound-film*.—(3) To make a cinematograph film.

See **acetate—**
band—
celluloid—
cinematograph—
class-room—
colour—
cycle—
documentary—
double-coated—
feature—
nitrate—
non-flam—
safety—
sound—
theatre—
animated cartoon
negative film stock
ortho do.
pan do.
positive do.
standard do.
sub-standard do.

film gate (*Cinema.*). The detachable element which guides the film past the exposing aperture and holds it in position during exposure.

film record (*Acous.*). A record, intended for subsequent reproduction, in which the registration is made photographically on film, the variation in density along a track constituting the record, which is scanned by a constant beam of light. See **sound-film.**

film recorder (*Cinema.*). The machine which records sound on film, generally in sound-film production. See **sound camera.**

film recording (*Acous.*). The process of recording sound on a sound-track on the edge of cinematograph film, for synchronous reproduction with the picture. The track is exposed so as to vary the density in the direction of motion of the film according to the recorded sounds, in order that subsequent scanning by a finely focused slit and photo-electric cell may reproduce the modulation of the density.

film speed (*Cinema.*). The speed at which a cinematograph film passes through a gate; expressed in feet per minute or second, or frames per second. For standard film, the speed is 90 feet per minute, or 24 frames per second.

film stock (*Cinema.*). Film, for cinematograph purposes, which is ready for use in cameras.

See **negative—**
ortho—
pan—
positive—
standard—
sub-standard—

filmic (*Cinema.*). The same as *cinematic*.

filmogen'ic (*Cinema.*). Said of action or scenes which would have cinematographic values if photographed.

fil'oplumes (*Zool.*). Feathers having a slender hair-like shaft, with few or no barbs.

filopo'dia (*Zool.*). Fine, thread-like pseudopodia of some *Sarcodina*.

fi'lose (*Zool.*). Said of pseudopodia which are long and slender, and composed entirely of ectoplasm. Cf. *lobose*.

filter (*Chem.*, *etc.*). An apparatus used for the separation of liquids from solids. See **filtration.**

filter (*Elec. Comm.*). Abbrev. for *frequency-discriminating filter*, or *electric wave filter*, a device greatly used in electrical communication circuits to discriminate between currents of different frequencies and keep transmitted signals in their proper channels, and to reject interference from other channels and from outside sources, etc.

See **amplitude—**
band-elimination—
band-pass—
bridged-T—
carrier—
Cauer—
confluent—
constant-k—
directional—
electric wave—
frequency-discriminating—
high-pass—
high-stop—
K-filter—
lattice—
low-pass—
low-stop—
m-derived—
prototype—
wave—
Zobel—

filter (*Met.*). Apparatus for separating a solution from finely crushed ore after leaching. It consists essentially of a canvas cloth, through which the solution is forced or drawn by pressure or suction, leaving the solid as a cake on the outside of the canvas.

filter (*Photog.*). A device, usually consisting of a glass plate or a sheet of gelatine, interposed across a beam of light for the purpose of altering the relative intensity of the different component wavelengths in the beam.

See **colour—**
disc—
gelatine—
monochromatic—
neutral wedge—
standard—
trichromatic—
wedge—

filter bed (*Sewage*). A general name for a *contact bed* (q.v.) or any similar bed used for filtering purposes.

filter circuit (*Radio*). A resonant circuit connected in the lead to a transmitting antenna, to prevent the radiation of harmonics generated in the transmitter.

filter cut (*Photog.*). The wavelength at which the relative absorption for light of different wavelengths changes rapidly.

filter factor (*Photog.*). The number of times a given exposure must be increased because of the presence of a filter, which absorbs light and reduces the effective exposure of a lens system.

filter overlap (*Photog.*). The band of wavelengths transmitted by a combination of filters.

filter paper (*Chem.*). Paper, consisting of pure cellulose, which is used for separating solids from liquids by filtration. Filter paper for quantitative purposes is treated with acids to remove all or most inorganic substances, and has a definite ash content.

filter-passer (*Bacteriol.*). Filter-passing virus; filterable virus; ultramicroscopic virus. A living organism which is invisible by ordinary microscopical methods, and is able to pass through the pores of a filter which retains microscopically visible bacteria. Filterable viruses cause many infectious diseases. See also **virus.**

filter press (*Chem.*). An apparatus used for filtrations; it consists of a set of frames covered with filter cloth between which the mixture which is to be filtered is pumped.

filter-press action (*Geol.*). A differentiation process involving the mechanical separation of the still liquid portion of a magma from the crystal mesh. The effective agent is pressure operating during crystallisation.

filter pulp (*Paper*). Rag fibre made up into convenient cakes at the paper mill. It is reduced to fibres again when required.

filter record position (*Teleph.*). The special position at which records of calls on specified lines are made, to ascertain whether they are overloaded or not.

filterable (or **filtrable**) **virus** (*Bacteriol.*). See **filter-passer.**

filtering basin (*Hyd. Eng.*). A tank through which water passes on its way from the reservoir to the mains, and in which it is subjected to a process of filtration.

filtrate (*Chem.*). The liquid freed from solid matter after having passed through a filter.

filtration (*Chem*, *etc.*). The separation of solids from liquids by passing the mixture through a suitable medium, e.g. filter paper, cloth, glass wool, which retains the solid matter on its surface and allows the liquid to pass through.

filty (*Mining*). A colloquial term for *fire-damp*.

fi'lum termina'le (*Zool.*). In some Vertebrates, a slender non-nervous thread into which the hinder end of the spinal cord is drawn out.

fim'bria (*Zool.*). Any fringing or fringe-like structure: the delicate processes fringing the internal opening of the oviduct in Mammals: the processes fringing the openings of the siphons in Molluscs.

fimbriate, fimbriated (*Bot.*, *Zool.*). Having a fringed margin.

fim'briocele, —sēl (*Med.*). Hernia containing the fimbriae of the Fallopian tube.

fim'ico'lous (*Bot.*). Growing on or in dung.

fin (*Aero.*). In an aeroplane, a fixed vertical surface giving lateral stability of motion; usually placed at the tail, then sometimes called a TAIL FIN. In an airship, a fixed vertical or horizontal surface giving stability of motion.

fin (*Carp.*). A tongue left or formed on the edge of a board.

fin (*Eng.*). (1) The name applied to the thin projecting strips of metal formed integral with an air-cooled engine cylinder to increase the cooling area.—(2) A thin projecting edge on a casting or stamping, formed by metal extruded between the halves of the die: any similar projection.

fin (*Zool.*). In Fish, some *Cephalopoda*, and other aquatic forms, a muscular fold of integument used for locomotion or balancing; supported in the case of Fish by internal skeletal elements.

fin rays (*Zool.*). In Fish, the distal skeletal elements which support the fins.

final common path (*Zool.*). A motor neurone serving several different afferent arcs.

final consonant articulation (*Acous.*). See **articulation.**

final limit-switch (*Elec. Eng.*). A limit switch used on an electric lift; it is arranged to operate in case of failure of the ordinary limit-switch. Also called an ULTIMATE LIMIT-SWITCH.

final selector (*Auto. Teleph.*). The selector which is operated by two trains of impulses so that the wipers finally rest on contacts which are connected to the required subscriber's line.

finder (*Astron.*, *etc.*). A small auxiliary telescope of low power fixed parallel to the tube of a large telescope for the purpose of finding the required object and setting it in the centre of the field; also used in stellar photography for guiding during an exposure.—(*Photog*) See **view finder.**

fine (*Textiles*). The term applied by woolsorters to wool of the best quality, from the shoulders.

fine aggregate (*Civ. Eng*). Sand or the screenings of gravel or crushed stone (forming a constituent part of concrete), which, when dry, will pass a sieve having ¼-in. diameter holes. See **aggregate.**

fine-grained (*Geol.*). See **grain-size classification.**

fine panel saw (*Join*) A saw differing from the panel saw only in that it has slightly smaller teeth.

fine-screen (*Photog.*, *Print.*). Said of a half-tone block whose screen is of the order of 150. The dots are small and close, necessitating the use of art paper. Usually produced on copper.

fine silt (*Geol.*). See **silt grade.**

fine stuff (*Plast.*). Lime slaked with a little water and then diluted to the consistency of cream, after which it is allowed to thicken by evaporation loss to a working consistency for plastering purposes.

fineness (*Chem.*). The state of subdivision of a substance.—(*Met.*) The purity of a gold or silver alloy; stated as the number of parts per thousand that are gold (or silver).

fineness modulus (*Civ. Eng.*). A numeral indicating the fineness of an aggregate, as determined by ascertaining the percentage residue remaining on each of a series of ten sieves with apertures ranging from 1·5 in. to 0·0058 in., summing, and dividing by 100.

finery (*Met.*). A furnace or hearth in which best quality bar-iron is produced from white pig-iron (used particularly in Sweden).

finger plate (*Join.*). A plate fixed on the side of the meeting stile of a door, near the lock, to prevent damage to the paintwork by finger-marks.

finger-type contact (*Elec. Eng.*). A type of contact which, as usually fitted to drum-type controllers, is in the form of a finger which is pressed against the contact surface by means of a spring.

fingering (*Textiles*). Worsted yarn of the type generally used for knitting by hand.

fin'ial (*Build.*). A term applied to an ornament placed at the summit of a gable, pillar, or spire.

finials (*Zool.*). In *Crinoidea*, the ossicles of the distal rami of the arms.

fining coat (*Plast.*). See **setting.**

fining-off (*Plast.*). The operation of applying the setting coat.

finings (*Brew.*). A preparation of isinglass and water, a small quantity of which is added to beer to clarify it.

finisher box (*Worsted*). A machine for straightening and levelling the fibres in readiness for drawing and spinning.

finishing (*Bind.*). The lettering and ornamentation of a bound volume by the finisher; the term does not apply to 'case' work.

finishing (*Furs*). (1) The operation of adding trimmings and paddings.—(2) The placing together of the component parts of an article.

finishing (*Leather*). The processes by which tanned leather is rendered suitable for a particular purpose; e g. dressing, dyeing, currying.

finishing coat (*Plast.*). See **setting.**

finishing cut (*Eng.*). A fine cut taken to finish the surface of a machined work.

finishing department (*Boots and Shoes*). The department in which the edges of the soles and the heels are trimmed, stained, and burnished, and the bottoms of the soles finished according to specification.

finishing-off (*Join.*). See **cleaning-up.**

finishing stove (*Bind.*). A small stove, with gas burners, on which the finisher heats the tools required for his work.

finishing tool (*Eng.*). A lathe or planer tool, generally square-ended and cutting on a wide face, used for taking the final or finishing cut.

Fink truss (*Eng.*). See **French truss.**

Finlay process (*Photog*). A system of colour photography in which a colour screen or a ruled screen is used over a panchromatic plate.

Finsen lamp (*Med.*). A form of arc lamp which is rich in ultra-violet rays; used for medical purposes.

fiords or **fjords** (*Geol.*). Narrow winding inlets of the sea bounded by mountain slopes; formed by the drowning of steep-sided valleys, which are thought to have been deeply excavated by glacial action; in many cases a rock-bar partially blocks the entrance and impedes navigation. Typical examples are the well-known Norwegian fiords.

fire alarms. In a building, these usually consist of thermostatically controlled 'detectors' installed in different parts of the building, or of a sprinkler system; both of these operate a gong on a rapid rise in temperature. In town systems, street alarm boxes are erected at various points; by these visual or audible notice of the outbreak of fire can be conveyed to the fire station.

fire-back (*Build.*). See **chimney-back.**

fireback boiler (*Build.*). The boiler fitted in a *kitchener* (q.v.).

fireball (*Astron.*). See **bolide.**

fire bank (*Mining*). A slack or rubbish heap or dump, at surface on a colliery, which becomes fired by spontaneous combustion.

fire-bar (*Elec. Eng.*). A heating element fitted to a high-temperature electric radiator.

fire-bars (*Eng.*). Cast-iron bars forming a grate on which fuel is burnt, as in domestic fires, boiler furnaces, etc.

fire barriers (*Build.*). Fire-resisting doors, enclosed staircases, and similar obstructions to the spread of fire in a building. See **fire stop.**

fire-box (*Eng.*). That part of a locomotive type boiler containing the fire; the grate is at the bottom, the walls and top being surrounded by water. See **locomotive boiler.**

firebrick arch (*Eng.*). An arch built at the end of a boiler furnace, either to deflect the burning gases or to assist the combustion of volatile products.

fire cement (*Build.*). See **refractory cement.**

fireclay (*Geol., Met.*). Clay consisting of minerals containing predominantly SiO_2 and Al_2O_3, with small proportions of Fe_2O_3, CaO, MgO, etc. Those clays which soften only at high temperatures are used widely as refractories in metallurgical and other furnaces. Fireclays occur abundantly in the Carboniferous System, as 'seat earths' underneath the coal-seams. See **underclay.**

fire-cracked (*Pot.*). Said of ware which has cracked during firing in the biscuit oven.

fire cracks (*Plast.*). Fine cracks which appear in a plastered surface, due to unequal contractions between the different coats.

fire-damp (*Mining*). The combustible gas contained naturally in coal; chiefly a mixture of methane and other hydrocarbons; forms explosive mixtures with air.

fire-damp cap (*Mining*). A small cap which forms over the flame of a safety-lamp when sufficient fire-damp (methane) is present.

firedog (*Grates*). See **andiron.**

fire door (*Build., etc.*). A fire-resisting door of wood, metal, or both; e.g. the door of a boiler furnace.

fire drencher (*Build.*). A hand-operated appliance for extinguishing fire.

fire escape (*Build.*). A special means of exit from a building, for use in the event of fire.

fire extinguishers. These are generally portable, and have a range up to 40 ft. In most types the discharge contains CO_2 gas.

fireman (*Mining*). (1) In a metal-mine, a miner whose duty it is to explode the charges of explosive used in headings and working places. —(2) In a coal-mine, an official responsible for safety conditions underground. See **deputy.**

fire opal (*Min.*). A variety of opal (amorphous silica) characterised by a brilliant orange-flame colour. Particularly good specimens, prized as gemstones, are of Mexican origin.

fireplace (*Build.*). The place where the chimney opens into a room.

fire plug. A *hydrant* (q.v.) for service in extinguishing fires.

fire point (*Oils, etc.*). The temperature at which sufficient vapour is given off by a heated liquid, under standard test conditions, to maintain combustion. Cf. *flash point.*

fire polishing (*Glass*). The polishing of glass-ware, decorated with a pressed pattern, by holding it in a glory-hole.

fireproof aggregates (*Build.*). Materials such as crushed firebricks, fused clinkers, slag, etc., incorporated in concrete to render it fire-resisting.

fire refining (*Met.*). The refining of blister copper by oxidising the impurities in a reverberatory furnace and removing the excess oxygen by poling. May be used as an alternative to electrolytic refining, and in any case is carried out as a preliminary to this.

fire-resisting covering (*Elec. Eng.*). An incombustible covering for electric wires and cables, placed over the ordinary combustible insulation.

fire ring (*Eng.*). A top piston-ring of a special heat-resisting design, used in some two-stroke oil engines.

fire stink (*Mining*). The smell given off underground when a fire is imminent, e.g. in the gob.

fire-stone (*Geol.*). A stone or rock capable of withstanding a considerable amount of heat without injury. The term has been used with reference to certain Cretaceous and Jurassic sandstones employed in the manufacture of glass furnaces.

fire stop (*Build.*). An obstruction across an air passage in a building to prevent flames from spreading further.

fire-trap or **magazine valve** (*Cinema.*). The pair of rollers through which the film passes in entering and leaving the feed and take-up magazines on a projector; its purpose is to cool the film and prevent the ingress of air to the magazine, should the film ignite in the gate, and so stop the spread of fire to the bulk of the reel in the magazine.

fire-tube boiler (*Eng.*). A boiler in which the hot furnace gases, on their way to the chimney, pass through tubes in the water space, as opposed to a *water-tube boiler* (q.v.). See **marine boiler, locomotive boiler.**

firing (*Eng.*). (1) The process of adding fuel to a boiler furnace.—(2) The ignition of an explosive mixture, as in a petrol or gas engine cylinder.—(3) Excessive heating of a bearing.

firing (*Jewel.*). A method of changing the colour of some precious stones; it consists in exposing them to heat.

firing (*Pot.*). Baking or vitrifying clay goods in a kiln.

firing (*Vet.*). The application of the thermo-cautery to the tissues of animals.

firing key (*Elec. Eng.*). A key which fires a charge of explosive by completing the electric circuit to a fuse.

firing order (*I C. Engs*) The sequence in which the cylinders of a multi-cylinder internal-combustion engine fire; e.g. 1, 3, 4, 2 for a 4-cylinder engine.

firing stroke (*Eng.*). The power or expansion stroke of an internal-combustion engine.

firing tools (*Eng.*). Implements (e.g. shovels, rakes, and slicers or slicing bars) used in firing a boiler furnace by hand.

firing top-centre (*Eng.*). The top dead-centre of an internal-combustion engine, when the piston is about to make its power stroke.

firmer chisel (*Carp., Join.*). A woodcutting chisel, usually thin in relation to its width, which varies between $\frac{1}{16}$ in. and 2 in. It is stouter than a paring chisel but less robust than a mortise chisel.

firmer gouge (*Carp.*). A stout chisel having a shaped blade, which cuts a segmental groove.

fir′mister′nous (*Zool.*). Having the two halves of the pectoral girdle firmly united, as Frogs. Cf. *arciferous.*

firn (*Geol.*). A more or less compacted snow-ice occurring above the snow-line; it consists of small rounded crystalline grains formed from snow crystals. Also called NÉVÉ (nā-vā).

Firola (*Join.*). A patented type of fireproof revolving door or shutter.

firring (*Carp.*). Timber strips of constant width but varying depth, which are nailed to the wood bearers to flat roofs as a basis for roof boarding, to which they give a suitable fall. Also spelt FURRING.

first coat (*Plast.*). The base of coarse stuff applied in plastering.

first detector (*Radio*). The modulating portion of a frequency changer.

first fixings (*Join.*). Items, such as grounds, plugs, etc., which form a basis for the support of joinery.

first floor (*Build.*). The floor next above the ground floor.

First Point of Aries (*Astron.*). See **Aries (First Point of), equinoctial points.**

First Point of Libra (*Astron.*). See **equinoctial points.**

first runnings (*Chem.*). The first fraction collected from a *fractional distillation* (q.v.) process, usually containing low boiling impurities.

first ventricle (*Zool.*). In Vertebrates, the cavity of the left lobe of the cerebrum.

first water (*Gems*). Gems of the highest value, irrespective of size, are said to be of the *first water*. In diamonds, the term applies to stones which are without colour and are unflawed. The incoming of a slight amount of colour detracts from the value and they are said to be *off colour*. Actually diamonds of the first water are almost bluish-white.

first weight (*Mining*). The first indications of roof pressure which take place after the removal of coal from a seam.

fish (*Elec. Eng.*). To insert wires or strings in conduits or holes to facilitate the drawing-in of insulated conductors.

fish-bar (*Rail*). See **fish-plate.**

fish-beam (*Civ. Eng.*). A beam which is *fish-bellied* (q.v.).

fish-bellied (*Eng.*). Said of (1) steel girders with a convex lower edge; (2) long straight-edges, which are convex upward; such a form results in greater resistance to bending.

fish-eye (*Min.*). A literal translation of the term *ichthyophthalmite* (=*apophyllite*, q.v.).

fish glue. (1) *Isinglass* (q.v.).—(2) Any glue prepared from the skins of fish (esp. sole, plaice), fish-bladders, and offal.

fish joint. A *fished joint* (q.v.).

fish-piece (*Carp.*). The wooden or steel cover-plate used on each side of a fished joint.

fish-plate (*Eng., Rail., etc.*). A steel cover-plate, fitted one to each side of a fished joint between successive lengths of beam or rail. Also called FISH-BAR, SPLICE PIECE, SHIN.

fish-wire (*Elec. Eng.*). A thin wire drawn into a conduit for electric cables or wires during their construction, in order that it may be subsequently used for drawing in the cables or wires themselves.

fished joint (*Eng., Rail., etc.*). A butt joint between two rails or beams, in which fish-plates or cover-straps are fitted on both sides of the joint and bolted together. See **butt joint.**

fishing (*Carp., Eng., etc.*). Jointing two parts in the same straight line by butting their ends, and securing them together by means of two short side pieces covering the joint.

fishing (*Eng.*). The process of recovering tools dropped from drilling tackle during oil-well drilling operations.

fissile (*Bot.*). Split, or having a tendency to split.

fissilin′gual (*Zool.*). Having a forked tongue.

fission (*Astron*). The breaking-up of a single gaseous body into two unequal masses, to form a binary star, according to a possible dynamical theory of the origin of such systems.

fission (*Zool*). See **binary— multiple—**

fission fungi (*Bot*). Bacteria.

fis′siped (*Zool.*). Having the digits free. Cf. *pinniped.*

fissiros′tral (*Zool.*). Having a cleft beak.

fissle (*Mining*). The sound which is heard in a coal-mine when the floor is rising because of pressure.

fissure (*Geol.*). A cleft in rock determined in the first instance by a fracture, a joint plane, or fault, subsequently widened by solution or erosion; may be open, or filled in with superficial deposits. See **grikes.**

fissure (*Med.*). (1) Any normal cleft or groove in organs of the body.—(2) Linear ulceration of the anus, usually the result of constipation.

fissure eruptions (*Geol.*). Throwing-out of lava and (rarely) volcanic ' ashes ' from a fissure, which may be many miles in length. Typically there is no explosive violence, but a quiet welling-out of very fluid lava. Recent examples are known from Iceland.

fissure vein (*Mining*). Valuable mineral filling a crack or fissure in the earth's crust. It has no special significance with regard to depth or value.

fistu′ca (*Civ. Eng.*). A pile-driver.

fis′tula (*Build.*). An ancient name for a water-pipe.

fistula (*Med.*). A morbidly formed infected canal in any part of the body, often communicating with a hollow viscus.—*adj.* **fistulous.**

fis′tular, fis′tulose (*Bot.*). Hollow like a pipe.

fistulous withers (*Vet.*). Abscess formation in the withers of a horse due to infection by *Brucella abortus*, *Bacillus viscosum equi*, or *Staphylococcus*. Sometimes the ruptured abscess contains a neuratode worm, *Onchocerca cervicalis*, which is transmitted by *Culicoides nebeculosus*.

fit (*Med.*). A sudden attack of disturbed function of the sensory or of the motor parts of the brain, with or without loss of consciousness. See also **epilepsy.**

fit-up (*Civ. Eng.*). Shuttering which is framed so as to be suitable for repetition work.

fitch (*Furs*). The dressed skin of the fitchew or polecat; the fur is dark-brown above and black below, with white markings on the face.

fitch (*Paint.*). A small hog's-hair brush with a chisel edge, used for fine finishing work.

fitchering (*Dec.*). Lining or picking-out with a fitch brush.

fitter (*Eng.*). A mechanic who assembles finished parts in an engineering workshop.

fitter's bench (*Eng.*). A heavy wooden bench provided with a vice and a drawer for tools; used by a fitter.

fitter's hammer (*Eng.*). A hand hammer having a flat striking face, and either a straight, cross, or ball pane.

Fittig's synthesis, fit'ihh (*Chem.*). The synthesis of benzene hydrocarbon homologues by the action of metallic sodium on a mixture of a brominated benzene hydrocarbon and an alkyl bromide or iodide in a solution of dry ether.

fitting (*Illum.*). A device used for supporting or containing a lamp, together with its holder, and its shade or reflector; part of the equipment of an electric-light installation.

See **bulkhead—**
candle—
conduit—
continuity—
factory—
indirect—
inspection—
mill—
oyster—
semi-indirect—
split—
standard—
waterproof—
weatherproof—

fitting (*Eng.*). Hand or bench work involved in the assembly of finished parts by a fitter.

fittings (*Eng.*). (1) Small auxiliary parts of an engine or machine.—(2) Boiler accessories, as valves, gauges, etc.

fitting shop (*Eng.*). The department of an engineering workshop where finished parts are assembled. See **erecting shop.**

five-centred arch (*Build.*). An arch having the form of a false ellipse struck from five centres.

five-electrode valve (*Thermionics*). See **pentode valve.**

five-unit code (*Teleg.*). The Baudot code, as used for machine transmission of telegraphic signals in synchronous and start-stop systems.

five-wire system (*Elec. Eng.*). A system used for electrical distribution. It may be a d.c. system in which one wire is at earth potential, two are at a potential of V to earth, and the other two are at a potential of 2V to earth; or it may be a 2-phase four-wire system, in which the two phases are connected and earthed at their mid-points, and a neutral wire is brought out from this point.

fixation (*Bot.*, *Zool.*). The treatment of a specimen with a reagent which will fix its structure and appearance in a life-like condition.—(*Zool.*) The action of certain muscles which prevent disturbance of the equilibrium or position of the body or limbs: the process of attachment of a free-swimming animal to a substratum, on the commencement of a temporary or permanent sessile existence.

fixation (*Psycho-path.*). An emotional arrest of the personality at an earlier stage of development; caused by the maintenance of the instinctual forces in the channels of gratification common to that phase.

fixation of nitrogen (*Chem.*). The conversion of atmospheric nitrogen into a combined form, suitable for use in fertilisers, explosives, etc. The most important methods are the *arc process* (q.v.), the *Haber process* (q.v.), and the *cyanamide process* (q.v.)—(*Bot.*) The formation, by soil bacteria, of nitrogenous compounds from elementary nitrogen.

fix'ative (*Bot.*, *Zool.*). A reagent which will permanently fix the structure of a specimen in a life-like condition.

fixed air (*Chem.*). An obsolete term for *carbon dioxide*.

fixed ammunition. See **cartridge, cartridge case.**

fixed beam (*Struct.*). A beam with fixed ends.

fixed-charge collector (*Elec. Eng.*). A device, attached to prepayment meters, which is arranged so that the insertion of coins corresponding to a fixed charge (rental or hire-purchase charge) allows a consumer to close a switch to receive a supply, the switch being opened automatically after a predetermined time.

fixed contact (*Elec. Eng.*). The contact of a switch or fuse which is permanently fixed to the circuit terminal.

fixed eccentric (*Eng.*). An eccentric which is permanently keyed to a shaft, not capable of angular movement, as is a *loose eccentric* (q.v.).

fixed end (*Struct.*). The term applied to the end of a beam when it is built in or otherwise secured so that the tangent at the end to the curve taken up by the beam when it is deflecting under applied loading remains fixed.

fixed expansion (*Eng.*). A steam-engine in which the cut-off cannot be altered and which thus works with a constant expansion ratio.

fixed handle circuit-breaker (*Elec. Eng.*). See **fixed trip.**

fixed light position (*Bot.*). The position of a fully developed leaf in respect of the direction of the strongest diffused light that reaches it.

fixed needle surveying (*Surv.*). Traverse work done with a compass fitted with a vernier connected to the line of sight, and moving over a fixed graduated circle, the instrument being used to measure horizontal angles, as if it were a theodolite, the bearing being carried forward, while the needle is read only as a check after the first station. Also called FAST NEEDLE SURVEYING, RACKING.

fixed oils (*Dec.*). Vegetable oils which are not changed by heat or distillation.

fixed points (*Heat*). The standard temperatures chosen to define a thermometer scale. Those invariably used are the temperature of melting ice and the temperature of steam from water boiling under a pressure of 76 cm. of mercury.

fixed pulley (*Eng.*). A pulley keyed to its shaft. See **fast pulley.**

fixed sash (*Build.*). (1) A *stand sheet* (q.v.).—(2) A sash permanently fixed in a solid frame.

fixed time-lag (*Elec. Eng.*). See **definite time-lag.**

fixed-trip (*Elec. Eng.*). A term applied to certain forms of circuit-breaker or motor starter to indicate that the tripping mechanism cannot operate while the breaker or starter is actually being closed. Also called FIXED-HANDLE. Cf. *free-trip.*

fixed-type metal-clad switchgear (*Elec. Eng.*). Metal-clad switchgear in which all parts are permanently fixed, no provision being made for easy removal of any part for inspection or maintenance purposes.

fixing block (*Build.*). A block of material, having the shape of a brick, which can be built into the surface of a wall to provide a substance to which joinery, such as window frames, may be nailed. Fixing blocks are made of porous concrete, of coke breeze, or of a special brick made with a mixture of sawdust which burns away in the kiln to leave a porous brick material. See also **wood brick.**

fixing fillet (or **pad**) (*Build.*). A *slip* (q.v.).

fixings (*Join.*). Supports, such as grounds and plugs, for securing joinery in position.

fixture (*Build.*). An attachment to a building.

fjords (*Geol.*). See **fiords.**

flab′ellate, flabel′liform (*Bot., Zool.*). Shaped like a fan.

flabel′lum (*Zool.*). Any fan-shaped structure: in *Crustacea*, the distal exite of a phyllopodium: an epipodite.

flaccid, flak′sid (*Bot.*). Limp and flabby.

flag or **flagstone** (*Civ. Eng.*). A flat thin stone, either natural or artificial, used as a paving material or for purposes of providing cover (e.g. for a catch-pit).—(*Geol.*) Natural flagstones are sedimentary rocks of any composition which can be readily separated, on account of their distinct stratification, into large slabs. They are often fine-grained sandstones interbedded with shaly partings along which they can be split.

flag (*Surv.*). A piece of cloth tied to a pole at a survey station, in order to render the station more easily visible from a distance in cases where the line of sight passes between trees, or when the background is deceptive, etc.

Flagella′ta (*Zool.*). See **Mastigophora.**

flagellate (*Bot., Zool.*). (1) Having flagella.—(2) Bearing a long thread-like appendage.—(3) A member of the *Flagellatae* or *Mastigophora.*

flagellate disseminule (*Bot.*). A zoospore or other motile means of propagation.

flagel′liform (*Bot.*). Like a whip lash.

flagel′lispore or **flagellu′la** (*Zool.*). A zoospore having one or more flagella as locomotor organs.

flagel′lum (*Bot.*). (1) A delicate filiform branchlet in mosses.—(2) A thread-like extension of the protoplast of a cell or of a motile spore.

flagellum (*Zool.*). (1) A thread-like extension of the protoplasm of a cell, or of a Protozoan, which is capable of carrying out lashing movements: in Insects, the *clavola* (q.v.).—(2) In some *Arachnida*, a group of specialised setae on the proximal segment of a chelicera, believed to be tactile.—*pl.* **flagella.**

flaikes (*Mining*). Sandstone which splits along the grain.

flail joint (*Med.*). A joint in which there is, as a result of disease or of operation, excessive mobility.

flakes (*Met.*). Minute transverse internal fissures which appear as bright scales on fractured surfaces of steel forgings. They occur most frequently in large forgings of alloy steels. Attributed to the presence of hydrogen.

flake white (*Paint.*). A paint base composed of pure white lead; made in England in small scales.

flake yarn (*Textiles*). A fancy yarn, composed of two foundation threads, which has pieces of short-fibred twistless roving twisted in at intervals. Two doublings are necessary for its production. The foundation threads are first twisted together, and the roving which produces the *flakes* at this stage delivered intermittently. A further twisting process is necessary to lock the flakes of roving in position. The finished thread has small bunches of fibres bound to it at intervals; these form a spot or lump if the yarn is woven into cloth.

flaking (*Build.*). A basis for reed thatching, formed by covering the rafters with reeds thinly interlaced.

flaking (*Paint.*). A defect in paintwork, the paint film breaking away in small areas from the surface it was covering.

flambé, flom-bā (*Pot.*). A form of lustre ware, usually red or yellow, with flame-like splashes of blue, violet, and other colours, giving changing tints in different aspects.

flame (*Chem.*). A region in which chemical interaction between gases occurs, accompanied by the evolution of light and heat. See also **neutral flame*, sensitive flame.**

flame-arc (*Illum.*). An electric arc maintained between carbons containing certain metallic salts, which give a colour to the arc flame.

flame-arc lamp (*Illum.*). An arc lamp employing flame carbons.

flame carbons (*Illum.*). Carbon electrodes containing certain metallic salts, which have the effect of colouring an arc maintained between them. See **flame-cored carbon.**

flame-cell (*Zool.*). See **solenocyte.**

flame-cored carbon (*Illum.*). A carbon electrode having a central core of a material designed to colour the flame of an arc drawn from it.

flame lamp (*Illum.*). A filament lamp having the bulb in the form of a flame.

flame plates (*Eng.*). Those plates of a boiler firebox subjected to the maximum furnace temperature.

flame-proof (*Elec. Eng.*). See **explosion-proof.**

flame test (*Chem.*). The detection of the presence of an element in a substance by the coloration imparted to a Bunsen flame.

flame trap (*I.C. Engs*). A gauze or grid of wire, or coiled corrugated sheet, placed in the air intake to a carburettor to prevent the emission of flame from a 'pop-back.'

flaming onions (*Ammunition*). An anti-aircraft projectile having the appearance of a string of fireballs.

flamper (*Mining*). Beds of clay ironstone.

flang (*Mining*). A double-pointed mandril or pick.

flange (*Eng.*). (1) A projecting rim, as the rim of a wheel which runs on rails.—(2) The top or bottom members of a rolled I-beam.—(3) A disc-shaped rim formed on the ends of pipes and shafts, for coupling them together; or on an engine cylinder, for attaching the covers. See also **flanged rail.**

flange coupling (*Eng.*). A shaft coupling consisting of two accurately faced flanges keyed to their respective shafts and bolted together.

flange joint (*Eng.*). Any joint between pipes, made by bolting together a pair of flanged ends.

flange protection (*Elec. Eng.*). The rendering of electrical apparatus flame-proof by providing all joints with very wide flanges.

flanged beam (or **girder**) (*Eng.*). A rolled-steel joist of I-section.

flanged chuck (*Eng.*). See **face chuck.**

flanged nut (*Eng.*). A nut having a flange or washer formed integral with it. See **collar-headed screw.**

flanged pipes (*Eng.*). Pipes provided either with integral or attached flanges for connecting them together by means of bolts.

flanged rail (*Rail., etc.*). A rail section of inverted-T shape, the flange being at the bottom and the end of the cross-piece of the T at the top—the latter part being enlarged locally to form the head of the rail. Also called a FLAT-BOTTOMED RAIL.

flanged seam (*Eng.*). A joint made by flanging the ends of furnace tubes and bolting them together between a pair of steel rings.

flank (*Build.*). (1) A roof valley. (*Local*).—(2) The side of a building.

flank (*Eng.*). (1) That part of a gear-tooth profile which lies inside the pitch-line or circle.—(2) The working face of a cam.

flanks (*Build., Civ. Eng.*). The parts of the intrados of an arch near to the abutments. Also called HAUNCHES. See also Supplement.

flanks (*Masonry*). The side surfaces of a building stone or ashlar, when it is built into a wall.

flank dispersion (*Elec. Eng.*). See **end leakage flux.**

flank holes (*Mining*). Holes bored ahead of a working place, when approaching old workings.

flank wall (*Build.*). A side wall.

flanking window (*Build.*). A window located beside an external door.

flannel (*Textiles*). An all-wool material made from fine soft wools, the weave being either plain or twill. The cloth is shrunk and raised.

flannelette (*Textiles*). A cotton fabric of plain or twill weave, raised on both sides during finishing. Used for pyjamas.

flanning (*Build.*). The internal splay of a window jamb, or of a fireplace.

flap (*Aero.*). A movable pivoted section of a wing or aerofoil, forming the trailing edge, for modifying the drag or lift of the complete structure, either automatically or through controls. Such a flap may alter the chord, or introduce a slot over part or all of the trailing edge.

flap (*Carp.*). A hinged leaf of a shutter, counter, table, etc.

flap (*Surg.*). An area of tissue partly separated by the knife from the surface of the body, in connexion with amputation of a limb or for the purpose of grafting skin.

flap tile (*Build.*). A purpose-made tile, shaped so as to fit over a hip or valley line, or to catch water.

flap-trap (*San. Eng.*). A type of anti-flood valve, in which back flow is prevented by a hinged metal flap fitted in an intercepting chamber, so as to allow of flow in one direction only.

flap-valve (*Eng.*). A non-return valve in the form of a hinged disc or flap, sometimes leather- or rubber-faced, used for low pressures.

flare. A bright, often coloured, light used as a signal, e g. a *Very light* (q.v.).

flare (*Photog.*). An extraneous image, generally of a light source, registered on the sensitive surface, through spurious focusing, by internal reflection within a complex lens.

flare (*Acous.*). The prominent part of the opening of a horn, bell, or trumpet attached to a loud-speaking unit.

flare header (*Build.*). A brick which has been burnt to a darker colour at one end, so that it may be used with others in facing-work, to vary the effect.

flare, lead (*Cables*). A flare (or bell) of lead which fits the paper stress cone placed on the core near the cut of the lead sheath.

flaring. A term applied to the end of a pipe, etc. when it is shaped out so as to be of increasing diameter towards the end. See also **flare** (*Acous.*).

flas'er structure (*Geol.*). A type of parallel arrangement of mica in thin wavy films in gneisses, typically seen in certain plutonic gneisses. Flaser gabbro is basic plutonic rock in which the original structure is largely destroyed, but the striking mineral banding of the hornblende-schist into which it ultimately passes has not yet been developed. See **foliation.**

flash, flash service (*Elec. Comm.*). The sudden, emergency, or priority use of a communication channel, such as broadcasting or trunk telephone.

flash (*Met.*). A thin fin of metal formed at the sides of a forging where some of the metal is forced between the faces of the forging dies. By extension, a similar extrusion in other (e.g. moulded) materials.

flash boiler (*Eng.*). A steam boiler consisting of a long coil of steel tube, usually heated by oil burners, in which water is evaporated as it is pumped through by the feed pump. See **steam car.**

flash colours (*Zool.*). Bright colours on the body of an animal which are conspicuous while it is moving, but which are either concealed or merge with the surroundings—and so render it invisible—as soon as it stops.

flash-guard (*Elec. Eng.*). See **barrier** (2).

flash-lamp (*Illum.*). A filament lamp, usually for less than 5 volts, intended for use with a dry battery.

flashlight (*Photog.*). The use of magnesium or aluminium powder for rapid ignition in air, with consequent brilliant illumination for a short period, usually for taking photographs when the available lighting is inadequate.

flash-over (*Elec. Eng*). The accidental occurrence of an arc between two parts of a piece of electrical apparatus, or between a piece of the apparatus and earth.

flash-over test (*Elec. Eng.*). A test applied to electrical apparatus to determine the voltage at which a flash-over occurs between any two parts, or between a part and earth. Also called a SPARK-OVER TEST.

flash-over voltage (*Elec. Eng.*). The voltage at which a flash-over occurs between two parts of a piece of electrical apparatus, or between one part and earth.

See **dry—** **wet—**

flash-point (*Oils, etc.*). The temperature at which a liquid, heated in a Cleveland cup (open test) or in a Pensky-Martens apparatus (closed test), gives off sufficient vapour to flash momentarily on the application of a small flame. The *fire point* (q.v.) is ascertained by continuing the test.

flash roasting (*Met.*). The roasting of finely ground concentrates by blowing them into a large combustion chamber in which the sulphur is burned off as they fall.

flash spectrum (*Astron*). A phenomenon seen at the first instant of totality in a solar eclipse; the dark lines of the Fraunhofer spectrum formed in the chromosphere flash out into bright emission lines as soon as the central light of the sun is cut off.

flash suppressor (*Elec. Eng.*). A device for preventing flash-overs on the commutators of d.c. generators; it consists of an automatically operated switch for short-circuiting certain points in the winding, thereby reducing the voltage to zero before a flash-over has had time to develop.

flash test (*Elec. Eng.*). A test applied to electrical equipment for testing its insulation strength; it consists of the application of a voltage of about twice the working voltage, for a period of not more than about one minute.

flashed glass (*Glass*). A term sometimes applied to glass coloured by the application of a thin layer of densely coloured glass to a thicker, colourless, base layer.

flasher (*Illum.*). An apparatus for intermittently lighting electric lamps; used largely for decorative or advertising purposes. See **thermal flasher.**

flashing (*Build.*). A method of brick burning in which the air supply is periodically stopped in order that the colouring of the bricks shall be irregular.

flashing (*Hyd. Eng.*). The process of passing a boat across any point in a river where there is a sudden fall; effected by constructing a convergent passage from the high to the low level, shutting it by a sluice gate to allow the water to pond up, and then opening the gate and allowing the boat to be carried through the sluice way by the artificially deepened water.

flashing (*Plumb.*). A strip of sheet-lead or zinc laid around the junction of two surfaces, e.g. where a chimney projects from a roof, in order to render the junction watertight. See also **apron.**

flashing board (*Build.*). A board to which flashings are secured.

flashing hook (*Build.*). A form of wall hook for carrying steel rods supporting expanded metal to be used for forming a ceiling surface.

flashing (*Paint.*). Glossy patches appearing on flat-finished surfaces.

flashing (*Thermionics*). An operation in the manufacture of thermionic cathodes, in which the cathode is raised to a very high temperature for a short period.

flask (*Foundry*). A moulding box of wood, cast-iron, or pressed steel, for holding the sand mould in which a casting is made; it may be in several sections. See **cope, drag.**

flat (*Build.*). A part of a house or building used for domestic purposes and frequently self-contained.

flat (*Cinema.*). (1) The unit panel of which sets are constructed.—(2) A *tormentor* (q.v.).

flat (*Elec. Eng*). A term used to denote a point on the surface of a commutator where the bars are lower than normal, due to wear or displacement.

flat (*Mining*). (1) A number of working places in a coal-mine worked under one deputy.—(2) A cap or cross-piece in a timber for roof support.

flat (*Photog.*). Characterised by *flatness* (q.v.).

flat (*Textiles*). One of a chain of metal bars, wire-covered, forming part of a carding engine.

flats (*Eng.*). Iron or steel bars of rectangular section.

flat arch (*Build.*). An arch whose intrados has no curvature and whose voussoirs (laid in parallel courses) are arranged to radiate to a centre. It is used over doorway, fireplace, and window-openings, to relieve the pressure on the beam or lintel below it. Also called a JACK ARCH and STRAIGHT ARCH.

flat-back (*Bind.*). Said of a volume having a back that has been finished 'flat,' instead of being rounded.

flat-back (*Moulding*). A pattern having a flat upper surface at the joint of the mould, so lying wholly within the drag or bottom half.

flat band (*Build.*). A square and plain impost stone.

flat-bar toothed rack (*Civ. Eng.*). A form of rack-railway in which the rack is centrally located, and is formed by cutting the edge of a flat steel bar so as to provide a row of teeth along its upper edge.

flat-bottomed rail (*Rail.*). See **flanged rail.**

flat chisel (*Eng.*). A cold chisel having a relatively broad cutting edge, used in chipping flat surfaces.

flat coat (*Paint.*). A *flatting* (q.v.) coat of paint.

flat-compounded (*Elec. Eng.*). Said of a compound-wound generator the series winding of which has been so designed that the voltage remains constant at all loads between no-load and full-load. Also LEVEL-COMPOUNDED.

flat cost (*Civ. Eng.*). The *prime cost* (q.v.).

flat finish (*Paint.*). A non-glossy finish, showing no brilliancy of surface. Also called a DEAD FINISH.

flat foot (*Med.*). See **pes planus.**

flat gouge (*Carp., etc.*). A gouge having a cutting edge shaped to a large radius of curvature. See **middle gouge, quick gouge.**

flat joint (*Build.*). The type of mortar joint made in *flat pointing* (q.v.).

flat-joint jointed (*Build.*). A flat joint which has had a narrow groove struck along the middle of its face by means of a jointer.

flat keel (*Ship Constr.*). See under **keelson.**

flat lead (*Plumb.*). Sheet-lead.

flat lighting (*Cinema.*). The lighting of objects to be photographed in which the illumination is uniform, contrast being obtained solely through reflection from the objects, and not from the relative intensity of their illumination.

flat of keel (*Ship Constr*). The portion of a ship's form actually coinciding with the base line in a transverse plane.

flat pointing (*Build.*). The method of pointing, used for uncovered internal wall surfaces, in which the stopping is formed into a smooth flat joint in the plane of the wall.

flat-rate tariff (*Elec. Eng.*). A method of charging for electrical energy in which only one single charge is made; e.g. a fixed price per unit consumed.

flat roof (*Build.*). A roof surface laid nearly horizontal, i.e. having a fall of only about 1½ in. in 10 ft.

flat roof antenna (*Radio*). The same as *flat top antenna.*

flat sheets (*Mining*). Iron sheets, laid at rail junctions, crossings, and ends underground, on which tubs or trucks can be turned.

flat spin (*Aero.*). See **spin (flat).**

flat spot (*I.C. Engs.*). In a carburettor, a point during increase of air flow (resulting from increased throttle opening or speed) at which the air-fuel ratio becomes so weak as to prevent good acceleration.

flat surface (*Paint.*). The surface presented by a flat coat.

flat tint (*Photog.*). A surface in an image which is uniform in brightness and colour.

flat top antenna (*Radio*). An antenna in which the uppermost wires run horizontally. Also called FLAT ROOF ANTENNA.

flat-topped wave (*Elec. Eng.*). A wave-form of current, voltage, flux, etc., sometimes met with in alternating-current work, in which the ordinates of the maximum value of the wave are less than those of a corresponding sine wave.

flat tuning (*Radio*). Inability of a tuning system to discriminate sharply between signals having different frequencies.

flat twin cable (*Elec. Eng.*). Cable for wiring work in which two conductors are laid side by side (but not twisted together) and surrounded by a suitable covering or sheath.

flatness (*Photog.*). A photographic fault whereby contrast is lost through over-exposure or unsuitable development.

flattener (*Glass*). One who takes a cylindrical piece of glass like a wide tube, cracked longitudinally, and, after heating it to softening in a furnace, flattens it out to form a sheet. An old process only used for making special types of sheet.

flatter (*Eng.*). (1) A smith's tool resembling a flat-faced hammer, which is placed on forged work and struck by the sledge-hammer.—(2) A draw-plate for producing flat wire, such as watch-springs.

flatter (*Mining*). A man who uncouples empty tubs or trucks and couples on full tubs, to make up sets at the inbye sidings or putter's flat.

flatting (*Paint.*). Paint, particularly paint used for undercoating, which dries with a dull non-glossy finish.

flatting varnish (*Paint.*). An oil varnish, containing considerable resin, used as a basis for the final coat of varnish.

flatulence (*Med.*). Excessive accumulation of air or gas in the stomach or intestines.

fla'tus (*Med.*). Gas or air accumulated in the stomach or intestines.

flaunching (*Build.*). The slope given to the top surface of a chimney, in order that it may throw off the rain.

flaves'cent (*Bot.*). Having yellow-green or yellow spots mingled with the normal green of the general surface.

flav'one (*Chem.*). A yellow plant pigment; the phenyl derivative of chromone, parent substance of a number of natural vegetable dyes.

flaw-piece (*Timber*). A slab of timber cut from the outer parts of a log.

fleaking (*Build.*). The operation of making a thatched roof with reeds.

fleam (*Carp.*). The angle of rake between the cutting edge of a saw-tooth and the plane of the blade.

fleam (*Hyd. Eng.*). An artificial water-course.

fleam (*Vet.*). A lancet used in phlebotomy.

fleam-tooth (*Tools*). A saw-tooth having the shape of an isosceles triangle.

flèche, flesh (*Arch.*). A very slender spire, particularly a timber one, springing from a roof ridge.

flèches d'amour, dam-oor' (*Min.*). Acicular, hair-like crystals of rutile, a crystalline form of oxide of titanium, TiO_2, embedded in quartz. Used as a semi-precious gemstone. Also called LOVE ARROWS—the literal translation of *flèches d'amour.*

fleck (*Mining*). To flake off or fall off suddenly, due to a natural parting; as coal in a coal-seam.

flecked (*Woollen*). The term applied to yarn or cloth having a spotted effect.

fled (*Pot.*). Said of pottery in which cracks have appeared after removal from the biscuit-oven.

fleece wool (*Textiles*). Wool obtained from a clip made subsequent to the first clip (which is termed *lamb's wool* or *yearling's wool*).

fleecy fabrics (*Textiles*). A term applied in the hosiery trade to fabrics having at the back a thick yarn which is brushed to raise a pile.

Fleming valve (*Thermionics*). The original form of thermionic valve, comprising an incandescent filament lamp, with an additional electrode acting as an anode sealed into the bulb.

Fleming's rule (*Elec. Eng.*). A simple rule for relating the directions of the flux, motion, and e.m.f. in an electric machine. The forefinger, second finger, and thumb, placed at right-angles to each other, represent respectively the directions of flux, e.m.f., and motion or torque. If the right hand is used the conditions are those obtaining in a generator (*Fleming's right-hand rule*), and if the left hand is used the conditions are those obtaining in a motor (*Fleming's left-hand rule*).

Flemish bond (*Build.*). A bond consisting of alternate headers and stretchers in every course, each header being placed in the middle of the stretchers in the courses above and below.

Flemish garden bond (*Build.*). A bond in which each course consists of three stretchers alternating with a header, each header being placed in the middle of the stretchers in the courses above and below.

Flemming's germ-centres (*Zool.*). In Vertebrates, the centres of the cortical nodules of the lymph-glands where active formation of lymph-corpuscles is taking place.

flesh side (*Eng.*). That side of leather which formed the internal surface of the hide; used next to the pulley in driving belts.

flesh split (*Leather*). The middle split of a hide, or the inner split of a sheepskin.

fleshing (*Furs, Leather*). The operation of removing fat and flesh from the inner side of hides and skins.

fleshy (*Bot.*). Thick and soft, but not necessarily juicy. Cf. *succulent.*

fleshy disseminule (*Bot.*). A seed or fruit consisting in large part of fleshy material.

fletton (*Build.*). A well-known type of brick of a mottled pink and yellow colour and having sharp arrises and a deep frog; made chiefly around Peterborough and Bedford.

Flewel'ling circuit (*Radio*). A form of super-regenerative receiving circuit in which the quenching oscillations are generated by the same valve as is used for super-regeneration.

flews (*Hyd. Eng.*). A Scottish term for a sluice draining water from irrigated lands.

flex (*Elec. Eng.*). A colloquial term for *flexible cord, flexible cable.*

flex (*Struct.*). To bend, as a beam under applied loading.

flexibil'itas ce'rea (*Med.*). The state in which the limbs will remain in any position in which they are passively placed; e.g. in catalepsy.

flexible (*Bind.*). The term used to indicate that in attaching the sections of a volume together the bands are not let into the back of the sections, the sewing thread passing completely round each band. See **raised bands.**

flexible cable (*Elec. Eng.*). A cable containing one or more cores of such cross-section and sufficiently fine stranding as to make the whole quite flexible.

flexible cord (*Elec. Eng.*). A flexible cable of small cross-section, consisting usually of a large number of fine wire strands, surrounded by rubber insulation and braiding. Used for connexions to portable domestic apparatus, pendant lamps, etc. See **twin flexible cord.**

flexible coupling (*Eng.*). A shaft coupling used to connect two shafts in which perfectly rigid alignment is impossible; the drive is commonly transmitted from one flange to another through a resilient member, such as a steel spring, or a rubber disc or bushes.

flexible support (*Elec. Eng.*). A support for an overhead transmission line, which is designed to be flexible in a direction along the line, but rigid in a direction at right-angles to the line.

flexible suspension (*Elec. Eng.*). A method of suspending the contact wire of a traction system so that it has a certain amount of lateral and vertical movement relative to the fixed supports.

flexible wiring (*Elec. Eng.*). The use of flexible cables in wiring an interior installation.

flexor (*Zool.*). A muscle which by its contraction bends a limb or a part of the body. Cf. *extensor.*

flex'uose, flexuous (*Bot.*). Said of a stem which is zig-zag, usually showing a change of direction at each node.

flexure (*Struct.*). The bending of a member; e.g. under load.

flexures (*Geol.*). See **folding.**

flick (*Cinema.*). A colloquialism for *cinematograph film.*

flick roll (*Aero.*). See **roll.**

flicker (*Cinema.*). The perception of discontinuity in the projection of motion pictures, due to insufficient number of flashes of the pictures per second, the effect becoming more pronounced with increase of illumination.

flickers (*Cinema.*). A primitive form of motion picture in which consecutive pictures of action on paper are flicked before the eye.

flicker effect (*Thermionics*). The irregular emission of electrons from a thermionic cathode due to spontaneous changes in the condition of the emitting surface.

flicker photometer (*Illum.*). A photometer in which a screen is illuminated alternately and in quick succession by the lamp under test and a standard lamp, thus producing a flickering effect. When the illumination from the two sources of light is equal, the flickering effect disappears.

flicker shutter (*Cinema.*). The rotating shutter that flashes the stationary images on to the screen, as contrasted with the automatic shutter, which cuts the light off the film when intermittent motion ceases.

flier (*Build*). A step, rectangular in plan, forming part of a stair.

flier (*Carp.*). A *flying-shore* (q.v.).

flies (*Cinema.*). The upper part of the stage and wings, remote from, and unseen by, the audience, into which scenery, drop curtains, screens with loudspeakers, etc., can be withdrawn at will by mechanical hoists.

flight (*Build.*). A regular series of steps, between successive landings.

Flinders bar (*Ships*). A bar of soft iron properly placed in the binnacle of a ship, in order to correct errors in the ship's compass due to variation in the earth's magnetism.

flint (*Geol.*). Flints are concretions of silica, sometimes tabular, but usually irregular in form, distributed in countless numbers on the bedding planes of the Upper Chalk. Thought to have been formed by the segregation of organic silica derived from siliceous sponges. See also **paramudra.**

flint (*Paper*). A coated paper with a hard polished surface produced by a flint burnisher. It is used for box covering.

flint glass (*Glass*). Originally lead glass, because the good quality silica needed to ensure freedom from colour was obtained from crushed flints. The name is now often applied indiscriminately to any glass of good 'colour.'

flint gravel (*Geol.*). A deposit of gravel in which the component pebbles are dominantly of flint. The Tertiary and fluvioglacial gravels in S.E. England are essentially of this kind.

flint wall (*Build.*). A wall built of broken flints set in mortar, with their black broken surfaces exposed on the face, and having masonry quoins.

flint ware (*Pot.*). An alternative name for stoneware.

Flintkote (*Build.*). A brand of bituminous material used as a waterproofing agent.

Flintshire process (*Met.*). A process for smelting lead sulphide ores in a reverberatory furnace. Some of the sulphide is first converted to oxide, the temperature is then raised, and the sulphide and oxide combine, producing lead and sulphur-dioxide.

flip-flop (*Elec. Comm.*). A pair of gas-filled or vacuum valves so arranged, by resistance back-coupling, that only one is conducting; which one conducts is determined by external impulses.

flirt (*Horol.*). A device for bringing about the sudden movement of mechanism.

flitch (*Timber*). A piece of timber of greater size than 4 × 12 in., intended for re-conversion.

flitch beam (*Build.*). A built-up beam formed of an iron plate sandwiched between two timber beams, the whole being securely bolted together. Also called FLITCHED BEAM, SANDWICH BEAM.

flitching (*Mining*). The operation of taking off the sides of an underground roadway or heading.

float. (1) A floating metal air-container for indicating the height of liquid in a tank.—(2) A polishing block used by marble-workers (see also **float stone,** *Build.*).—(3) A cart having a cranked axle and a very low floor.

float (*Aero.*). The distance travelled by an aircraft between flattening-out and landing.

float (*Build.*). A plasterer's trowel.

float (*Cinema.*). Said of walls or ceilings of sets which can be swung out of the way temporarily to obtain desired camera angles.

float or **float-cut file** (*Eng.*). A single-cut file, i.e. a file having only one set of parallel teeth, as distinct from a *cross-cut file.*

float (*Hyd. Eng.*). A small floating body whose rate of passage down a stream can be taken as a measure of the velocity of flow of the stream.

float (*Mining*). (1) Values so fine that they float on the surface of the water when crushed or washed; e g. *float gold.*—(2) Surfacial deposit of rock or mineral detached from the main dyke or vein; e g. *float quartz* in the Lake District.

float (*Petrol Engines*). A small buoyant cylinder of thin brass, steel, or proofed cork, placed in the float chamber of a *carburettor* (q.v.), for actuating a valve controlling the petrol supply from the main tank.

float (*Plumb.*). The floating, hollow ball in a *ball-cock* (q.v.).

float (*Weaving*). (1) A thread, either warp or weft, which passes over other threads, in order to produce the requisite pattern.—(2) A defect in a fabric, caused by a thread passing over other threads with which it is designed to interweave.

float bowl (*Eng.*). A float chamber. [U.S.]

float case (*Hyd. Eng.*). A *caisson* (q.v.).

float chamber (*Eng.*). In a *carburettor* (q.v.), the petrol reservoir from which the jets are supplied, and in which the fuel level is maintained constant by means of a float-controlled valve.

float-cut file. See **float** (*Eng.*).

float seaplane (*Aero.*). An aeroplane of the seaplane type, in which the water support consists of floats under the main undercarriage, and sometimes at the tail and wing tips. It may be of the *single-* or *twin-float type.*

float stone (*Build.*). A shaped iron block which is rubbed over curved brickwork, such as cylindrical backs, in order to remove marks left on the surface by the rough dressing.

float stone (*Min.*). A coarse, porous, friable variety of impure silica, consisting chiefly of the siliceous skeletons of infusoria. On account of its porosity it floats on water until saturated, hence the name.

float switch (*Elec. Eng.*). A switch operated by a float in a tank or reservoir, and usually controlling the motor of a pump.

floated coat (*Plast.*). A coat of plaster smoothed with a float.

floating (*Plast.*). The second of three coats applied in plastering, the method of application being with a float, to bring the coat level with the screeds.

floating accent (*Typog.*). See **accent.**

floating anchor (*Ships*). See **sea anchor.**

floating bank (*Eng.*). A stoker-fired boiler to which sufficient coal is fed to keep the boiler under full pressure.

floating battery (*Elec. Eng.*). A battery connected permanently in parallel with an electric supply circuit, thereby serving as a stand-by in case of failure of the main supply, and also assisting in the supply of peak loads.

floating bay (*Plast.*). An area between screeds, which is to be filled in with plaster.

floating bricks (*Build.*). See **Rhenish bricks.**

floating bridge (*Civ. Eng.*). A bridge supported on pontoons instead of on fixed piers.

floating-card compass (*Ships*). A compass in which a circular card, marked with the 32 points and having two or more magnetic needles attached below, floats in a brass bowl on a mixture of water and alcohol, or on oil, being free to turn on the point of a steel cone.

floating carrier system (*Radio*). A system of radio-telephone transmission in which the amplitude of the carrier wave varies with the depth of modulation.

floating crane (*Eng.*). A large crane carried on a pontoon; used in fitting-out docks, etc.

floating dam (*Hyd. Eng.*). A *caisson* (q.v.).

floating dry dock (*Civ. Eng.*). A floating structure of iron or steel, with air chambers. It is open at the ends, and can be sunk by admitting water to the air chambers, and raised when a vessel is berthed for repairs, etc., lifting the vessel with it. In some cases the dock is sectional, thus facilitating repair.

floating gudgeon pin or **wrist pin** (*Eng.*). A gudgeon or piston pin free to revolve in both the connecting-rod and the piston bosses.

floating harbour (*Hyd. Eng.*). A breakwater formed of booms fastened together and anchored so as to afford protection to vessels behind it.

floating kidney (*Med.*). See **nephroptosis.**

floating respiration (*Bot.*). Respiration using carbohydrates and other reserve materials.

floating ribs (*Zool.*). See **false ribs.**

floating rule (*Build.*). A long straightedge used to form flat surfaces in plaster or cement work.

floating tissue (*Bot.*). A tissue of thin-walled cells, usually containing air. The tissue is very difficult to wet, therefore does not readily become waterlogged; occurs in seeds and fruits which are dispersed by water.

floccilla'tion, floccita'tion, flok'si— (*Med.*). Fitful plucking at the bed-clothes by a delirious patient, as in typhoid fever. See **carphology.**

floc'cose (*Bot.*). Bearing a dense covering of tangled hairs resembling wool, which is easily detached from the plant.

flocculation (*Chem.*). The coalescence of a finely divided precipitate into larger particles.

floc'culent (*Chem.*). Existing in the form of cloud-like tufts.

floc'culi (*Astron.*). The name given by Hale to *faculae* (q.v.) on the solar surface, as photographed in calcium light, when they show as much more extensive than in ordinary photographs.

flocculus (*Zool.*). In higher Vertebrates, a small lateral outgrowth of the cerebellum.—*adj.* **floccular.**

floccus (*Zool.*). In Birds, the downy covering of the young forms of certain species: in Mammals, the tuft of hair at the end of the tail: more generally, a tuft.

flock (*Textiles*). Waste fibres produced in the processes of finishing woollen cloths.

flock paper (*Dec.*). Wallpaper printed with design in an adhesive material, then dusted with fine shreds of wool, plain or coloured.

flogging (*Carp.*). The operation of rough-dressing a timber to shape, when the material is removed in large pieces.

flogging chisel (*Eng.*). A large heavy cold-chisel used for rough work, now largely superseded by pneumatic chisels.

flong (*Typog.*). Papier-mâché sheets used for making moulds from which stereo plates are cast. They consist of layers of tissue and blotting paper pasted together.

flood fencing (*Hyd. Eng.*). Fencing which is so anchored as (1) to enable it to withstand the force of flood waters, or (2) to permit it to hinge over when the water rises sufficiently.

flood fever (*Med.*). See **shimamushi fever.**

flood flanking (*Hyd. Eng.*). The constructing of an embankment by depositing stiff moist clay in separate small loads, so that each shall unite so far as is possible with the others, while the crevices left when the clay has dried out are filled with *sludging* (q.v.).

flood-lighting (*Illum.*). The lighting of a large area or surface by means of light from projectors situated at some distance from the surface.

flood-light projector (*Illum.*). The housing and support for a lamp used in a flood-lighting scheme; it is designed with a reflector which directs the light from the lamp into a suitable beam.

flooding (*Med.*). Copious bleeding from the uterus.

flookan or **flucan** (*Mining*). A vein of clayey material: a vein of fine material and water which will run into underground workings if not stopped.

floor (*Build.*). The surface on which one normally walks within the rooms of a building.

floor (*Foundry*). The bed of sand constituting the floor of a foundry; in it large castings are often made.

floor (*Mining*). The upper surface of the stratum underlying a coal-seam.

floor contact (*Elec. Eng.*). A switch contact which is attached to the floor of an automatic electric lift and is operated by the passenger stepping into the lift; it is usually arranged so as to prevent the lift from being operated from any of the landings.

floor cramp (*Join.*). A cramp for closing up the joints of floor-boarding when it is being nailed in position.

floor guide (*Build.*). A groove formed in a floor surface to receive a sliding door or partition and direct its movement.

floor joist (*Carp.*). A *bridging joist* (q.v.).

floor line (*Join.*). A mark made at the lower end of a door-post, or other finishing, to indicate the level of the floor when the finishing is in position.

floor plan (*Build.*). A separate plan drawn for each floor of a building, showing the dimensions of the rooms, corridors, etc., and the thicknesses of walls.

floor standard (*Illum.*). A portable electric-light fitting, suitable for standing on the floor.

floor stop (*Build.*). A *door-stop* (q.v.) projecting from the floor near a door.

floor strutting (*Carp.*). *Bridging pieces* (q.v.).

floor-switch (*Elec. Eng.*). See **landing switch.**

flooring (*Malting*). The process of spreading out and turning the germinating grain on the floor of the malthouse to ensure aeration.

flop damper (*Build.*). A damper which stays under its own weight in the open or shut position.

flora (*Bot.*). (1) The plant population of any area under consideration.—(2) A description of the plants of any region.

floral axis (*Bot.*). See **receptacle** (6*a*).

floral diagram (*Bot.*). A conventional plan of the arrangement of the parts of a flower as seen in cross-section.

floral envelope (*Bot.*). The calyx and corolla, or perianth.

floral leaf (*Bot.*). (1) A bract or bracteole.—(2) A sepal or petal.

Florentine (*Textiles*). A twilled cotton cloth used for tropical suitings. The weave, a $\frac{3}{1}$ twill, is often termed the Florentine weave.

Florentine arch (*Build.*). An arch having a semicircular intrados and a pointed extrados, giving greater strength at the crown.

Florentine blind (*Build.*). An outside roller blind, similar to the Italian blind but having side pieces.

floret (*Bot.*). An individual flower in a crowded inflorescence.

floriated (*Arch.*). Said of an elaborately ornamented building style.

Florid'eae (*Bot.*). The larger of the two classes of the *Rhodophyceae*, containing many hundreds of species of red seaweeds, many of considerable size, and all characterised by the fact that the cells composing the thalli are united by protoplasmic threads.

florid'ean starch (*Bot.*). A solid carbohydrate resembling starch, formed by red algae as a product of assimilation. It stains reddish or brown with iodine.

floristic composition (*Bot.*). A complete list of the plants forming a plant community.

flos ferri (*Min.*). A 'massive' form (as distinct from individual crystals) of the orthorhombic carbonate of calcium *aragonite*, some of the masses resembling delicate coralline growths; deposited from hot springs.

flotation (*Met.*). An ore concentration process in which air is blown into a mixture of ore pulp, water, oil, and various chemicals. The oil forms a film on the mineral particles and air bubbles adhere to this. Thus the mineral particles are floated while other matter sinks.

flotation gear (*Aero.*). A system of air or gas bags, sometimes with hydrovanes, to enable a land plane, in an emergency, to land and remain afloat, on water.

flour (*Build., Civ. Eng.*). The fine dust incidentally formed in crushing material to be used as an aggregate.

flourom'eter (*Civ. Eng.*). An instrument used to determine the proportion of very fine material (*flour*) in a filler for asphalt.

flow (*Eng.*). A pipe by which water leaves a boiler or pressure cistern. Also called FLOW PIPE.

flow lines (*Met.*). Lines which appear on the surface of iron and steel when stressed to the yield point. They arise from the fact that all parts of a given sample do not yield at the same time; the lines are traces on the surface of the planes along which yielding first occurs.

flow-off (*Moulding*). A channel cut from a riser to allow metal to escape when it has reached a pre-determined height.

flow pipe (*Eng.*). A *flow* (q.v.).—(*Plumb.*) The pipe conveying hot water from the boiler to the tank in a domestic system of hot-water supply.

flow sheet (*Met., etc.*). A diagram showing the sequence of operations employed in a process of production with a given plan; e.g. the extraction and refining of metals.

flow-structure (*Geol.*). A banding, often contorted, resulting from flow movements in a viscous magma, adjacent bands differing in colour and/or degree of crystallisation. It is also shown by the alignment of phenocrysts, or of minute crystals and crystallites, in the groundmass of lavas and, more rarely, minor intrusions.

flower (*Bot.*). A group of closely crowded specialised leaves at the end of a short branch, including one or more of the following kinds of members:—sepals, petals, stamens, carpels.

flowers (*Typog.*). Small type ornaments, copied from early designs, used for building up fancy borders, etc.

flower bud (*Bot.*). A bud enclosing one or more young flowers but no foliage leaves.

flowers of sulphur (*Chem.*). A form of sulphur obtained by slow distillation of other forms.

flowering glume (*Bot.*). A glume which subtends a flower in the spikelet of a grass.

flowing-on (*Dec.*). The process of applying paint or varnish with a full brush, to minimise brush work.

Fluate (*Build.*). A chemical preparation applied to building-stone as a preservative.

flucan (*Mining*). See **flookan.**

fluctuating variation (*Gen.*). Variation as shown by the differences between the individuals of one progeny.

fluctuation (*Bot.*). A change in a plant due to the effect of its environment on it.

fluctuation (*Med.*). The palpable undulation of fluid in any cavity or abnormal swelling of the body.

fluctuation noise (*Thermionics*). The noise produced in the output circuit of an amplifier by shot and flicker effects.

flue (*Build.*). A smoke-duct in a chimney.—(*Eng.*) A passage or channel through which the products of combustion of a boiler or other furnace are taken to the chimney.

flue bridge (*Eng.*). See **firebrick arch.**

flue gas (*Eng.*). The gaseous products of combustion from a boiler furnace, consisting chiefly of CO_2, CO, O_2, N_2 and water vapour, whose analysis is used as a check on the furnace efficiency. See **CO_2 recorder,** also Supplement.

flue gathering (*Build.*). See **gathering.**

flue grouping (*Build.*). The arrangement of flues whereby a number are brought together within a single stack.

flue lining (*Build.*). A fireclay pipe arranged with others within a flue passage to protect the walls.

flue pipe (*Acous.*). A pipe of metal or wood which relies only on the air-column resonance excited by an edge tone for producing a musical note.

flueing soffit (*Build.*). A flush soffit under a geometrical stair.

fluffing (*Leather*). An operation which produces a velvet finish on the flesh side of leather.

fluffy (*Carp.*). A term applied to wood having a woolly instead of a clean surface on being cut.

fluid. A substance which flows. It differs from a solid in that it can offer no permanent resistance to change of shape. See **liquid, gas.**

fluid flywheel (*Eng.*). A device for transmitting power through the medium of the change in momentum of a fluid, usually oil. Similar in principle to a Froude brake, in which the stator is released and forms the driven member.

fluid lubrication (*Eng.*). A state of perfect lubrication in which the bearing surfaces are completely separated by a fluid or viscous oil film which is induced and sustained by the relative motion of the surfaces.

fluidity (*Phys.*). The inverse of *viscosity* (q.v.).

fluing (*Build.*). A term applied to window jambs which are splayed. See **splayed jambs.**

fluing arch (*Build., Civ. Eng.*). See **splaying arch.**

fluke (*Zool.*). A semi-popular name for worms belonging to the group *Trematoda*.

flukes (*Ships*). The flattened and curving points terminating the arms of an anchor.

flume (*Build., Civ. Eng.*). A metal chute used for the distribution of concrete from a placing plant.—(*Hyd. Eng., Mining, etc.*) A flat-bottomed timber trough, or other open channel, for the conveyance of water, e.g. to a water-wheel, ore-washing plant, etc.—(*Aero.*) A *wind-tunnel* (q.v.).

fluobor'ic acid (*Chem.*). A complex monobasic acid formed by the combination of hydrogen fluoride and boron trifluoride. Salts called *borofluorides* or *fluoborates*.

flu'orene (*Chem.*). Diphenylenemethane, $(C_6H_4)_2CH_2$; colourless fluorescent plates; m.p. 113° C., b.p. 295° C.; contained in coal-tar; produced by leading diphenylmethane through red-hot tubes.

fluorescein, —es'e-in (*Chem.*). $C_{20}H_{12}O_5$, resorcinol-phthalein, red crystals which dissolve in alkalis with a red colour and green fluorescence.

fluores'cence. The absorption of radiation of a particular wavelength by a substance and its re-emission as light of greater wavelength. With many substances, such as quinine sulphate, ultra-violet radiation produces visible fluorescence.—(*Cathode Ray Tubes*) The emission of visible light from certain materials when excited by invisible radiation or by electronic bombardment.

fluores'cent screen (*Cathode Ray Tubes*). That portion of a cathode ray tube upon which the luminous spot appears. It consists of a surface layer of fluorescent material, such as zinc sulphide, upon which the electron beam is focused.

flu'orides (*Chem.*). Salts of hydrofluoric acid.

fluorine (*Chem.*). Symbol, F. A non-metallic element, the lightest of the halogens, in the seventh group of the periodic system. At. no. 9, at. wt. 19·00, valency 1. Fluorine is extremely reactive, as it is the most electronegative (non-metallic) of the elements. It is a pale greenish-yellow gas; m.p. −223° C., b.p. −187° C., density 1·696 gms. per c.c. at N.T.P.

fluorite (*Min.*). See **fluorspar.**

fluorophore (*Chem*). A group of atoms which give a molecule fluorescent properties.

fluoro'sis (*Med.*). Chronic poisoning with fluorine.

flu'orspar or **fluorite** (*Min.*). Calcium fluoride, CaF_2, crystallising in the cubic system, commonly in simple cubes. Occasionally colourless, yellow, green, but typically purple; the coloured varieties fluoresce strongly in ultra-violet light.

flush (*Bot.*). (1) A period of renewed growth in a woody plant.—(2) A limited area watered by a spring or by the run off from rainfall, and distinguished by its luxuriant vegetation.

flush (*Build., Join., etc.*). In the same plane.

flush bead (*Join.*). A sunk bead, finished so as to be level with the surface which it decorates.

flush boards (*Bind.*). A method of binding in which boards are drawn on and trimmed with the book. The covers are then flush with the page edges.

flush-bolt (*Join.*). A sliding bolt sunk into the side or edge of a door so as to be flush with the surface.

flush-faced door (*Join.*). See **hospital door.**

flush joint (*Build.*). The type of mortar joint made in *flat pointing* (q.v.).

flush panel (*Join.*). A panel whose surface is in line with the faces of the stiles.

flush-plate (*Elec. Eng.*) See **switch plate.**

flush soffit (*Build.*). The continuous surface under a stair formed of *spandrel steps* (q.v.).

flush-switch (*Elec. Eng.*). A switch which can be mounted flush with the wall; used in electric installation work. Also called PANEL-SWITCH, RECESSED SWITCH.

flush (*San. Eng.*). To cleanse a space by *flushing* (q v.): the water used in flushing.

flush valve (*Plumb.*). A valve operating the flushing system for a fixture.

flushing (*Hyd. Eng., San. Eng.*). The process of cleansing a sewer or other space by suddenly passing through it a quantity of water.

flushing (*Mining*). The operation of clearing off accumulation of fire-damp or noxious gases underground by means of air currents.

flushing tank (*San. Eng.*). A tank used to accumulate the water for flushing a drain or sewer which is not laid at a self-cleansing gradient. The discharge is often effected automatically by a siphoning device.

flushing (*Masonry*). A crushing of the edges of a stone at a *hollow bed* (q.v.), due to excessive pressure upon them.

flute (*Build.*). A long vertical groove, usually circular in form, in the surface of a column or other member.

flutes (*Glass*). Substantially parallel depressions, cut in a glass article or moulded in whilst the glass is plastic, for the purpose of decoration.

fluted carbon (*Illum.*). An arc lamp carbon with grooved sides, used for exceptionally heavy-current arcs.

fluting (*Build.*). See **flute.**

fluting (*Eng.*). Parallel channels or grooves, longitudinal or helical, cut in a cylindrical object such as a tap or reamer.

fluting plane (*Join.*). A special plane for cutting grooves.

flutter (*Acous.*). A wow which has fluctuation changes between about 6 to 30 changes per second.

flutter (*Aero.*). An unstable oscillation arising from aerodynamical and/or mechanical forces interacting with one another.

flutter (*Med*). An abnormality of cardiac rhythm, in which the auricles of the heart contract regularly at a greatly increased frequency (between 180 and 400 beats a minute), the ventricles contracting at a slower rate.

flu'viatile (*Bot., Zool.*). Occurring in rivers and streams.

fluviatile deposits (*Geol.*). Sand and gravel deposited in the bed of a river.

flu'viomarine, —ēn' (*Zool.*). Able to live in rivers and in the sea, as the Salmon.

flu'vioterres'trial (*Zool*). Found in rivers and on their banks, as the Otter.

flux (*Chem.*). A substance added to a solid to increase its fusibility.

flux (*Elec. Eng.*). See **electric— magnetic—**

flux (*Illum.*). See **light flux.**

flux (*Met.*). Material added to a furnace charge to combine with the gangue and form a fusible slag.

flux (*Pot.*). An easily fusible material, such as borax, lead, lime, or silica, used in mixing enamels or glazes.

flux density (*Elec. Eng., Illum.*). The quantity of flux passing through a unit area.

See **electric— luminous— magnetic—**

fluxmeter (*Elec. Eng.*). An electrical instrument for measuring the total quantity of magnetic flux linked with a circuit; it consists of a search-coil, placed in the magnetic field under investigation, and a ballistic galvanometer

fly (*Horol.*). An air brake; a fan with two or four blades, used in clocks to maintain uniformity between the blows of the hammers when striking or chiming.

flyback (*Television*). The return of the scanning spot from the end of one scanning line to the beginning of the next, usually at a much higher speed than during the forward motion.

flyback action (*Horol.*). In a chronograph or stop-watch, that part of the action which causes the hands to fly back to zero when the button is pressed.

fly cutter (*Eng.*). A narrow milling cutter used for cutting slots such as keyways in shafts.

fly frames (*Cotton Spinning*). A series of machines used to attenuate roving in preparation for the spinning frame.

fly leaf (*Bind.*). A blank leaf at the beginning and at the end of a bound volume. It may be part of an end-paper.

fly nut (*Eng.*). See **wing nut.**

fly pinion (*Horol.*). The pinion on the arbor of which a fly is mounted.

fly press (*Eng.*). A press for punching holes, making driving fits, etc.; it consists of a bed supporting a vertical frame through which a square-threaded screw is fitted. The screw is turned by a cross-piece terminating in one or two heavy steel balls, for giving additional impetus to the descent of the die attached to the bottom end.

fly rail (*Join.*). A flap attached to a table-frame by means of a vertical hinge; it swings out to provide support for a folding leaf.

fly shuttle (*Weaving*). The name given to the mechanism, invented by John Kay in 1738, for propelling the shuttle across the loom. It superseded hand-shuttling.

fly spring (*Teleph.*). In a relay spring assembly, a very thin spring for the first contact. The partial operation of the relay is sufficient to cause the fly spring contact to close, thus making a current for the full operation of the relay and for closing the remainder of the contacts.

flywheel (*Eng.*). A heavy wheel attached to a shaft (e.g. an engine crankshaft) either to reduce the speed fluctuation resulting from uneven torque, or to store up kinetic energy to be used in driving a punch, shears, etc., during a short interval.

flywheel-type alternator (*Elec. Eng.*). An alternator having a heavy spider so that a separate flywheel is not necessary to prevent hunting, when running in parallel with others.

fly wire (*Build.*). A fine woven wire mesh used to cover the joint between adjacent pieces of building-board.

fly-blown (*Vet.*), Said of an animal affected by myiasis.

flyer (*Build*). A *flier* (q.v.).

flyer (*Carp.*). A *flying shore* (q.v.).

flyer spinning (*Spinning*). A method of spinning, used for coarse yarns, in which twist is inserted by bobbin and flyer. The flyer guides the yarn on to the bobbin and revolves at a different speed.

flying-boat (*Aero.*). An aeroplane of the seaplane type in which the water support consists of a boat body or hull.

flying bond (*Build.*). See **monk bond.**

flying bridge (*Civ. Eng.*). A temporary bridge.

flying buttress (*Build*). An arched buttress giving support to the foot of another arch. Also called ARC-BOUTANT, ARCH(ED) BUTTRESS.

flying levels (*Surv.*). Back-sight and fore-sight readings taken between any two points, without reference to bench marks, when only the difference of level of the points is required.

flying organ (*Bot.*). Any structure attached to a fruit or seed which facilitates dispersal by the wind.

flying scaffold (*Build.*). A *suspended scaffold* (q.v.).

flying-shore (*Carp*). A horizontal baulk of timber used to provide temporary support between two opposite walls, usually not more than about 30 ft. apart.

flying spot system (*Television*). A system in which the object to be televised is illuminated by a rapidly moving spot of light, the successively illuminated portions being viewed by a photo-electric cell.

foal paralysis (*Vet.*). Pyosepticaemia of sucklings.

foam (*Chem.*). A suspension, often colloidal, of a gas in a liquid.

focal (or **working**) **aperture** (*Photog.*). The ratio of the focal length to the true diameter of the centre of the lens which is in use. This may differ appreciably from the diameter of an inserted diaphragm or an adjusted iris. See ***f*-number.**

focal length of a lens (*Light*). The distance, measured along the principal axis, between the principal focus and the second principal point. In a thin lens both principal points may be taken to coincide with the centre of the lens. See **back—***, **equivalent—***; also **convention of signs.**

focal plane (*Light*). The plane, at right-angles to the principal axis of a lens or lens system, in which the image of a particular object is formed. The principal focal plane passes through the principal focus, and contains the images of objects at infinity.—(*Photog.*) The plane in which light rays from an external object are focused in a camera—the normal location of the sensitive surface of a film or plate, or a ground-glass focusing screen.

focal plane shutter (*Photog.*). A roller blind with a slot, which is pulled rapidly across, and as close as practicable to, the plate or film being exposed in a camera.

focimeter, fō-sim′— (*Photog.*). An arrangement of numbered cards for ascertaining the true focusing adjustment of a camera.

focus (*Geol.*). See **earthquake.**

focus (*Light*). A point to which rays converge after having passed through an optical system, or a point from which such rays appear to diverge. In the first case the focus is said to be *real*; in the second case, *virtual*. The *principal focus* is the focus for a beam of light rays parallel to the principal axis of a lens or spherical mirror.

See **chemical—**
paraxial—*
pulling—
sagittal—*
tangential—*
focusing (*Photog.*)
depth of focus.

focusing (*Acous.*). The concentration of radiated sound power from a diaphragm, because the dimensions of the latter are comparable to or greater than the wavelength of the sound generated.

focusing (*Cathode Ray Tubes*). The bringing together of the stream of electrons emitted from the cathode, substantially to a point, by means of electrostatic or magnetic fields, or by the presence of positive ions in the tube.

focusing (*Photog.*). The act of adjusting an optical system, as in a camera, by observation of the image, generally on a ground-glass screen located where the emulsion will be during subsequent exposure.

focusing arc lamp (*Illum.*). An arc lamp with a feed mechanism arranged in such a way that the position of the arc crater does not alter.

focusing cloth (*Photog.*). Opaque cloth, usually velvet, for excluding extraneous light while focusing an image on the ground-glass screen of a camera.

focusing coil (*Cathode Ray Tubes*). A coil carrying a direct current which produces a magnetic field for focusing the beam.

focusing glass (*Photog.*). A small eye-piece for examining the sharpness of focus of an image on the ground-glass screen of a camera. Also called MAGNIFIER.

focusing screen (*Photog.*). The temporary screen, located in the place of a film or plate, for adjusting the focusing of the lens before exposure. The image is realised on a sheet of plate-glass, sand-blasted, ground with emery, or coated with a translucent varnish.

foetal membranes, fē′tal (*Zool.*). In Reptiles, Birds, and Mammals, outgrowths from the embryo, or the extra embryonic tissue, which surround and protect the foetus and facilitate respiration. See **amnion, allantois, chorion.**

foetus, fē′tus (*Zool.*). A young animal within the egg or the uterus of the mother, from the commencement of organogeny until birth.—*adj.* **foetal.**

fog (*Meteor.*). A condition of obscurity in which *visibility* (q.v.) is less than 1 kilometre. Fog may consist of a cloud of water droplets, dust, or smoke particles, or a combination of these. It is of most frequent occurrence in anticyclones during autumn and winter.

fog (*Paint.*). The thick mist of paint forced through a spray-gun or Aerograph under pneumatic pressure. See also **fogging.**

fog (*Photog.*). The general reduction of silver halide, apart from that exposed to the required image; due either to extraneous light (*light fog*), or to deterioration of the emulsion or to over-vigorous development (*chemical fog*).

See **chemical— dichroic— light—**

fogbow (*Meteor.*). A bow seen opposite the sun in fog. The bow is similar to the rainbow, but the colours are faint, or even absent, owing to the smallness of the drops, which causes diffraction scattering of the light.

fog sickness (*Vet.*). See **tympanites.**

fog signal (*Rail.*). A detonating cap which is placed on a rail before the passage of a train, so that the detonation occurring when a wheel passes over it shall serve as a signal to the driver in foggy weather.

fog-type insulator (*Elec. Eng.*). A type of overhead-line insulator having long creepage distances; specially designed for areas in which fog is prevalent.

fogging (*Paint*). *Blooming* (q v.).

föhn wind, fēn (*Meteor.*). A warm, dry wind which blows down a mountain side It is prevalent on the northern slopes of the Alps, and is likely to occur whenever a cyclonic system passes over mountains.

foig (*Mining*). A crack or a break in the roof.

foil (*Jewel.*). A highly polished leaf of metal placed beneath an inferior stone, or clear enamel, to enhance brilliancy.

foil (*Paper*). Wrapping or decorative paper coated with tin, copper, etc., in powder form.

folded horn (*Acous*). A horn which is constructed so that its cross-section increases according to a specified law with respect to an axis which is not straight but may be turned through several angles in order to reduce the effective space taken by the horn as a whole.

folded vernation (*Bot*). The condition in which the leaf is folded about the midrib, with the two faces brought together.

folded yarns (*Spinning*). Yarns formed from two or more single threads combined; the operation is termed *doubling*.

folding (*Bind., etc.*). The operation of making a fold in a book-sheet or a newspaper, so that the pages will appear in proper relation. Book-sheets are generally machine-folded, newspapers always so. See **parallel—** **square—**

folding (*Geol.*). *Folding* (*bending*) of strata is usually the result of compression that causes the formation of the geological structures known as anticlines, synclines, monoclines, isoclines, etc. The amplitude (i e. vertical distance from crest to trough) of a fold ranges from a fraction of an inch to thousands of feet.

folding boards (*Mining*). See **faulding boards.**

folding doors (*Join*). Doors which close an opening by two leaves hinged at the opposite jambs.

folding shutters (*Join.*). See **boxing shutters.**

folding wedges (*Build., Civ. Eng., etc.*). *Striking wedges* (q.v.) used for tightening and easing shoring and centring, and in some joint construction in joinery.

fo′lia′ceous, fo′liose (*Bot.*). (1) Flat and leaf-like.—(2) Bearing leaves.

foliage leaf (*Bot.*). The ordinary green leaf of a plant, largely concerned with photosynthesis and transpiration.

Fo′lian process (*Zool.*). In Mammals, an anterior process of the malleus which extends into the Glaserian fissure.

foliar gap (*Bot.*). See **leaf gap.**

foliar trace (*Bot.*). See **leaf trace.**

foliated structure (*Geol.*). See **foliation.**

foliation (*Geol.*). The arrangement of minerals normally possessing a platy habit (such as the micas, chlorites, and talc) in folia or leaves, lying with their principal faces and cleavages in parallel planes; due to development under great pressure during regional metamorphism.

fo′licole (*Bot.*). Living on leaves, either as a parasite or as an epiphyte.

folie circulaire, fol-ē sĕr-kü-lăr′ (*Psychol.*). Manic-depressive psychosis, in which phases of melancholia and mania regularly alternate.

folio (*Typog*). (1) A sheet of paper folded in half.—(2) A book made up of sheets folded once, so having four pages to the sheet.—(3) The number of a page.

fo′liobran′chiate (*Zool.*). Having leaf-like gills.

fo′liolose (*Bot.*). Made up of minute flattened lobes.

fo′liose (*Bot.*). Said of a thallus which is flattened and leaf-like.

Folkestone Beds (*Geol.*). A series of variously coloured sands, well exposed at the type locality on the Kent coast, but traceable all round the Weald, lying between the Gault above and the Sandgate Beds below, in the Lower Cretaceous Lower Greensand. Contain glauconite and, locally, iron oxides derived from its decomposition.

fol′licle (*Bot.*). A fruit formed from a single carpel and containing several seeds; it resembles a pod, but splits open along the ventral suture only.

follicle (*Zool.*). Any small sac-like structure, as the pit surrounding a hair-root in Mammals.—*adjs.* **follic′ular, folliculose.**

follic′uli′tis (*Med.*). Inflammation of a follicle, especially of the ovary.

folliculitis, bovine (*Vet*). A pustular eruption of the pilo-sebaceous glands of the udder of milch cows due to infection by staphylococci.

folliculitis, demodectic (*Vet.*). An inflammation of the skin of dogs due to infection of the sebaceous glands by *Demodex folliculorum.*

folliculo′ma (*Med*). A tumour arising from cells in the Graafian follicle of the ovary.

follower (*Civ. Eng.*). An intermediate length of timber which transmits the blow from the monkey to the pile; used when driving below water-level.

follower (*Horol.*). The driven wheel of a pair of wheels engaging with each other. In clocks and watches the wheels are the drivers and the pinions the followers. In synchronous electric clocks the wheels are the followers.

follower (*Surv.*). A chainman who has charge of the rear end of a chain and is responsible for lining-in the leader at each chain's length.

following dirt (*Mining*). A thin bed of unconsolidated dirt: a parting between the top of a coal-seam and the roof. See **pug.**

following stone (*Mining*). A bed of hard stone which falls simultaneously with the removal of the coal from some coal-seams.

fomes, fō′mēz (*Med.*). Any infected object other than food.—*pl.* **fomites** (fō′mit-ēz). Fomites such as clothing, bedding, etc., may convey infection from one person to another.

font (*Typog.*). See **fount.**

Fontainebleau Sands, fon^{g}ten-blō′ (*Geol.*). Marine sands of Oligocene age occurring in France; well known as furnishing the so-called sand-calcites by the local cementation of the sand by calcium carbonate, deposited in such a way as to build up perfect crystals of calcite of rhombohedral form.

fontanelle′ (*Zool.*). A gap or space in the roof of the cranium.

food body (*Bot.*). A soft mass of cells, containing oil and other nutrient substances, attached to the outside of the seed coat; it is eaten by ants, which drag the seed along, leave it when they have eaten the food body, and so assist dispersal.

food-chain (*Zool.*). A series of animals in a community successively dependent on one another for food, and always based on a herbivorous species.

food-cycle (*Zool.*). The sum-total of the food-chains in a given community.

food pollen (*Bot.*). Pollen formed by some flowers, which attracts insects; it may be incapable of bringing about fertilisation and may be formed in special anthers. Insects seeking food pollen help in conveying good pollen to other flowers.

food preservatives (*Chem.*). Substances preventing the fermentation and putrefaction of foodstuffs; e.g sulphurous acid, sodium benzoate.

food vacuole (*Zool.*). In the cytoplasm of some *Protozoa*, a space surrounding a food-particle and filled with fluid

fool-proof. Said of apparatus which cannot damage itself, other apparatus, or personnel, however inaccurately or erroneously operated.

foolscap (*Paper*). A standard size of printing paper 13½×17 in. (U.S., 13×16 in.); *foolscap writing* is 13¼×16½ in.

fool's gold (*Min.*). See **iron pyrite.**

foot, footage (*Acous.*). The pitch of the longest open pipe in a rank which can be operated by the lowest key on a manual is measured by its *footage*; thus an 8-foot stop is in unison with the keys of the manual, while a 4-foot stop sounds an octave higher, etc. For the pedals the unison stops are 16-foot, because that is the length of the open pipe with the lowest unison note.

foot (*Bot.*). A specialised part of the young sporophyte in the *Bryophyta* and *Pteridophyta*, attached to the gametophyte, and serving as an absorbing organ obtaining and conveying nourishment to the young plant.

foot (*Typog.*). The margin at the bottom of a book page.

foot (*Zool.*). A locomotor appendage: in *Crustacea*, any appendage used for swimming or walking: in *Arachnida*, *Myriapoda*, and *Insecta*, the tarsus: in *Echinodermata*, the podia (see **podium**): in *Mollusca*, a median ventral muscular mass, used for fixation or locomotion: in land Vertebrates, the podium of the hind limb, or of both limbs in *Tetrapoda*.

foot-and-mouth disease (*Vet.*). An acute febrile contagious disease of cloven-footed animals, due to infection by a filterable virus; characterised by a vesicular eruption on the mucous membrane and skin, especially in the mouth and in the clefts of the feet.

foot block (*Carp.*). An *architrave block* (q.v.).

foot blower (*Glass*). A man who blows a small ball which is applied to the stem of a glass article and then opened out to form a foot.

foot-board (*Rail.*). See **foot-plate.**

foot bolt (*Join.*). A robust form of tower bolt, fixed near the foot of a door in a vertical position.

foot brake (*Automobiles*). A pedal operating the brake shoes on all four wheels of a car, either through levers and cables, or by hydraulic means. See **hydraulic brake** (2).

footbridge (*Civ. Eng.*). A bridge for the use of pedestrians only.

foot-candle (*Illum.*). A unit of illumination; it is the illumination produced on the surface of a sphere, having a radius of 1 ft., by a source of one candle-power placed at the centre of the sphere; it is equal to a luminous flux density of 1 lumen per sq. ft. Sometimes called a CANDLE-FOOT.

foot cell (*Bot.*). A small, thick-walled segment of the hypha from which a conidiophore of a mould (*Aspergillus*) arises.

foot irons (*Build.*). Shaped iron bars which can be partly built into the joints of a manhole wall, leaving projecting steps for use by workmen descending the manhole. Also called STEP IRONS.

foot-pace (*Build.*). A *dais* (q.v.).

foot plate (*Build.*). A *hammer-beam* (q.v.).

foot-plate (*Rail.*). The platform on which the driver and fireman of a locomotive stand.

foot-pound (*Eng.*, *Phys.*). The unit of work in the British system of units. It is equal to the work done in raising a mass of one pound through a vertical distance of one foot against gravity.

foot-rail (*Rail.*). A *flanged rail* (q.v.).

footrill (*Mining*). An adit or tunnel, driven into a hillside, through which trains of tubs or trucks are drawn.

foot rot (*Vet.*). Ulceration of the skin of the coronary band of sheep due to infection by *Fusiformis necrophorus*.

foot run (*Build.*, *Civ. Eng.*). A term meaning foot of length, as in speaking of a loading or of a price *per foot run*.

foot screws (*Surv.*). See **plate screws.**

foot-stall (*Build.*). The base of a pillar.

footstep bearing (*Eng.*). A thrust bearing used to support the lower end of a vertical shaft.

footstone (*Build.*). The lowest coping-stone over a gable.

foot switch (*Elec. Eng.*). A switch arranged for operation by the foot.

foot-ton (*Eng.*, *Phys.*). 2240 *foot-pounds* (q.v.).

foot valve (*Eng.*). (1) The non-return or suction valve fitted at the bottom of a pump barrel, or in the valve chest of a pump.—(2) A non-return valve at the inlet end of a suction pipe.

footwall (*Geol.*, *Mining*). The lower wall of country rock in contact with a vein or lode. The upper wall is the *hanging wall.*

footway (*Mining*). A colliery shaft in which ladders are used for descending and ascending.

footage (*Acous.*). See **foot.**

footage (*Cinema.*). The length of a sound-film in feet, the standard speed being 90 ft. per minute through all cameras and projectors; 400 ft. of sub-standard film are equivalent in projection time to 1000 ft. of standard film.

footage number (*Cinema.*). Before development, all negative film is exposed in a machine which exposes a sequence number (*footage number*) on the edge of the film, so that every foot of film is identifiable, both as a negative and after printing.

footing (*Build.*, *Civ. Eng.*). The lower part of a column or wall, standing immediately upon the foundation; usually enlarged locally in order to distribute the load over a greater area.

footing (*Elec. Eng.*). The foundation which is set in the ground to support a tower of an overhead transmission line.

footing (*Hyd. Eng.*). The lowest and, usually, flattest part of the slope of a sea embankment.

footing resistance (*Elec. Eng.*). The ohmic resistance between a transmission-line tower and the earth.

forage mites (*Vet.*). Acari of the family *Tyroglyphidae*, which commonly infest the skin of animals and birds.

fora'men (*Bot.*). See **micropyle.**

foramen (*Zool.*). An opening or perforation, especially in a chitinous, cartilaginous, or bony skeletal structure.

foramen lacerum, las'— (*Zool.*). An opening of the Vertebrate skull in the side of the brain-case, which is situated between the alisphenoid and the orbitosphenoid, and through which pass the third, fourth, fifth ophthalmic, and sixth cranial nerves.

foramen magnum (*Zool.*). The main opening at the back of the Vertebrate skull, by which the spinal cord issues from the brain-case.

For'aminif'era (*Zool.*). An order of *Sarcodina*, the members of which have numerous fine anastomosing pseudopodia and a shell which is usually calcareous; the ectoplasm is sometimes vacuolated.

forb (*Bot.*). Any herb other than a grass.

Forbes's zones of depth (*Ocean.*). A series of depth zones having distinct faunae, especially in European seas; i.e. the *littoral zone*, the *laminarian* *zone*, the *corallin zone*, and the *zone of deep-sea corals*.

force (*Mech.*). That which, when acting on a body which is free to move, produces an acceleration in the motion of the body. The unit of force is that which produces unit acceleration in unit mass. See **dyne, poundal.**

force diagram (*Struct.*). A diagram in which the internal forces in a framed structure, assumed pin-jointed, are shown to scale by lines drawn parallel to the members themselves. Also called a RECIPROCAL (or STRESS) DIAGRAM.

force feed (*Eng.*). Lubrication of an engine by forcing oil to main bearings and through the hollow crankshaft to the big-end bearings.

force piece or **fore set** (*Mining*). Timber set to support roof at the working face.

force pump (*Eng.*). Any pump which delivers liquid under a pressure greater than its suction pressure. It consists of a barrel fitted with a solid plunger, and a valve chest with suction and delivery valve.

force pump (*Gas Fittings, Plumb.*). An air pump used to clean out gas and other service pipes by blowing air through them.

forces, composition of (*Mech.*). See **composition of forces.**

forces, polygon of (*Mech.*). A polygon whose sides are parallel and proportional to the forces acting at a point, the directions of the forces being cyclic around the polygon. The polygon is closed if the forces are in equilibrium, otherwise the closing side of the polygon is parallel and proportional to the equilibrant of the forces.

forces, resolution of (*Mech.*). The process of substituting two forces in different directions for a single force, the latter being equal to the resultant of the two components. If these are at right-angles to each other, the one which makes an angle θ with the original force P is equal to $P \cos \theta$, the other being $P \sin \theta$.

forces, triangle of (*Mech.*). A particular case of the polygon of forces drawn for three forces in equilibrium at a point. See **forces (polygon of).**

forced-circulation boilers (*Eng.*). Steam boilers in which water and steam are continuously circulated over the heating surface by pumps (as opposed to natural circulation systems) in order to increase the steaming capacity. See **Velox boiler, Löffler boiler.**

forced commutation (*Elec. Eng.*). The usual process of commutation, in which the change of direction of the current in the coil actually undergoing commutation is assisted by flux from a commutating pole.

forced-draught (*Elec. Eng.*). Said of electrical apparatus cooled by ventilating air supplied under pressure from some external source.

forced draught (*Eng.*). An air supply to a furnace driven or induced by fans or steam jets (as opposed to the *natural* draught created by a chimney) in order to obtain a high rate of combustion. See **closed stokehold, induced draught, balanced draught.**

forced-draught furnace (*Eng.*). A furnace, but more particularly a boiler furnace, arranged to work under forced draught.

forced-flow boilers (*Eng.*). See **forced-circulation boilers.**

forced lubrication (*Eng.*). The lubrication of an engine or machine by oil under pressure. See **force feed, full force feed.**

forced movements (*Physiol.*). See **tropism.**

forced oscillations (*Radio*). Oscillatory currents whose frequency is determined by factors other than the constants of the circuit in which they are flowing; e.g. those flowing in a resonant circuit coupled to a fixed frequency oscillator. Cf. *free oscillations*.

forced vibrations (*Phys.*). Vibrations which result from the application of a periodic force to a body capable of vibrating. The amplitude of forced vibrations becomes very great when resonance occurs, that is, when the frequency of the applied force equals the natural frequency of the vibrator, particularly if the damping is small.

forceps (*Anat.*) That part of either of the two ends of the *corpus callosum* of the brain which diverges into the adjacent brain tissue on each side.

forceps (*Med.*). A pincer-like instrument with two blades, for holding, seizing, or extracting objects. *Obstetrical forceps* have large blades, which, applied to the foetal head, aid delivery.

forceps (*Zool.*). In *Dermaptera*, the pincer-shaped cerci: in *Arachnida* and *Crustacea*, the opposable distal joints of the chelae: in *Echinodermata*, the distal opposable jaws of pedicellariae. —*adj.* **forcip'ulate.**

forcing. The process of hastening growth by artificial means (frames, glass-houses, soil-heating).

forcing set (*Mining*). A pump for forcing water to a higher level or to the surface.

for'cipate (*Bot.*). Having the form of a pair of pincers.

forcipate, forcip'ulate (*Zool.*). Said of pedicellariae the jaws of which are longer than they are broad.

forcip'iform (*Zool.*). Said of pedicellariae in which the jaws cross at their lower ends.

Forcip'ula'ta (*Zool.*). An order of *Asteroidea*, in which the dorsal surface is beset with small spines surrounded by numerous forcipulate pedicellariae; the tube-feet terminate in suckers.

fore-and-aft level (*Aero.*). See **longitudinal clinometer.**

forebay (*Hyd. Eng.*). A reservoir at the head of a pipe line.

fore-brain (*Zool.*). In Vertebrates, that part of the brain which is derived from the first or anterior brain-vesicle of the embryo, comprising the olfactory lobes, the cerebral hemispheres, and the thalamencephalon: the first or anterior brain-vesicle itself.

forecast (*Meteor.*). A statement of the anticipated weather conditions in a given region, usually for a period of 12, 24, or 36 hours; made from a study of current synoptic charts.

fore-drift (*Mining*). The one of a pair of parallel headings which is kept a short distance in advance of the other.

fore-edge (*Bind., Typog.*). The outside margin of a book page; the edge opposite to the back: the outer edge of a volume. Cf. *head, tail.*

fore-gut (*Zool.*). That part of the alimentary canal of an animal which is derived from the anterior ectodermal invagination or stomodaeum of the embryo.

fore observation (*Surv.*). Any observation made, with a surveying instrument, in the direction of progress of the survey. Cf. *back observation.*

fore plane (*Join.*). A bench plane intermediate in size between the jack and the jointing plane.

forepoling (*Mining*). A method of progressing through loosely consolidated ground by driving poles forward over frames.

fore runner tip (*Bot.*). A leaf tip which becomes active while the rest of the leaf is developing.

fore set (*Mining*). See **force piece.**

fore shift (*Mining*). The first or morning shift of mine workers.

fore-shore. That area of shore which is uncovered between high water and low water.

fore sight (*Surv.*). The levelling staff reading as taken forward to a station which has not been passed by the instrument. The last reading taken by the levelling instrument at any given set-up is invariably a *fore sight.* See also **back sight** and **intermediate sight.**

foredge (*Bind., Typog.*). See **fore-edge.**

Foreland Grits (*Geol.*). A series of reddish sandstones and grits resembling Old Red Sandstone, of Lower Devonian age; occur in N. Devon and adjacent parts of N. Somerset. They are the oldest Devonian rocks exposed in these parts.

Foreman Series (*Geol.*). A non-marine formation of Upper Jurassic age occurring in the Cordilleran geosyncline, as in northern California. Marine invertebrates occur in certain beds.

forest climax (*Bot.*). A climax community composed of trees.

Forest Marble (*Geol.*). A shelly oölitic limestone in the Great Oölite Series of the Cotteswold Hills, between the Bradford Clay and Cornbrash.

forfex (*Zool.*). See **forceps.**

forfic'iform (*Zool.*). Said of pedicellariae in which the jaws do not cross.

forfic'ulate (*Bot*). Shaped like scissors.

forge (*Met.*). A plant where forging is carried out.

forge pigs (*Met.*). Pig-iron suitable for the manufacture of wrought-iron.

forge scale (*Eng.*). The iron oxide coating which forms on iron and steel during forging.

forge tests (*Eng.*). Rough workshop tests made to check the malleability and ductility of iron and steel.

See **bending test** **ramshorn test**
compression do. **rivet** do.
drifting do. **welding** do.

forged work (*Eng.*). Wrought-iron work shaped by forging, as distinct from cast or riveted work.

forging (*Eng.*). The operation of shaping hot metals by means of hammers or presses. It includes hand-hammer, steam-hammer, press and drop forging.

forging machines (*Eng.*). Power hammers and presses used for forging and drop forging. See **drop forging.**

fork (*Horol.*). In lever escapements, the end of the lever which receives the impulse pin.

fork (*Mining*). (1) A tool with a long wooden handle and prongs for loading lump coal.—(2) A double-pronged clip on a tub or wagon for the haulage rope or chain.—(3) *In fork*, in check; e.g. to keep the water in a mine *in fork* is to check its inflow.

fork, tuning (*Acous.*). See **tuning fork.**

forked, forking (*Bot.*). Dividing into two (or more) distinct branches which diverge as they elongate.

forked channel (*Elec. Comm.*). A channel which divides for either simultaneous or alternative reception from one transmitting system.

forked circuit (*Elec. Comm.*). The same as *divided circuit.*

forked lightning. A popular name given to a lightning stroke; the name derives from the branching of the stroke channel which is commonly observed.

forked tenon (*Join.*). A joint formed by a slot mortise astride a tenon cut across the length of a member.

forking (*Bot.*). See **forked.**

forkstaff plane (*Join.*). A plane adapted for shaping convex cylindrical work.

form (*Civ. Eng.*). See **mould.**

form (*Crystal.*). A complete assemblage of crystal faces similar in all respects as determined by the symmetry of a particular class of crystal structure. Thus the *cube*, consisting of six similar square faces, and the *octahedron*, consisting of eight faces, each an equilateral triangle, are crystal *forms.* The number of faces in a form ranges from one (the pedion) to forty-eight (the hexakis-octahedron). A natural crystal may consist of one form or many.

form, cable (*Elec. Comm.*). See **cable form.**

form drag (*Aero.*). That part of the drag represented by the components of the pressures at points on the surface of an aerofoil, resolved normal to the surface. Also called PRESSURE DRAG.

form factor (*Elec. Eng.*). The ratio of the r.m.s. value of an alternating wave to its mean value taken over half a cycle. See **field-form factor.**

form genus (*Gen.*). A group of species which have similar morphological characters, but which are not certainly known to be related in descent. The species are *form species.*

form grinding (*Eng.*). See **profile grinding.**

form species (*Bot.*). See under **form genus.**

form tool or forming cutter (*Eng.*). Any cutting tool which produces a desired contour on the work-piece by being merely fed into the work, the cutting edge having a profile similar to, but not necessarily identical with, the shape produced. See **chaser.**

formwork (*Civ. Eng.*). *Shuttering* (q.v.).

formal'dehyde (*Chem.*). H·CHO, b.p. −21° C., a gas of pungent odour, readily soluble in water, and usually used in aqueous solution. Formaldehyde easily polymerises to *paraformaldehyde* (q.v.) or metaformaldehyde. It is produced by oxidation of methyl alcohol, or by the oxidation of ethylene in the presence of a catalyst. It forms with ammonia *hexamethylene-tetramine* (q.v.). It is a disinfectant and hardens albuminous substances; of great importance in plastics manufacture.

formaldehyde resins (*Chem.*). Synthetic resins which are condensation products of formaldehyde with phenols, urea, etc.

for'malin (*Chem.*). The term for a commercial 40% aqueous formaldehyde solution.

formant (*Acous.*). A specific type of wave-forms produced by the human voice and by certain musical instruments.

format (*Print.*). The general appearance or style of a book, including size, quality of paper, type face, and binding.

formates (*Chem.*). The salts of *formic acid* (q.v.).

formation (*Bot.*). See **association.**

formation (*Geol.*). A non-committal term for one of the larger stratigraphical divisions, more accurately designated *stage, series,* or *system.*

formation (*Surv.*). The surface to which earthwork will have to be carried in a bank, or down to which it will have to be excavated in a cut, in the process of executing such a work as the construction of a road or railway. Permanent-way materials are laid upon formation.

formation level (*Surv.*). The height above datum of any given point on formation.

formative region (*Bot.*). The growing point of a stem or root.

formative stage of growth (*Bot.*). The stage in development when a cell is formed from a pre-existing cell.

formative-trophic (*Zool.*). In development, pertaining to stimuli which assist indirectly in the production of structures which are qualitatively different, or to the effects of such stimuli. Cf. *augmentative-trophic reaction.*

forme (*Typog.*). Type matter assembled and locked up in a chase ready for printing.

formed plate (*Elec. Eng.*). A type of plate used in lead-acid accumulators; made by electrolytically converting the substance of which the plate is made into active material.

former (*Elec. Eng.*). A tool for giving a coil or winding the correct shape; it sometimes consists of a frame upon which the wire can be wound, the frame afterwards being removed.

former-wound coil (*Elec. Eng.*). An armature coil built to the correct shape by means of a former, it being then dropped into the slots on the armature.

formic acid (*Chem.*). HCOOH, a colourless liquid, of pungent odour, corrosive, m.p. 9° C., b.p. 101° C., prepared by absorption of carbon monoxide in soda-lime at 210° C.

formication (*Med.*). The sensation such as would be produced by ants crawling on the skin.

forming cutter (*Eng.*). See **form tool.**

formol titration (*Chem.*). A method of estimating volumetrically the amount of amino acids present in a solution. It is based upon the fact that amino acids and their derivatives possess both a carboxyl and an amino group which neutralise each other, and that by the addition of formaldehyde the amino group is converted into a methylene derivative without basic properties, by which reaction it becomes possible to titrate subsequently the carboxyl in the usual manner.

formula. A fixed rule or set form.—(*Chem.*) The representation of the nature and number of the atoms present in a molecule of a compound by means of letters and figures, e.g. H_2SO_4, C_2H_5OH.—(*Maths.*) A rule expressed in algebraic symbols.—(*Med.*) A prescription.

fornicate (*Bot.*). Arched and hood-like.

fornix (*Zool.*). In the brains of higher *Vertebrata*, a tract of fibres connecting the posterior part of the cerebrum with the hypothalamus.

for'sterite (*Min.*). An end-member of the olivine group of minerals, crystallising in the orthorhombic system. Chemically, forsterite is silicate of magnesium, Mg_2SiO_4.

forsterite-marble or **ophical'cite** (*Geol.*). A characteristic product of the contact metamorphism of magnesian (dolomitic) limestones containing silica of organic or inorganic origin. The dolomite splits up into magnesia, CO_2 and $CaCO_3$. The first combines with the silica to form forsterite, while the calcium carbonate recrystallises as marble.

Forstner bit (*Carp.*). A patent brace-bit for sinking blind holes in timber.

Fort Pierre Shales (*Geol.*). Marine shales containing shell-banks of lamellibranchs (*Lucina*) deposited during Cretaceous (Montanan) times in the region of the Great Plains of the U.S.A. See also **tepee buttes.**

Fortin's barometer (*Meteor.*). A pattern of mercury barometer suited for accurate readings of the pressure of the atmosphere. The zero of the scale is indicated by a pointer inside the mercury cistern, the bottom of which is flexible and may be moved by an adjusting screw until the mercury surface just touches the pointer.

forward eccentric (*Eng.*). On a steam-engine having link motion reverse gear, the eccentric which drives the valve when the engine is going ahead. See **link motion.**

forward lead (*Elec. Eng.*). See **forward shift.**

forward perpendicular (*Ship Constr.*). The forward side of a ship's stem post when this is truly perpendicular to the longitudinal base line; but in cases when the stem post is 'raked,' i.e. angled to the base line, it is the perpendicular intersecting the forward side of the stem post at the summerload water line.

forward shift (*Elec. Eng.*). A movement of the brushes of a commutator machine around the commutator, from the neutral position, and in the same direction as that of rotation. Also called **forward lead.**

forwarding (*Bind.*). The operations entailed in bookbinding, until a book has been placed in its covers. See **finishing.**

Fosalsil (*Build.*). A heat-insulating, fire-resisting material of great mechanical strength made from moler, and used in the form of hollow blocks for partitions.

fossa (*Zool.*). A ditch-like or pit-like depression, as the *glenoid fossa.*

fossette (*Zool.*). In general, a small pit or depression: in some *Arthropoda*, the socket which receives the base of the antennule.

fossicker (*Mining*). One who searches for small amounts of mineral.

fossil (*Geol.*). A relic of some former living thing—plant or animal—embedded in, or dug out of, the superficial deposits of past geological periods. Fossils usually occur as the hard parts of organisms, such as bones or shells, and as moulds, casts, and impressions preserved in rocks. Rarely, creatures having no hard parts, such as jellyfishes, sea-cucumbers, etc., have been recognised in rocks as ancient as the Cambrian; by contrast, complete extinct mammals, including mammoths, occur frozen in the gravels of Pleistocene age in Siberia. See also **palaeontology** and **palaeobotany.**

fossil meal (*Build.*). A diatomaceous earth used in the manufacture of Fosalsil.

fosso'rial (*Zool.*). Adapted for digging.

Foster's reactance theorem (*Elec. Comm.*). An expression for the generalised impedance of a number of tuned circuits, in series or parallel, which indicates that such impedances exhibit resonant and anti-resonant frequencies which are in order.

foto (*Photog.*). A variant spelling of *photograph.*

Föttinger coupling (or **transmitter**), fĕt'ing-er (*Eng.*). A hydraulic coupling, gear, or clutch for transmitting power from, e.g., an engine to a ship's propeller; it consists essentially of an outward-flow water turbine driving an inward-flow turbine, within a common casing.

Föttinger speed transformer (*Eng.*). A hydraulic reduction gear formerly used in marine propulsion, comprising a centrifugal pump and turbine runner in a single unit, giving a speed reduction of 5.1.

Foucault current, foo-kō (*Elec. Eng.*). See **eddy current.**

Foucault's measurement of the velocity of light (*Light*). One of the first successful attempts to obtain an accurate result for this important constant. Foucault, in 1862, made use of a rapidly rotating mirror sending light to a distant fixed concave mirror which reflected it back. Measurement of the displacement of the reflected image gave a value of $2{\cdot}986 \times 10^{10}$ cm. per sec. for the velocity of light *in vacuo.*

Foucault's pendulum (*Astron.*). An instrument devised by Foucault in 1851 to demonstrate the rotation of the earth; it consists of a heavy metal ball suspended by a very long fine wire; the plane of oscillation slowly changes through 15° sin (latitude) per sidereal hour.

foul air flue (*Build.*). A ventilating flue through which vitiated air from a room is drawn.

foul clay (*Build.*). A brick earth composed of silica and alumina combined with only a small percentage of lime, magnesia, soda, or other salts. Such a clay lacks sufficient fluxing material to fuse its constituents at furnace temperature, and is improved by the addition of sand or loam, lime or ashes. Also called PURE CLAY, PLASTIC CLAY, STRONG CLAY.

foulard (*Textiles*). A light-weight dress fabric with a printed pattern, made either of silk or of super-quality cotton.

fouling (*Eng.*). (1) Coming into accidental contact with.—(2) Deposition or incrustation of foreign matter on a surface, as of carbon in an engine cylinder, or marine growth on the bottom of a ship or on structures subject to the action of sea-water.

fouls (*Mining*). The cutting-out of portions of the coal-seam by 'wash outs' or barren ground.

found (*Glass*). The name for the melting operation which the raw materials undergo in a furnace.

foundation (*Build.*, *Civ. Eng*). The formation, either natural or artificial, upon which a building or construction rests.

foundation cylinder (*Eng.*). A large steel or iron cylinder sunk into the ground to provide a solid foundation for bridge piers, etc. in soft ground.

foundation piles (*Civ. Eng.*). Piles driven into the ground to provide an unyielding support for a structure.

foundation ring (*Eng.*). In a locomotive boiler, a rectangular iron ring of rectangular section, to which the lower edges of the inner and outer plates of the fire box are secured.

founded (*Civ. Eng.*). Said of a caisson which has been sunk to a firm level.

founder (*Vet.*). See **laminitis.**

foundering (*Geol.*). Subsidence due to two causes: downwarping, resulting in the development of a monoclinal fold; and displacement along faults which hade inwards towards one another, as in rift valleys. *Cauldron subsidence* (q.v.) is a special case.

foundry (*Eng*). A workshop in which metal objects are made by casting in sand or loam moulds. See **moulding, moulding sands.**

foundry (*Print*). That department of a printing establishment where work in connexion with electrotype and stereotype plates is carried out.

foundry ladle (*Eng.*). A steel ladle lined with fireclay; used for transporting molten metal from a foundry cupola to the moulds. Small ladles are carried by hand, large ones by a truck or crane. See **hand shank.**

foundry pig-iron (*Eng.*). Bars of cast-iron 2-3 ft. long and 3-4 in. diameter, as bought by an iron foundry.

foundry pit (*Eng.*). A large hole in the floor of a foundry, which serves the purpose of a moulding box for very large or deep castings.

foundry stove (*Eng.*). A large oven for drying moulds and cores, heated either externally by hot gases or internally by a fire-basket.

fount or **font** (*Typog.*). A complete set of type of the same face and size, containing proportionate weights of the individual characters.

four-centred arch (*Build.*). A pointed arch struck from four centres.

four-electrode valve (*Thermionics*). Any thermionic valve containing a cathode and three other electrodes. See **bigrid-valve, co-planar grid-valve, screened grid-valve.**

four-part vault (*Build.*). A vault formed at the intersection of two barrel vaults.

four-phase system (*Elec. Eng.*). A name sometimes given to a two-phase system in which the mid-points of the two phases are connected to form a neutral point.

four-stroke (or 4-stroke) cycle (*I.C. Engs.*). An engine cycle completed in four piston strokes (i.e. in two crankshaft revolutions), consisting of suction or induction, compression, expansion or power stroke, and exhaust. See **Otto cycle, Diesel cycle.**

four-wire circuit (*Elec. Comm.*). A duplex or quasi-duplex circuit in which the return speech-currents are separated from the go speech-currents by segregating them on separate pairs of conductors.

four-wire repeater (*Elec. Comm.*). A repeater for insertion into a four-wire telephone circuit, in which the two amplifiers, one for amplifying in each direction, are kept separate.

four-wire system (*Elec. Eng.*). A system of distribution of electric power requiring four wires. In a three-phase system, the four wires are connected to the three line terminals of the supply transformer and the neutral point; and in the two-phase system, the wires are connected to the ends of the two transformer windings.

fourchette, foor-shet′ (*Anat.*). The posterior junction of the labia minora.

fourchettes (*Gloves*). The forked pieces placed between the fingers.

fourdrin′ier (*Paper*). The standard type of paper machine, introduced by the brothers Fourdrinier about 1800.

Fourier integral, foor-yā (*Elec. Comm*). The expression of a non-repeated and isolated waveform in the form of a summation of adjacent frequency components, from zero to infinity, with a spectral distribution of energy content.

Fourier series (*Maths.*). The expansion of a function $f(x)$ in the form of the uniformly converging series: $a_0+\Sigma(a_n \cos nx+b_n \sin nx)$, where x lies between θ and π, and $f(x)$ has a finite number of maxima and minima values and a finite number of discontinuities in the range. These conditions are sufficient but not necessary.*—(*Elec. Comm.*) The expression of a steadily repeated wave form in terms of a fundamental and harmonics, the latter having particular amplitudes and initial phases with respect to the fundamental.

fourteen-inch wall (*Build.*). See **brick-and-a-half wall.**

fourth pinion (*Horol*). The pinion on which the fourth wheel is mounted.

fourth rail (*Elec. Eng*). A conductor-rail on an electric traction system. When there are two running rails and two conductor-rails, the fourth rail generally carries the return current, instead of its being allowed to return along the running rails.

fourth-rail insulator (*Elec. Eng.*) An insulator for supporting a fourth rail in an electric-traction system.

fourth ventricle (*Zool.*). In Vertebrates, the cavity of the hind-brain.

fourth wheel (*Horol*). The wheel in a watch which drives the escape pinion. If the train is suitable for a seconds hand (i.e. the fourth wheel makes one turn per minute), the hand is carried on an extension of the fourth wheel arbor.

fourth wire (*Elec. Eng.*). A name sometimes given to the neutral wire in a 3-phase, 4-wire distribution system.

fo′vea (*Zool.*). A small pit or depression.—*adj* **foveate.**

fovea centra′lis (*Zool.*). A slight depression at the centre of the macula lutea (see **yellow spot**).

foveo′la (*Bot.*, *Zool.*). A small pit or depression.—*adjs.* **fo′veolar, fo′veolate.**

fovil′la (*Bot.*). The material inside a pollen grain.

fowl cholera (*Vet.*). See **cholera (fowl, duck).**

fowl paralysis (*Vet.*). See **neurolymphomatosis.**

fowl plague (*Vet.*). An acute contagious filterable-virus infection of birds.

fowl pox (*Vet.*). Avian diphtheria. An acute contagious disease of birds due to infection by a filterable virus; characterised by hyperplastic nodules on the skin or diphtheritic inflammation of the mouth.

Fowler position (*Med.*). The semi-sitting position in which the patient is placed in bed after an abdominal operation, in order to prevent infective fluids reaching the upper part of the abdominal cavity.

fox (*Furs*). The dressed skin of one of the various species of fox. The European fox (*Vulpes vulpes*) has a reddish fur; the Silver or Black fox, a variety of the American fox, has a black fur, sprinkled with silver; the Arctic fox has a downy fur of light bluish-grey, often dyed; the Cross fox has an orange-yellow fur marked by a cross on the shoulders; Greenland and Alaskan foxes (Blue fox) are slaty-brown in colour.

foxtail saw (*Join.*). A dovetail saw.

foxtail wedging (*Join.*). The tightening-up of a tenon in a blind mortise by inserting small wedges in saw-cuts in the end of the tenon before inserting the latter in the mortise. The operation of driving the tenon into position then forces the wedges into the saw-cuts and spreads the fibres of the tenon, giving a secure hold resisting withdrawal. Also called FOX WEDGING or FOX TENONING.

Fox Hills Sandstone (*Geol.*). An aeolian sandstone which succeeds the Fort Pierre Shales in the Cretaceous succession of Wyoming, etc.

foxiness (*Timber*). A term applied to a form of decay which affects hardwoods, causing local reddish-brown staining.

foyaite, fō'ya-īt (*Geol.*). A widely distributed variety of nepheline-syenite, described originally from the Foya Hills in Portugal. Typically it contains about equal amounts of nepheline and potash feldspar, associated with a subordinate amount of coloured mineral such as aegirine.

f.p. Abbrev. for *freezing-point.*

F.P. (*Ship Constr.*). Abbrev. for *forward perpendicular.*

fraction of saturation (*Meteor.*). See **relative humidity.**

fractional crystallisation (*Chem.*). The separation of substances by the repeated partial crystallisation of a solution.—(*Geol.*) The formation, at successively lower temperatures, of the component minerals in a magma, coupled with the tendency for the components which crystallise at high temperatures to separate, on account of their high specific gravity, thus giving a concentration in the lower parts of a magma body.

fractional distillation (*Chem.*). Distillation process for the separation of the various components of liquid mixtures. An effective separation can only be achieved by the use of *fractionating columns* (q.v.) attached to the still.

fractional pitch (*Eng.*). (Of a screw-thread cut in the lathe) a pitch not an integral multiple or submultiple of the pitch of the lathe-head screw. See **even pitch.**

fractional test meal (*Med.*). See **Rehfuss test.**

fractionating column (*Chem.*). A vertical tube or column attached to a still and usually filled with rings or intersected with bubble plates. An internal reflux takes place, resulting in a gradual separation between the high- and the low-boiling fractions inside the column, whereby the fractions with the lowest boiling-point distil over. The efficiency of the column depends on its length and on the number of bubble plates used.

fractionation (*Chem.*). See **fractional distillation.**

fracture (*Min.*). The broken surface of a mineral as distinct from its cleavage. The fracture is described, in different cases, as conchoidal (shell-like), platy, or flat, smooth, hackly (like that of cast-iron), or earthy. Thus calcite has a perfect rhombohedral cleavage (i.e. it splits readily parallel to the six faces of the rhombohedron), but has a conchoidal fracture.

fraenot'omy (*Surg.*). See **frenotomy.**

frae'num (*Zool.*). See **frenum.**

fragil'itas os'sium (*Med.*). Osteogenesis imperfecta. A condition, sometimes hereditary, in which a child is born with abnormally brittle -bones, multiple fractures occurring.

fragment (*Bot.*). A piece detached from a chromosome.

fragmental deposits (*Geol.*). These include epiclastic and pyroclastic rocks, i.e. all those which consist of fragments of rocks or minerals covering the whole range of grain size, and resulting from normal disintegration of rocks, or from shattering by volcanic action.

fragmentation (*Bot., Cyt.*). (1) See **amitosis.**—(2) The break-up of an algal filament into a number of parts, each capable of growing into a new filament. —(3) The separation of a portion from the main body of a chromosome.

fragmentation of the myocardium (*Med*). Transverse fissuring of the muscle fibres of the heart, occurring after violent death or in a diseased heart.

Fram floor (*Build.*). A patented form of fire-resisting floor made of reinforced hollow fireclay blocks.

framboesia, frambesia, —bē'zi-a (*Med.*). *Yaws* (q.v.).

frame (*Cinema.*). The unit picture in a cinematograph film, which is locked in position in the picture gate in the camera or projector during photography or projection.

frame (*Struct., etc*). See **framework.**

frame (*Television*). The picture formed by a single traverse of the scanning spot over the whole field of a television image.

frames (*Civ. Eng.*). The centring used in concrete construction.

frame antenna (*Radio*). An antenna comprising a loop of one or more turns of conductor wound on a frame, its plane being oriented in the direction of the incoming waves, or, in the case of transmission, in the direction of maximum radiation. The transmitter or receiver is connected across the two ends of the loop. Also called COIL ANTENNA, LOOP ANTENNA.

frame development (*Photog*). Development of lengths of cinematograph film by winding them round a flat frame, for immersion in the minimum quantity of developer. Cf. *drum development, continuous development.*

frame (or **loop**) **direction-finder** (*Radio*). A simple type of direction-finder using a loop, preferably screened to obviate antenna effect, the polar response of which is a figure of eight; the loop is rotated until the received signal vanishes, when the axis of the frame is in line with the direction of arrival of the wave. See **sense.**

frame frequency (*Television*). The number of times per second which a television image is scanned. Also called PICTURE FREQUENCY.

frame-high (*Build.*). At the level of the top of window or door frames.

frame level (*Masonry*). A mason's level.

frame line (*Cinema.*). The thin black line dividing the frames in the positive projection print of a motion picture.

frame noise (*Cinema.*). In sound-film reproduction, noise arising from the film being displaced in the sound-gate, so that the scanning light is interrupted by the frame lines. The resulting modulation contains frequencies which are multiples of the frame frequency, normally 24 per second, and is inseparable from other frequencies recorded on the sound-track.

frame-saw (*Tools*). A thin-bladed saw, which is held taut in a special frame. Also called SPAN SAW.

frame-synchronising impulse (*Television*). An impulse transmitted at the end of each complete frame-scanning operation, to synchronise the framing oscillator at the receiver with that at the transmitter.

frame turner (*Ship Constr.*). A tradesman engaged in turning and bevelling ships' frames, when red hot, to the shape of the ship's form.

frame-type switchboard (*Elec. Eng.*). See **skeleton-type switchboard.**

frame weir (*Civ. Eng.*). A type of movable weir consisting of a wooden barrier supported against iron frames placed at intervals across a river, and capable of being lowered on to the bed of the river in flood-time, or of being entirely removed.

framework (*Struct., etc.*). The supporting skeleton of a structure.

frames per second (*Cinema.*). The rate of taking or projecting motion-pictures. On projection, each frame may be flashed one or more times on the screen, the increase diminishing the flicker.

framed (*Carp.*). Said of work assembled with mortise and tenon joints.

framed and braced door (*Join.*). A boarded door secured in a frame consisting of two stiles, and top, middle, and bottom rails, with diagonal braces between.

framed floor (*Carp*). A floor in which the bridging joists are supported at intervals by binding joists, which in turn are supported at intervals by girders. Cf. *double floor.*

framed grounds (*Join.*) Grounds used in good work around openings such as door openings, the heads being tenoned into the posts on each side.

framed, ledged, and braced door (*Join.*). A boarded door secured in a frame consisting of two stiles and a top-rail, and braced on one side with middle and bottom rails and diagonal braces.

framing (*Cinema.*). The vertical adjustment of the picture gate in a projector, so as to get the image on the screen exactly on the desired area without appreciable top or bottom clipping or view of the frame lines.

framing (*Struct., etc.*). The operation of assembling into final position the members of a structure.

framing (*Television*). The process of adjustment of the picture-repetition frequency in a television receiver so as to keep the picture stationary on the screen.

framing chisel (*Carp., Join.*). See **mortise chisel.**

framing oscillator (*Television*). The oscillator which generates the frame-scanning voltage or current.

framing timber (*Build.*). The Australian equivalent of *carcassing timber.*

Francis water turbine (*Eng.*). A reaction turbine in which the water flows radially inwards into guide vanes, and thence into the runner, which it leaves axially.

Frankfort black (*Dec.*). An alternative term for *drop black.*

franking (*Join.*). The operation of notching a sash-bar to make a mitre joint with a transverse bar.

Franklin antenna (*Radio*). A directive antenna comprising a number of radiating elements uniformly spaced along a line at right-angles to the direction of maximum radiation. Each element consists of a vertical wire several half-wavelengths long, the radiation from alternate half-wavelengths being suppressed, to secure maximum radiation along the horizontal direction.

frank'linite (*Min.*). Zinc-manganese spinel, occurring rarely as at the type-locality, Franklin Furnace, New Jersey.

frass (*Zool.*). Faeces; excrement.

Fraunhofer lines, frown'hō-fer (*Light*). Dark lines in the solar spectrum, produced by selective absorption in the relatively cool gaseous envelope surrounding the incandescent photosphere. See [A], [B], [C], etc.

fraz'il ice (*Meteor.*). Ice, in the form of small spikes and plates, formed in rapidly flowing streams, where the formation of large slabs is inhibited.

Fredericksburg Series (*Geol.*). The middle of the three divisions of the Comanchean in southern U.S.A. and Mexico; succeeded by the Washita and underlain by the Trinity Series; together with the former constitutes the great Mesocretaceous limestone formation of Mexico.

free (*Bot.*). (1) Not joined laterally to another member of the same kind.—(2) Said of gills of agarics which reach the stipe but are not joined to it.

free association (*Psycho-an.*). The method used in psychotherapy for making unconscious processes conscious. Associations to ideas are allowed to arise spontaneously in the mind, without conscious direction or selective criticism when factors previously unknown and unconscious may be revealed; these are often accompanied by an affect of pain or disgust. See **abreaction.**

free balloon (*Aero.*). Any balloon floating freely in the air, not propelled or guided by any power or mechanism, either within itself or from the ground.

freeboard (*Ship Constr.*). An assignment made by law to prevent overloading of a ship; calculated from statutory tables based on the vessel's form. Permanent markings are made on the ship's side to indicate the depth to which a ship may be loaded, and severe penalties are incurred by any overloading.

free cell formation (*Bot*). The formation of daughter cells which do not remain united.

free cementite (*Met.*). Iron carbide in cast-iron or steel other than that associated with ferrite in pearlite.

free central placentation (*Bot.*). The grouping of the ovules on the surface of a placenta which stands up from the base of the ovary and is not united with the walls of the chamber, either at the side or at the top.

free-cutting brass (*Met.*). α-β Brass containing about 2-3% of lead, to improve the machining properties. Used for engraving and screw machine work.

free-cutting steel (*Met.*). Steel in which the phosphorus is increased to 0·15% and the sulphur to 0·2%, to induce a certain degree of brittleness which facilitates rapid machining.

free end (*Struct*). The end of a cantilever which is not fixed or built in.

free energy (*Chem.*). The capacity of a system to perform work, a change in free energy being measured by the maximum work obtainable from a given process.

free ferrite (*Met.*). Ferrite in steel or cast-iron other than that associated with cementite in pearlite.

free-handle (*Elec. Eng.*). See **free-trip.**

free-hearth electric furnace (*Elec. Eng*). A direct-arc furnace in which one electrode forms a part of the bottom of the hearth.

freemartin (*Zool.*). In cattle, a sterile female intersex occurring as co-twin with a normal bull-calf.

free-needle surveying (*Surv.*). Traverse work done with a compass, the bearing of each line from the magnetic meridian being read in turn.

free nuclear division (*Cyt*). Nuclear division unaccompanied by the formation of cell walls.

free oscillations (*Radio*). Oscillatory currents whose frequency is determined by the constants of the circuit in which they are flowing; e.g. those resulting from the discharge of a condenser through an inductance. Cf. *forced oscillations.*

free path (*Chem.*). See **mean free path.**

free pole (*Elec. Eng.*). A magnet pole which is imagined, for theoretical purposes, to exist separately from its corresponding opposite pole.

free radical (*Chem.*). A group of atoms which normally exists only in combination with other atoms, brought into independent existence by special conditions.

free-running speed (*Elec. Eng.*). The speed which a vehicle or train will attain when propelled by a constant tractive effort; i.e. the speed at which the applied tractive effort exactly equals the forces resisting motion. Also called BALANCING SPEED.

free-sprung (*Horol.*). A watch is said to be *free-sprung* when no index and curb pins are available for the correction of its rate. The balance and spring are so proportioned and adjusted as to give the best possible performance under all conditions. Chronometers and chronometer watches are always free-sprung.

freestone (*Build.*). A building-stone which can be worked with a chisel without tending to split into definite layers.

free stuff (*Timber*). *Clear stuff* (q.v.).

free-trip (*Elec. Eng.*). Said of certain types of circuit-breaker or motor starter in which the tripping mechanism is independent of the closing mechanism, and will therefore allow the switch to trip while the latter is being operated. Also FREE-HANDLE. Cf. *fixed-trip*.

free vibrations (*Phys.*). The vibrations which occur at the natural frequency of a body when it has been displaced from its position of rest and allowed to vibrate freely without the application of any periodic force.

free-wheel (*Automobiles*). A one-way clutch, usually depending on the wedging action of rollers, placed in the transmission line, so as to transmit torque only when the engine is driving.

free-wheel (*Bicycles*). This has a drive actuated by pawls depressed by light springs. The pawls engage the ratcheted inside edge of the sprocket when pedalling takes place, but overrun the ratchet when it stops.

Freeman's white (*Paint.*). A non-poisonous white lead paint, made of sulphate of lead, zinc oxide, and barytes; highly resistant to discoloration by sulphurous fumes.

freeze (*Cinema.*). Stoppage of action by artists in sound-film production so that the equivalent of a still picture is obtained; or in order that the subsequent action may be continued without a change in the position of the artists.

freezing (*Heat*). The conversion of a liquid into the solid form. This process takes place at a definite temperature for each substance, this temperature being known as the *freezing-point*. The freezing of a liquid invariably involves the extraction of heat from it, known as *latent heat of fusion*. See **latent heat, depression of freezing-point.**

freezing mixture (*Chem.*). A mixture of two substances, generally of ice and a salt, used to produce a temperature below 0° C.

freezing-point (*Heat*). The temperature at which a liquid solidifies, which is the same as that at which the solid melts (the *melting-point*). The freezing-point of water is used as the lower fixed point in graduating a thermometer. Its temperature is defined as 0° C. or 32° F. See also **water** and **depression of freezing-point.**—(*Met.*) The temperature at which a metal solidifies. Pure metals, eutectics, and some intermediate constituents freeze at constant temperature; alloys generally solidify over a range.

freezing-point method (*Chem.*). See **cryoscopic method.**

freibergite, frī′-ber-git (*Min.*). An obsolete name for argentiferous tetrahedrite.

freight car (*Rail.*). The American term for a goods wagon.

frem′itus (*Med.*). Palpable vibration, especially of the chest wall, during speech or coughing; variations in intensity are of diagnostic value.

Fremont test (*Met.*). A type of impact test in which a beam specimen notched with a rectangular groove is broken by a falling weight.

Frémy's salt, frā-mē (*Chem.*). Potassium bifluoride, potassium hydrogen fluoride, or acid potassium fluoride.

French arch (*Build.*). A brick arch, flat at the top and bottom, constructed with ordinary bricks not worked to wedge shape but laid so as to slope outwards from the middle of the arch.

French bit (*Carp.*). A boring tool having a flat blade, shaped at the two cutting edges in continuous curves, from the point to and beyond a place of maximum diameter; used in a lathe-head for drilling hard wood.

French casement (*Build.*). A pair of glazed folding doors.

French chalk (*Min.*). The mineral talc ground into a state of fine subdivision, its softness and its perfect cleavage contributing to its special properties when used as a dry lubricant.

French cross-head (*Surv.*). A form of cross-staff consisting of an octagonal metal box with slits in the opposite sides, so that the instrument may be used for setting out angles of 90° or 45°.

French curve. A drawing instrument used to guide the pen or pencil in drawing curved lines It consists of a thin flat sheet of celluloid, wood, or other material cut to curved profiles at the edges.

French doors (*Build.*). *French windows* (q.v.).

French drain. A drain formed by partly filling a trench at the bottom with loose broken bricks or rubble.

French fliers (*Carp.*). Steps in an *open newel stair* (q.v.) with *quarter-space landings* (q.v.).

French foot (*Hosiery*). A type of hosiery in which the foot is produced in one piece, the design of the leg portion being carried round the foot.

French moult (*Vet.*). A defective development of the first plumage of birds leading to the shedding of the wing and tail primaries; particularly observed in aviary-bred budgerigars.

French polish (*Dec.*). A solution of shellac dissolved in methylated spirit and coloured with dragon's blood. Applied to wood surfaces to produce a high polish on them.

French roof (*Build.*). A *mansard roof* (q v.).

French stuc (*Build.*). Plasterwork finished to present a surface resembling that of stonework.

French system of drawing (*Textiles*). See **porcupine system.**

French truss (*Eng.*). A symmetrical roof truss for large spans, composed of a pair of braced isosceles triangles based on the sloping sides of the upper chord, their apices being joined by a horizontal tie. Also called BELGIAN TRUSS, FINK TRUSS.

French white (*Paint.*). See **silver white.**

French window (*Build.*). A glazed casement, serving as both window and door.

frenchman (*Plast.*). A joint-trimming tool, used for pointing.

frenot′omy, fraenot′omy (*Surg.*). Cutting of the frenum of the tongue for tongue-tie.

fren′ulum (*Zool.*). In some *Lepidoptera*, a bunch of strong bristles arising from the costal border of the hind-wing, which engages the fore-wing and so locks the two wings together during flight: in some *Scyphozoa*, a thickening of the sub-umbrella: more generally, a membranous fold.

fre′num (*Zool.*). A membranous or ligamentous structure which checks the movement of a part: in *Cirripedia*, a tegumentary fold at the base of the mantle: in some insects, a membranous or chitinous fold or ridge extending from the scutellum to the base of the fore-wing: a frenulum.—*adj.* **frenate.**

frequency (*Phys., etc.*). The number of vibrations, or waves, or cycles, of any periodic phenomenon per second. The frequency is the reciprocal of the period or periodic time. Also PERIODICITY.

frequency (*Bot.*). The relative number of any given species in a given place.

frequency (*Elec.*). The frequency at which an electric current alternates; measured in *cycles per second* (*hertz*).

See **alien—**
angular—
carrier—
cut-off—
dot—
limiting—
radio—
turnover—*
side—

frequency band (*Radio*). The interval in the frequency spectrum occupied by a modulated signal. In the case of sinusoidal amplitude modulation, it is twice the maximum modulating frequency.

frequency changer (*Elec. Eng.*). A machine designed to receive power at one frequency and deliver it at another frequency.—(*Radio*) A combination of oscillator and modulator valves used in a superheterodyne receiver to change the incoming signal from its original carrier frequency to a fixed intermediate carrier frequency. Also called FREQUENCY CONVERTER.

frequency demultiplication (*Radio*). The process of producing a current whose frequency is an exact sub-multiple of another frequency. It is achieved by means of a series of oscillators, the harmonic of one being locked with the fundamental of the next. Also FREQUENCY DIVISION.

frequency-discriminating filter (*Elec. Comm.*). The same as an *electric wave filter*, but implying the essential feature of discrimination amongst component frequencies of electric signals, in that some bands of frequencies are passed with minimum and uniform attenuation, while frequencies not in these nominal bands are highly attenuated or cut off, or vice versa.

frequency distortion (*Radio*). Impairment of the quality of the reproduced signal, arising from the unequal transmission of the different frequency components thereof.

frequency division (*Radio*). See **frequency demultiplication.**

frequency doubler (*Radio*). A frequency multiplier in which the output current or voltage has twice the frequency of the input.

frequency doubling (*Acous.*). The introduction of marked double-frequency components through lack of polarisation in an electromagnetic or electrostatic transducer, in which the operating forces are proportional to the square of the operating currents and voltages respectively.

frequency factor (*Bot.*). The percentage occurrence of a species in a plant community.

frequency meter (*Elec. Eng.*). An indicating instrument for measuring the frequency of an alternating voltage. See **integrating frequency meter.**

frequency modulation (*Radio*). Variation of the frequency of a transmitted wave in accordance with the impressed modulation.

frequency multiplier (*Radio*). Any four-terminal device in which the output current or voltage has a frequency which is an integral multiple of that of the input. A saturated iron-cored inductance, or a thermionic valve working on the non-linear part of its characteristic, can be used, together with the appropriate frequency-selecting circuits, to produce this result. Also called STATIC FREQUENCY CHANGER.

frequency of infinite attenuation (*Elec. Comm.*). A frequency at which a filter inserted in a communication channel provides a maximum attenuation, theoretically infinite with loss-free inductances and condensers. Such large attenuation is generally provided by an anti-resonant series arm, or by an acceptance resonant shunt arm.

frequency relay (*Elec. Eng.*). A relay which comes into operation when the frequency of a system departs from a certain predetermined value.

frequency response (*Acous.*). The response, measured by the ratio expressed in decibels, of the output power-level to the input power-level of a transmission or reproducing system, or any section thereof, the response being plotted on a logarithmic frequency-base. The resulting curve exhibits the frequency-distortion present in the system or part of the system, the power-levels being so defined that the response of the complete system is the sum of the responses of its several sections.

frequency stabilisation (*Radio*). The prevention of changes produced in the frequency of oscillation of a self-oscillating circuit by changes in supply voltage load impedance, valve parameters, etc.

frequency transformer (*Elec. Eng*) A static piece of apparatus (e.g. a transformer or mercury-arc convertor) which receives power at one frequency and delivers it at another frequency. Sometimes called a STATIC FREQUENCY CHANGER.

frequency tripler (*Elec. Eng*). A static frequency transformer consisting of a specially designed electromagnetic transformer which produces an output frequency of three times the input frequency.

fresco (*Paint.*). A method of painting on plastered walls with lime-fast colours, while the plaster is still wet.

fresh-air inlet (*San. Eng.*). A fitting, usually placed at the intercepting chamber, admitting fresh air into a drainage system to dispel the foul gases.

fresh-water sediments (*Geol*) These include those of all the main types that accumulate in other environments, and cover the whole range of grain size. Fresh-water conditions were widespread in N.W. Europe in later Tertiary times (Aquitanian-Oligocene), characteristic deposits being the Bovey Tracey pipe-clays and lignites, and the Bembridge fresh-water limestones. These are lacustrine deposits, while fluviatile and fluvio-glacial deposits also fall in this main category.

Fresnel's bi-prism, frā-nel (*Light*). An isosceles prism having an angle of nearly 180°, used for producing interference fringes from the two refracted images of an illuminated slit.

Fresnel's mirrors (*Light*). Two plane mirrors inclined at an angle of a little less than 180°, used for producing interference fringes from the two reflected images of an illuminated slit.

Fresnel's reflection formula (*Light*). A formula giving the fraction of the incident light reflected at the surface of a transparent medium. The fraction equals

$$\tfrac{1}{2}\left\{\frac{\sin^2(i-r)}{\sin^2(i+r)}+\frac{\tan^2(i-r)}{\tan^2(i+r)}\right\},$$

where i and r are the angles of incidence and refraction respectively.

Fresnel's rhomb (*Light*). A glass rhomb which is used for obtaining circularly polarised light from plane-polarised light by total internal reflection. The rhomb is so constructed that two such reflections at an angle of 54° are obtained, each of which introduces a phase difference of one-eighth of a period between the two components obtained from the incident plane-polarised light.

fret (*Furn.*). Pierced carving done with a fret-saw.

fret-saw (*Carp.*). See **compass saw.**

fret-work (*Build.*). A mode of glazing in which diamond-shaped panes (quarrels) are connected together by leaden cames to form a window.

fretted lead (*Plumb.*). Strip-lead of suitable section for use as *cames* (q.v.).

Freud's theory of the libido, froid (*Psycho-an.*).

According to this theory, the libido (energy attaching to the sexual instinct) becomes organised at different stages of development along different routes, e.g. oral, anal, phallic and genital, each phase having its own well-defined characteristics. Mental mechanisms common to these phases are found also in the psychoneuroses and psychoses, thus showing a definite correlation between these disorders and arrested mental development in any of these phases, e.g.

early oral	arrest	correlates with	schizophrenia
late oral	do.	do.	melancholia
early anal	do.	do.	paranoia
late anal	do.	do.	obsessional neurosis
phallic	do.	do.	hysteria.

friability test (*Civ. Eng*). A test for determining the suitability (that is, its resistance to crushing) of any given stone for use in asphalt work. A sample is heated for 15 minutes in a sand bath at 350° F., and should then not disintegrate on receiving a blow from a hammer.

friction (*Mech.*). The resistance to motion which is called into play when it is attempted to slide one surface over another with which it is in contact. The frictional force opposing the motion is equal to the moving force up to a value known as the *limiting friction*. Any increase in the moving force will then cause slipping. *Static friction* is the value of the limiting friction just before slipping occurs. *Kinetic friction* is the value of the limiting friction after slipping has occurred. This is slightly less than the static friction. The *coefficient of friction* is the ratio of the limiting friction to the normal reaction between the sliding surfaces. It is constant for a given pair of surfaces.

friction (*Med.*). (1) The sound produced by the rubbing together of two inflamed surfaces, as in pleurisy or pericarditis.—(2) Rubbing of a part, as in massage.

friction and windage loss (*Elec. Eng.*). Losses in an electrical machine due to friction of sliding parts (see **friction loss**) and also to air resistance. These losses are frequently considered together in designing and testing electrical machinery.

friction clutch (*Eng.*). A device for connecting or disconnecting two co-axial shafts, under any conditions of relative rotation. It consists of a pair of opposed members, between which the drive is transmitted through the friction of their contact surfaces, and which may be separated by a lever system.

See	**band clutch**	**disc** (or **plate**) **clutch**
	block do.	**multiple disc** do.
	cone do.	**split-ring** do.

friction compensation (*Elec. Eng*). A small torque, additional to the main torque, provided in a motor-type integrating meter in order to compensate for the effect of friction of the moving parts.

friction drag, surface (*Aero.*). See **surface friction drag.**

friction drive (*Eng.*). A drive in which one wheel causes rotation of a second wheel with which it is pressed into contact, through the agency of the friction forces at the contact surfaces.

friction gear (*Eng.*). A gear in which power is transmitted from one shaft to another through the tangential friction set up between a pair of wheels pressed into rolling contact. One of the contacting surfaces is usually fabric-faced. Suitable only for small powers.

friction glazing (*Paper*). A method of glazing in which one or more of the calender cylinders revolve at a speed greater than that of the others. By this means a very high polish is obtained.

friction horse-power (*Eng.*). That part of the gross or indicated horse-power developed in an engine cylinder which is absorbed in frictional losses; the difference between the indicated and the brake horse-power. Abbrev. **F.H.P.**

friction loss (*Elec. Eng.*). The power absorbed in the bearings, commutator, or slip-ring surfaces, or at any other sliding contacts of an electric machine.

friction pile (*Build., Civ. Eng.*). A pile which supports its load only by the friction over its sides.

friction rollers (*Eng.*). See **anti-friction bearing.**

frictional damper (*Eng.*). A device consisting of a supplementary mass frictionally driven from a crankshaft at a point remote from a node, which dissipates vibrational energy in heat.

frictional electricity (*Elec.*). A name given to electric charges produced by the rubbing together of certain insulating materials (e.g. ebonite and silk, or glass and fur).

frictional machine (*Elec. Eng.*). See **electrostatic generator.**

frictional-rest escapement (*Horol.*). See **escapement.**

Friedel and Crafts' synthesis (*Chem.*). The synthesis of benzene hydrocarbons or their homologues by the action of alkyl halides on aromatic hydrocarbons in the presence of anhydrous aluminium chloride.

Friedreich's ataxia, frēd′rihh (*Med.*). A hereditary nervous disease in which there are irregular, unco-ordinated movements of the voluntary muscles, a slow, staggering, reeling gait, and various deformities—the result of degenerative changes in the nerve tracts of the spinal cord.

frieze (*Arch., Build.*). (1) The middle part of an entablature, between the architrave and the cornice.—(2) The decorated upper part of a wall, below the cornice.

frieze (*Textiles*). A heavy woollen material with a rough surface, made from coarse yarns of mixed colours which give a rough tweed effect.

frieze-panel (*Join.*). An upper panel in a six-panel door.

frieze rail (*Join.*). The rail next to the top rail in a six-panel door.

frig-bob saw (*Quarrying*). A long handsaw used in Bath stone quarries.

frigidity (*Psychol.*). In women, decrease or absence of the normal sexual response; usually dependent on strongly repressed inhibitions and phantasies of instinctual desire.

frill (*Bot.*). A thin sheet of interwoven hyphae forming a horizontal circular flange around the stem of an agaric. Also called ARMILLA.

frilling (*Photog.*). The crinking of the emulsion on a plate, resulting in detached folds and wrinkles.

fringe (*Photog.*). A defect in colour photography due to lack of registration of the elementary colours (e.g. owing to parallax). See also **colour fringes.**

fringe (*Textiles*). Loose threads at the end or edge of a cloth.

fringing (*Elec. Eng.*). The spreading of the lines of force of a magnetic field, at the edges of an air-gap in a magnetic circuit.

fringing coefficient (*Elec. Eng.*). A coefficient used in making magnetic circuit calculations, in order to allow for the effect of fringing of the flux.

fringing reefs (*Ocean.*). Platforms of coral formation stretching out from the land. See **coral reef.**

Frisbie's feeder (*Glass*). A device whereby a bucket of coal is forced up into the *eye* (q.v.) of a pot-furnace from below.

frisket (*Print.*). A thin iron frame attached to the tympan of a hand press, holding the sheet of paper in position and protecting its edges. Seldom used.

frit (*Pot.*). See Supplement.

frit, lead (*Chem.*). *Lead disilicate* (q.v.).

frizing (*Leather*). The process of removing a thin layer from the grain surface, in order to facilitate staining.

frog (*Build.*). The depression made in one or both of the larger sides of some bricks in order to form a key for the mortar at the joints.

frog (*Elec. Eng.*). See **trolley-frog.**

frog (*Rail., etc.*). The point of intersection of the inner rails, where a train or tram crosses from one set of rails to another. The frog is in the form of a V. See **turnout.**

frog (*Vet.*). A V-shaped band of horn passing from each heel to the centre of the sole of a horse's foot.

frog (*Weaving*). A metal stop used on a power loom to stop the machine if the shuttle is trapped in the warp.

Frohlich's syndrome, frė'lihh (*Med.*). See **dystrophia adiposogenitalis.**

Froin's syndrome (*Med.*). The presence of yellow cerebro-spinal fluid, which has a high content of protein but no cells, below the site of obstruction (e.g. by a tumour) of the spinal cord.

frond (*Bot.*). (1) A general term for the leaf of a fern.—(2) A flattened expanded thallus of a seaweed.—(3) A similar thallus in a liverwort.—(4) A general term for a leaf-like structure of obscure morphological status.

frondes'cent, fron'dose (*Bot.*). Leaf-like: well provided with leaves.

frons (*Zool.*). In Insects, an unpaired sclerite of the front of the head: in higher Vertebrates, the front of the head above the eyes.—*adj.* **frontal.**

front (*Carp.*). The sole face of a plane.

front (*Meteor.*). The line of separation between masses of air at different temperatures. There is usually some rainfall at a front.
See **cold—** **warm—**

front cavity (*Bot.*). The opening of a stoma nearest the epidermis.

front contact (*Teleph.*). In a relay assembly, a contact with which a moving contact makes contact on the operation of the relay.

front hearth (*Build.*). The part of the hearth extending beyond the chimney breast.

front, wave (*Acous.*). See **wave front.**

frontage line (*Build.*). The *building line* (q.v.).

frontal (*Zool.*). (1) A paired dorsal membrane bone of the Vertebrate skull, lying between the orbits.—(2) Pertaining to the frons.

frontal plane (*Zool.*). The median horizontal longitudinal plane of an animal.

frontispiece (*Print.*). An illustration facing the title-page of a book.

frontoclyp'eus, frunt'— (*Zool.*). A sclerite of the head in Insects, formed by the fusion of the frons and the clypeus.

frontogen'esis, frontol'ysis (*Meteor.*). Respectively, the intensification or realisation of a front, and its weakening or disappearance.

fron'ton (*Build.*). The cornice and pediment, supported on consoles over the entrance to a building.

frost (*Meteor.*). A *frost* is said to occur when the air temperature falls below the freezing-point of water (0° C. or 32° F.). See **hoar frost.**

frost, geological action of. Frost is one of the most active agents causing rock disintegration, through the expansion which takes place when water in crevices, joints, and other fractures freezes. Rocks just above the ice- or snow-level become soaked by melt waters when exposed to the sun; frost action comes into play at night. Frost is thought to be the active agent in corrie formation according to the 'bergschrund hypothesis.' See also **solifluction.**

frosted lamp (*Illum.*). A filament-lamp the bulb of which is etched or sand-blasted in order to break up any direct rays of light from the filament. See **inside-frosted lamp.**

froth (*Chem.*). See **foam.**

froth flotation (*Mining*). The separating of finely crushed minerals from one another by causing some to float and others to sink in a froth. Oils and various chemicals are used to activate, make floatable, or to depress the minerals.

frother (*Met.*). A substance used to promote the formation of a foam in the flotation process.

Froude brake, frood (*Eng.*). An absorption dynamometer consisting of a rotor inside a casing, itself free to rotate, the space between the two being filled with water. The energy is dissipated in eddy formation and heat, the torque absorbed being measured by the torque necessary to prevent rotation of the casing.

Froude's transition curve (*Surv.*). A transition curve the equation to which is that of a cubic parabola, the offset y from the straight produced being given by $y=\frac{x^3}{6lr}$, where x=distance from tangent point, l=length of transition, r=radius of the circular arc.

frow'y (*Timber*). Said of timber which is soft and brittle.

frozen (*Cinema.*). Said of arc carbons when they have fused together so that an arc cannot be struck by the mechanism.

frozen bearing (*Eng.*). A seized bearing. See **seizure.**

fructicole (*Bot.*). Living on fruits; said of parasitic fungi.

fructification (*Bot.*). (1) A general term for the body which develops after fertilisation and contains spores or seeds.—(2) Any spore-bearing structure, whether formed after fertilisation or by purely vegetative development.

fruc'tosans (*Chem.*). The anhydrides of fructose; e.g. inulin.

***l*-fructose** (*Chem.*). Fruit-sugar or laevulose, $C_6H_{12}O_6$, anhydrous rhombic crystals, m.p. 95° C. It is a *ketohexose* (q.v.), is prepared by heating inulin with dilute acids, and is always found together with *d-glucose* (q.v.) in sweet fruit juices.

frue vanner (*Mining*). A wide inclined rubber belt down which flows a stream of water. The belt passes over pulleys with a side shake. Used for washing light minerals away from heavier ones.

frugivorous, froo-jiv'— (*Zool.*). Fruit-eating.

fruit (*Bot.*). (1) The same as *fructification*.—(2) The structure which develops from the ovary of an angiosperm after fertilisation, with or without additional structures formed from other parts of the flower.

fruit body (*Bot.*). A well-defined group of fungal spores and the hyphae which bear and surround them.

frus'tule (*Bot.*). The cell of a diatom, consisting of two silicified valves fitting one into the other, like a box and its lid, and the living contents.

frutes'cent (*Bot.*). Shrubby.

fru'ticose (*Bot.*). (1) Bushy.—(2) Said of a lichen thallus which is attached by its base, and stands out from the substratum, branching, and having a bushy appearance.

frying, fry (*Acous.*). (1) The noise, consequent on extraneous noises, accidentally added to the sounds being recorded on a wax record for gramophone manufacture.—(2) The noise which arises when excessive current is passed through the carbon granules in a telephone transmitter.

frying arc (*Elec. Eng.*) See **hissing arc.**

F.S. (*Civ. Eng.*). Abbrev. for *factor of safety.*

fuchsine, fook'sēn (*Chem*). Magenta, the hydrochloride of rosaniline, a basic triphenylmethane dyestuff, dark green crystals, dissolving in water to form a purple-red solution.

fuchsite, fook'zīt (*Min.*). A variety of muscovite (white mica) in which chromium replaces some of the aluminium.

fucivorous, fū-siv'— (*Zool.*). Seaweed-eating.

Fucoid Beds (*Geol*). A division of the Cambrian System of the N.W. Highlands of Scotland, part of the Durness Limestone Series. Markings resembling 'seaweeds' were observed on some of the bedding planes, hence the name.

fudge (*Typog.*). A space reserved in a newspaper for late news. Also known as STOP PRESS.

fuel cell (*Chem.*). A galvanic cell in which the oxidation of a fuel is utilised to produce electricity.

fuel oils. Oils obtained as residues in the distillation of petroleum; used, either alone or mixed with other oils, for domestic heating and for furnace firing (particularly marine furnaces).

fuel tanks (*Aero*). The tanks in which the supply of fuel is carried. The *main tanks* carry the main supply, the *auxiliary tanks* the reserve supply; *gravity tanks* are those from which the supply to the carburettor is by gravity; *service tanks* are those from which the carburettor is fed directly; *slip tanks* are those which can be jettisoned if necessary.

fugacious (*Bot.*). (1) Lasting for only a short time.—(2) Soon falling from the parent plant.

fugacity (*Chem.*). The tendency of a substance to expand or escape; it is that value of the pressure which would permit the application of simple laws. Cf. *activity* (2).

fugitom'eter (*Chem.*). An apparatus for testing the fastness of dyed materials to light.

fugue, fūg (*Psycho-path.*). 'Flight.' A condition, seen in hysteria and also in organic mental disorder, in which a hypnoidal state develops and the individual attempts to resolve his unconscious conflict by an escape from reality; he may wander about for days without clear knowledge of his actions and behaviour.

fulcrum (*Bot.*). An outgrowth from the wall of the zygospore in some moulds.

fulcrum (*Mech.*). The point of support, or pivot, of a lever.

fulcrum (*Vet.*). An instrument used for obtaining leverage on forceps during the extraction of a horse's teeth.

fulcrum (*Zool.*). A ridge-like ganoid scale, in some Fish: in the mouth-parts of *Rotifera*, a segment of the incus: in some Vorticellids, a small spine.

ful'gurites or **lightning tubes** (*Min.*). Tubular bodies produced by lightning in loose unconsolidated sand; caused by the vitrification of the sand grains, forming quartz glass. Although of very narrow cross-section, some specimens have been found to exceed 20 ft. in length.

fuliginous, fū-lij'— (*Bot.*). Soot-coloured.

full (*Eng.*). A workshop term which, applied to a dimension, is generally understood to mean $\frac{1}{64}$ inch in excess of the nominal size. The opposite of *bare.*

full annealing (*Met.*). (Of steel) heating above the critical range, followed by slow cooling, as distinguished from (1) annealing below the critical range, and (2) normalising, which involves air-cooling.

full availability, limited availability (*Auto. Teleph.*). The extents to which a call can be extended, by an automatic switch, over a number of possible routes to the required subscriber.

full bound or whole bound (*Bind.*). Said of a volume the sides and back of which are covered with leather or cloth.

full-centre arch (*Build.*). A semicircular arch or vault.

full-fashioned (*Hosiery*). Said of knitted articles made in flat pieces and subsequently joined at the edges by seaming.

full feel (*Textiles*). A term descriptive of cloth which is pleasant to handle.

full-force feed (*Eng.*). An engine lubrication system in which oil is forced to main bearings, connecting-rod big-end bearings, and thence, by drilled holes or attached pipes, to the gudgeon pins and cylinder walls.

full gear (*Eng.*). (Of a steam-engine valve gear) the position giving maximum valve travel and cut-off for full power.

full-load (*Eng.*). The normal maximum load under which an engine or machine is designed to operate continuously.—(*Elec. Eng.*) The normal rated output of an electric machine or transformer.

full moon (*Astron.*). The instant when the moon is directly opposite the sun, in elongation 180°, and therefore fully illuminated, appearing as a bright circular disc.

full-pitch winding (*Elec. Eng.*). An armature winding in which the span of the coils is equal to a pole pitch.

full-plate watch (*Horol.*) A watch in which the top plate is circular and the balance is mounted above the plate.

full point (*Typog.*). A mark of punctuation (.), the full stop.

full satellite exchange (*Auto. Teleph.*). A small automatic telephone exchange which is entirely dependent for completion of calls on its parent or main exchange.

full shroud (*Eng.*). A gear-wheel in which the shrouding extends up to the tips of the teeth. See **shroud.**

full thread (*Eng.*). A screw-thread cut to the depth proper to its size and pitch.

full-wave rectification (*Elec. Eng., Radio*). Rectification in which current flows, during both half-cycles of the alternating voltage, through different rectifying devices alternately; e.g. in a double diode.

Fullerboard (*Diel.*). An early variety of *pressboard* (q.v.).

Fuller cell (*Elec. Eng.*). A double fluid variety of the bichromate cell.

Fuller faucet (*Plumb.*). A faucet in which a rubber ball is used to close the opening and so to stop the flow.

Fullerphone (*Elec. Comm.*). An army system of telegraphy which uses buzzer signals for keying and listening, and direct currents for actual transmission, thus making the system untappable.

fullering (*Eng.*). The operation of (1) caulking a riveted joint to make it pressure-tight; (2) grooving forged work by a *fullering tool* (q.v.).

fullering tool (*Eng.*). A tool for assisting in producing circumferential grooves on circular work; it consists of a split block internally radiated, which is placed round the work and hammered.

fullers' earth (*Geol.*). A non-plastic clay consisting essentially of the mineral montmorillonite, and similar in this respect to bentonite. Used originally in 'fulling,' i.e. absorbing fats from wool, hence the name. The Fullers' Earth of English stratigraphy is a small division of the Jurassic System in the S. Cotteswolds, lying immediately above the Forest Marble. A valuable deposit of fullers' earth occurs in the Lower Greensand at Nutfield in Surrey.

fulling (*Textiles*). See **milling.**

fulminating gold (*Chem.*). A yellow precipitate formed when a solution of gold chloride is treated with ammonia; it is explosive.

Fultograph (*Radio*). An early form of still-picture transmission system in which the picture was reproduced by the electrolytic action at the contact of a stylus with chemically prepared paper carried on a rotating drum.

ful′vous (*Bot., Zool.*). Tawny.

fumaginous, fū-maj′— (*Bot.*). Of a smoky colour.

fumar′ic acid (*Chem.*). HOOC·CH:CH COOH, small prisms which do not melt, but sublime at about 200° C., with the formation of maleic anhydride. Fumaric and maleic acid are stereoisomers, fumaric acid being the *trans*-form.

fu′maroles (*Geol.*). Small vents on the flanks of a volcanic cone, or in the crater itself, from which gaseous products emanate.

fume cupboard (*Chem*). A glass chamber or cupboard where laboratory operations involving obnoxious fumes are carried out.

fu′migants (*Chem.*). Substances which, when volatilised, are capable of destroying vermin, insects, bacteria, moulds, or which act as disinfectants. Examples are hydrogen cyanide and ethylene oxide for vermin and insects, and formaldehyde (disinfectant).

fuming (*Photog.*). Exposure of albuminised papers to ammonia gas, for facilitating photographic processes.

fuming liquids (*Chem.*). Liquids which give off vapours which unite with water to form a mixture or compound with a lower vapour pressure than water.

fuming (or **Nordhausen**) **sulphuric acid** (*Chem.*). A solution of sulphur trioxide in concentrated sulphuric acid.

function (*Biol.*). The normal vital activity of a cell, tissue, or organ.

functional (*Biol.*). Carrying out normal activities; active (as opposed to *passive*).

functional disease. Disease characterised by impaired function as opposed to one characterised by impaired structure (*organic disease*).—(*Bot.*) A plant disease due to some disturbance in the organisation or working of the plant, and not to parasitic attack.

fundamental colours. See **primary colours.**

fundamental complex (*Geol.*). A name (really a misnomer) applied to the highly crystalline Pre-Cambrian rocks of N.W. Scotland termed the Lewisian (or Hebridean); it comprises schists and gneisses of several kinds. As some of these were derived from pre-existing rocks, they are not *fundamental.*

fundamental component (*Elec. Eng.*). The harmonic component of an alternating wave which has the lowest frequency and which usually represents the major portion of the wave.

fundamental frequency (*Elec. Eng.*). The frequency of the fundamental component of an alternating wave.

fundamental frequency of antenna (*Radio*). The lowest frequency at which an antenna is resonant, when not loaded with terminal inductance.

fundamental interval (*Heat*). The number of degrees between the two fixed points on a thermometer scale.

fundamental mode (*Radio*). The mode of oscillation of an antenna at its fundamental frequency. In the case of an earthed antenna, it is characterised by a single node of current (at the extreme end of the antenna).

fundamental stage of growth (*Bot.*). The formation of new protoplasm.

fundamental tissue (*Bot.*). Ground tissue.

fundamental units (*Phys.*). The units of length, mass, and time upon which a system of units is based. Thus, the c.g.s. system of units is based on the *centimetre*, the *gram*, and the *second.*

fundamental wavelength (*Radio*). (1) The wavelength in free space corresponding to the fundamental frequency of an antenna.—(2) The main or operating wavelength in the case of a transmitter radiating harmonics.

fundus (*Anat*). See **eye-ground.**

fundus (*Zool.*). The proximal swollen bulb of the palpal organ of a male Spider.

fungal cellulose, fungus cellulose (*Bot*). A carbohydrate, akin to cellulose, present in the walls of some fungi.

Fungi, fun′jī (*Bot.*). One of the main groups of the *Thallophyta*, distinguished from the algae chiefly by the absence of chlorophyll; they cannot carry on photosynthesis, and live as saprophytes or parasites The *Fungi* probably include at least 100,000 species showing great diversity in their morphology.

Fungi Imperfecti (*Bot.*). A large assemblage of fungi having a septate mycelium, but, so far as is known, reproducing only by asexual spores. All seem devoid of sexuality or of anything resembling that.

fun′gicide (*Bot., etc*). A substance which kills fungi.

fu′nicle (*Bot.*). The small stalk which unites the ovule to the placenta.

funicle (*Zool.*). In Insects, those joints of the antenna which intervene between the club and the ring-joints, or between the club and the pedicel.

funic′ular railway (*Civ. Eng.*). A form of *cable railway* (q.v.).

funiculi′tis (*Med.*). Inflammation of the vas deferens of the testis.

funic′ulose (*Bot.*). Forming ropes of intertwined hyphae.

funic′ulus (*Zool.*). In some Invertebrates (as *Polyzoa*), thickened strands of mesoderm attaching the digestive organs to the body-wall: more generally, any small cord, as a tract of nerve fibres in the central nervous system.—*adj.* **funicular.**

fu′niform (*Bot*). Rope-like.

funnel cell (*Bot.*). A cell in the palisade layer of a leaf, which is widest just beneath the epidermis, and narrows off below.

funnel-shaped (*Bot.*). Tubular below, expanding upwards, and, sometimes, having lobes on the upper edge.

fuor (*Carp.*). A strengthening piece nailed to a decayed rafter.

fur (*Zool.*). In Mammals, the thick undercoat of short, soft, silky hairs.—(*Furs*) Any skin covered with soft hairs; the term thus excludes the skins of cattle, goats, and sheep (other than young lambs).

fu′ral (*Chem.*). See **furfural.**

fu′ran group (*Chem.*). A group of heterocyclic compounds derived from furan, C_4H_4O, a compound containing a ring of four carbon atoms and one oxygen atom.

fur′ca (*Zool.*). Any forked structure: in *Insecta*, a median thoracic apodeme having two arms and a single base: in *Diptera*, a short rod with two arms, which forms the principal skeleton of the oral lobes of the proboscis: in *Vertebrata*, a divergence of nerve fibres: in *Crustacea*, a pair of divergent processes at the end of the abdomen.

furcate (*Bot., Zool.*). Divided into two branches or diverging parts.

fur′cula (*Zool.*). In *Collembola*, the leaping apparatus, consisting of a pair of partially fused appendages arising from the fourth abdominal somite: in Birds, the partially fused clavicles: more generally, any forked structure.

furfur (*Med.*). A scale of epidermis: dandruff.

furfura'ceous (*Bot.*). Covered with bran-like particles: scurfy.

fur'fural (*Chem.*). Fural or furfuraldehyde, $C_4H_3O{\cdot}CHO$, a colourless liquid, b.p. 162° C., obtained by distilling pentoses with diluted hydrochloric acid. Used as a solvent, particularly for the selective extraction of crude rosin, also as raw material for synthetic resins.

furlong. A distance of 10 Gunter's chains, i e. 220 yards or one-eighth of a mile.

furnace.

(*Elec. Eng.*). See **electric furnace.**

(*Glass*). See **pot furnaces.**

(*Met.*). See **batch—**
blast—
continuous—
crucible—
cupola—
muffle—
open-hearth—
reheating—
reverberatory—
See also Supplement.

furnace clinker (*Build.*). The final residue from the combustion of coke or coal which has been burnt and re-burnt so as to consume the maximum of combustible matter in it. It is useful as an aggregate in the manufacture of concrete.

furnace linings (*Met*). The interior portions of metallurgical furnaces which are in contact with hot gases and the charge, and must therefore be constructed of materials resistant to heat, abrasion, chemical action, etc. See **refractories.**

furniture (*Build.*). A general name for all metal fittings for doors, windows, etc.

furniture (*Typog.*). Lengths of wood or hollow rectangles of metal, less than type height, used in a forme for making margins, etc. They are made to standard point widths and lengths.

furred (*Plumb.*). A term applied to pipes and boilers in which *furring* (q.v.) has developed.

furrier's bat (*Furs*). A shaped wooden instrument inserted in a skin when opening up.

furring (*Carp.*). See **firring.**

furring (*Plast.*). A wood-strip and plasterwork lining to a wall, which leaves an air-space between the plastering and the brickwork.

furring (*Plumb.*). The hard lime deposit formed on the inner surface of pipes and boilers in which hard water is heated.

furrowed (*Masonry*). A term applied to margin-drafted ashlars having parallel vertical grooves cut in the face.

furrowing (*Bot.*). The formation of a septum by the development of a ring of thickening on the inside of the cell wall, and the gradual closing of this ring by the walls growing in until the cavity of the cell is cut in two.

further outlook (*Meteor.*). A general forecast given for a period additional to that covered by the more detailed forecast.

furtherance (*Mining*). A money bonus paid to a coal-miner because of special difficulties in working.

fu'runcle (*Med.*). See **boil.**

furunculo'sis (*Med.*). The condition of having several boils.

fusain' (*Min.*). 'Mineral charcoal,' one of the important constituents of coal, which in household coal alternates with durain, etc., and gives rise to the characteristic stratification. Fusain consists of plant remains from which the volatiles have been eliminated. Mackenzie Taylor has shown that fusain may be produced from peat under a thin cover of marine clay, without considerable rise in temperature or increase of pressure.

fuscous (*Bot.*). Dingy-brown.

fuse (*Elec. Eng.*). A device used for protecting electrical apparatus against the effect of excess current; it consists of a piece of fusible metal, which is connected in the circuit to be protected, and which melts and interrupts the circuit when an excess current flows. The term fuse also includes the necessary mounting and cover (if any).

See **bi-metal—**
carbon tetrachloride—
cartridge—
expulsion—
home-office—
horn break—
immersed liquid-quenched—
liquid-quenched—
oil-quenched—
open—
screw-plug cartridge—
semi-immersed liquid-quenched—

fuse (*Mining, etc.*). A small waterproof canvas tube containing gunpowder surrounding a central tape arranged to burn at a given speed for setting off charges of explosive.

See **instantaneous—**
percussion—
safety—
time and percussion—

fuse-board (*Elec. Eng.*). See **distribution fuse-board.**

fuse box (*Elec. Eng.*). A term sometimes used to denote a distribution fuse-board when it is enclosed in a box.

fuse-carrier (*Elec. Eng., etc.*). A carrier for holding a fuse-link; arranged to be easily inserted between fixed contacts, so that a replacement of the fuse-link can be quickly carried out. Also called a FUSE-HOLDER.

fuse-element, fuse-link, or **fuse** (*Elec. Eng., etc*). The essential part of a fusible cut-out.

fuse-holder (*Elec. Eng.*). See **fuse-carrier.**

fuse-link (*Elec. Eng., etc.*). See **fuse-element.**

fuse-switch (*Elec. Eng.*). A *switch-fuse* (q.v.).

fuse tongs (*Elec. Eng.*). Tongs with insulating handles, used for withdrawing or replacing fuses on high-voltage circuits.

fused ring (*Chem*). See **condensed nucleus.**

fusee, fū-zē' (*Horol*). A spirally grooved pulley of gradually increasing diameter, used to equalise the pull of the main-spring. The fusee is connected to the main-spring barrel by a chain or gut line. The great-wheel is attached to the fusee. When the barrel is fully wound, the pull of the spring is taken on the small diameter of the fusee, and as the barrel gradually turns, the chain unwraps off the fusee on to the barrel. The theoretical outline of the fusee is that of a rectangular hyperbola, and at any instant the pull in the chain multiplied by the radius of the fusee at the point where the chain is leaving is a constant product.

fusee arbor (*Horol.*). The arbor on which the fusee is mounted.

fusee barrel (*Horol.*). A barrel for use with a fusee. The pull from the barrel is transmitted from the fusee by means of a chain or gut line, thence to the train. Winding takes place from the barrel edge, the winding operation being by key on the square of the fusee arbor.

fusee chain (*Horol.*). A fine-linked chain which connects the fusee to the barrel.

fusee engine (*Horol.*). A special lathe for the cutting of fusees.

fu'sel oil (*Chem.*). Mainly inactive amyl alcohol, $(CH_3)_2{\cdot}CH{\cdot}CH_2{\cdot}CH_2OH$, accompanied by active amyl alcohol, usually occurring in the products of alcoholic fermentation.

fu'selage (*Aero.*). The main structural body of an aeroplane, carrying the main planes, tail, etc., and providing the accommodation for the occupants and load.

fusible alloys or **metals** (*Met.*). Alloys of bismuth, lead, and tin (and sometimes cadmium or mercury) which melt at temperatures between 180° C. and 60° C.; used as solders and for safety devices in fire extinguishers and boilers, etc.

fusible cut-out (*Elec. Eng., etc.*). See **fuse.**

fusible plug (*Eng.*). A plug containing a metal of low melting-point, screwed into the crown of a boiler fire box to prevent serious over-heating of the plates if the water-level falls below them.

fu'siform (*Bot.*, *Zool.*). Elongated and tapering towards each end; shaped like a spindle.

fusing-factor (*Elec. Eng.*). The minimum current required to blow a fuse, expressed as a ratio to the rated current.

fusing point (*Met.*). See **melting-point.**

fusion (*Heat*). The conversion of a solid into the liquid state; the reverse of *freezing*. Fusion of a substance takes place at a definite temperature, the melting-point, and is accompanied by the absorption of latent heat of fusion.

fusion-cones (*Heat*). See **Seger cones.**

fusion welding (*Elec. Eng.*). A process of welding metals in which the weld is carried out solely by the melting of the metals to be joined, without any mechanical pressure.

fu'soid (*Bot.*). Rounded in section, widest in the middle and tapering to each end, and not markedly elongated.

fu'sospirillo'sis (*Med.*). Vincent's angina. Infection of the throat with the fusiform bacillus and spirilla described by Vincent.

fu'sospi'rochaetosis, fusospirochetosis,—kē-to'sis (*Med.*). Infection with fusiform bacilli and spirochaetes.

fust (*Arch.*). The shaft of a column.

fust (*Build.*). An ancient term for a roof ridge.

fustian (*Textiles*). A term including a number of cotton fabrics differing widely in structure and appearance, but all heavily wefted; they are used for clothing and furnishings. See **corduroy, moleskin, swansdown, velveteen.**

fuze. A variant spelling of *fuse*.

fuzz (*Acous.*). A type of extraneous noise introduced on a wax blank in the process of recording, and made evident by reproduction.

fuzzy (*Cinema.*). Said of (1) a sound-track when it visibly indicates lack of sharpness; (2) any acoustic reproduction which is characterised by high-order harmonic alien tones.

g. (*Chem.*). An abbrev. for *gram.*

g (*Chem.*) A symbol for *osmotic coefficient.*

g (*Phys*). The symbol used for the acceleration due to gravity.

γ (*Phys*). A symbol for: (1) *Ratio of specific heats of a gas*; (2) *Surface tension.*

γ- (*Chem.*). (1) Substituted on the carbon atom of a chain next but two to the functional group.—(2) Substituted on one of the central carbon atoms of an anthracene nucleus —(3) Substituted on the carbon atom next but two to the hetero-atom in a heterocyclic compound.—(4) A stereo-isomer of a sugar.

γ-rays (*Phys*) See **gamma rays.**

G (*Chem*) (In names of dyestuffs) yellow.

G (*Chem.*). A symbol for *thermodynamic potential, Gibbs' function, free energy.*—G. N. Lewis.

G (*Diel.*). See **conductance.**

[G] (*Light*). A pair of Fraunhofer lines in the deep blue of the solar spectrum. One, of wavelength 4308·081 A, is due to iron; the other, of wavelength 4307·907 A, is due to calcium.

G (*Phys.*). The symbol used for the *constant of gravitation.* See **gravitation.**

G (*San. Eng.*). The common abbrev. for *gulley.*

Gm (*Radio*) See **mutual transconductance.**

G-acid (*Chem.*) 2-Naphthol-6,8-disulphonic acid; an intermediate for dyestuffs.

Γ (*Chem.*). A symbol for *surface concentration excess.*

Ga (*Chem.*). The symbol for *gallium.*

gab (*Masonry*). A pointed tool for working hard stone.

gab'ardine (*Textiles*). A twill fabric made from worsted warp and a cotton weft, the former only appearing on the surface; used for dress purposes and light rainproof overcoatings. All-cotton gabardine is also used for the latter purpose.

gabbart scaffold (*Build.*). Scaffolding in which sawn timbers are used instead of round poles.

gabbro (*Geol.*). The name of a rock clan, and also of a specific igneous rock type. The rock gabbro is a coarse-grained plutonite, consisting essentially of plagioclase, near labradorite in composition, and clinopyroxene, with or without olivine in addition. The gabbro clan includes also norite, eucrite, troctolite, kentallenite, etc., together with their medium- and fine-grained equivalents.

gabers scaffold (*Build.*). A *gabbart scaffold* (q.v.).

gab'ion (*Civ. Eng.*). A long wicker basket, containing earth or stones, deposited with others to serve the same purposes as *fascines* (q.v.).

gable (*Build.*). A triangular part of an outside wall, between the sides of the roof and the line of the eaves.

gable board (*Build.*). A *barge board* (q.v.).

gable-end (*Build.*). An end wall surmounted by a gable.

gable moulding (*Build.*). A moulding used to decorate a gable.

gable roof (*Build.*). A ridge roof terminating in a gable-end.

gable shoulder (*Build.*). The projecting masonry or brickwork supporting the foot of a gable.

gable springer (*Build.*). The concrete, brick, or tile corbel supporting the gable shoulder.

gable tiles (*Build.*). Purpose-made arris tiles to cover the intersection between gable and roof.

gable window (*Build.*). A window built in the gable of a house.

ga'blet (*Arch., etc.*). A small decorated gable over a niche or other opening.

gablock. See **gavelock.**

gad (*Mining*). A short pointed chisel used for breaking or loosening rock: a steel wedge for breaking coal.

gadget. A small mechanical device.—(*Glass*) A tool for holding the stem of a piece of ware which is in course of treatment.

gad'olinite (*Min.*). A rare accessory mineral occurring in pegmatites as greenish- or brownish-black crystals of composition represented by $Be_2FeY_2Si_2O_{10}$, i.e. silicate of beryllium, iron, and yttrium, often with cerium.

gadolin'ium (*Chem*). Symbol, Gd. A rare metallic element; trivalent; a member of the rare earth group. At. no. 64, at. wt. 157·31. Only known in combination; obtained from the same sources as europium.

gaffer (*Cinema.*). The foreman electrician in a sound-film studio.

gaffer haulier (*Mining*). The man in charge of horse or pony traffic between the face and the mechanical haulage way.

gag (*Mining*). An obstruction in the clack valve or bucket of a pumping set.

gagger (*Foundry*). A *lifter* (q.v). See also **dabber.**

gaging (*Mining*). A heap of rubbish placed at the entrance of a disused roadway underground.

gahn'ite (*Min.*). A mineral belonging to the spinel group; occurs as grey octahedral cubic crystals. Also known as ZINC-SPINEL (see **spinel**), the composition being zinc aluminate, $ZnO \cdot Al_2O_3$.

gain (*Carp.*). A notch or mortise cut in a timber to support the end of a beam.

gain (*Mining*). A cutting made in the side of a roadway underground to facilitate the construction of a dam or air stopping.

gain (*Elec. Comm.*). The reverse of *loss*; generally provided by the insertion of an amplifier into a transmission circuit, or by matching impedances by a loss-free transformer. Measured in népers or decibels, and defined as the increase in power-level in the load, i.e. the ratio of the actual power delivered to that which would be delivered if the source is correctly matched, without loss, to the load in the absence of the amplifier.

gain (*Radio*). Of a directional antenna, the ratio (expressed in decibels) of the voltage produced at the receiver terminals by a signal arriving from the direction of maximum sensitivity of the antenna to that produced by the same signal in an omnidirectional reference antenna (generally a half-wave dipole). In the case of a transmitting antenna, the ratio of the field strength produced at a point along the line of maximum radiation by a given power radiated from the antenna to that produced at the same point by the same power from an omnidirectional antenna.

gain amplifier (*Cinema.*). The thermionic amplifier following the photo-electric cell amplifier and preceding the power stages in sound-film projection equipment.

gain control (*Radio*). The means of variation of the degree of amplification of an amplifier.

gaining (*Carp.*). The operation of cutting notches in timbers.

gait or **gaiting** (*Weaving*). The operation of preparing a loom for weaving, i.e. placing the warp in position, as well as the healds and reed.

gaize (*Build.*). A friable argillaceous sandstone which under heat treatment is converted into a pozzolana.

Gala Beds (*Geol.*). The highest division of Lapworth's Moffat Shales occurring in the central part of the Southern Uplands of Scotland; equivalent to the higher part of the Llandovery Series of the Silurian System.

galac'tagogue or **galac'tagog** (*Med.*). Promoting the secretion of milk (Greek, *gala*, gen. *galaktos*): any medicine which does this.

galac'tans (*Chem.*). The anhydrides of galactose. They comprise many gums, agar, and fruit pectins, and occur in algae, lichens, mosses.

galac'tic circle (*Astron.*). The great circle of the celestial sphere in which the latter is cut by the galactic plane: hence the primary circle to which the galactic co-ordinates are referred.

galactic concentration (*Astron.*). The tendency, first noted by Herschel, of the stars both bright and faint to crowd towards the galactic plane; hence a statistical criterion as to whether or not a given type of celestial object belongs to our stellar system.

galactic co-ordinates (*Astron.*). Two spherical co-ordinates referred to the galactic circle; the origin of galactic longitude is the point of intersection of the galactic circle with the celestial equator; galactic latitude is measured positively from the galactic plane towards the north galactic pole; these co-ordinates are not affected by the precession of the equinoxes.

galactic plane (*Astron.*). The plane passing as nearly as possible through the centre of the belt known as the Milky Way or Galaxy; hence the fundamental plane in sidereal astronomy.

galac'tite (*Min.*). A mineral of the zeolite group, intermediate in composition between natrolite and mesolite. Actually, the species was erected on the basis of an erroneous analysis.

galac'tocele (*Med.*). A cystic swelling in the breast, due to retention of milk as the result of a blockage of a milk duct.

galactophori'tis (*Med.*). Inflammation of the milk ducts.

galactoph'orous (*Zool.*). See **lactiferous.**

galactorrhoe'a or **galactorrhe'a** (*Med.*). Excessive secretion of milk by the breast, causing it to overflow through the nipple.

galac'tose (*Chem.*). A hexose of the formula $CH_2OH{\cdot}(CHOH)_4{\cdot}CHO$; thin needles; m.p. 166° C.; dextro-rotatory. It is formed together with *d*-glucose by the hydrolysis of milk-sugar with dilute acids. Stereoisomeric with glucose, which it strongly resembles in properties. Present in certain gums and seaweeds as a polysaccharide *galactan.*

galacto'sis (*Zool.*). See **lactation.**

Gal'alith (*Plastics*). A non-thermosetting plastic of the casein type. See **Erinoid.**

galate'a (*Textiles*). A cotton fabric with coloured stripe fast to washing; used for shirtings, nurses' uniforms, etc.

Gal'axy (*Astron.*). The name given to the belt, of milky white appearance, which encircles the heavens, nearly in a great circle; now known to be formed of individual stars in countless numbers. Also called the MILKY WAY.

gal'bulus (*Bot.*). A strobilus with fleshy cone scales, as in juniper.

gale (*Meteor.*). A wind having a velocity of about 40 miles per hour or more, at a height of 32 ft. (10 metres) above the ground. On the Beaufort scale a gale is a wind of force 8.

gale warning (*Meteor.*). A notice of the probability of gales issued by the Meteorological Office to certain ports and fishing stations, which then hoist a black cone, apex up if the gale is expected from the north, apex down if from the south.

ga'lea (*Zool.*). (1) A movable spinneret borne by the chelicerae of certain *Arachnida.*—(2) Any helmet-shaped structure: in *Insecta*, the outer distal lobe of the maxilla.

gal'eate or **gal'eiform** (*Bot., Zool.*). Shaped like a helmet or a hood.

gale'na or **lead glance** (*Min.*). Lead sulphide, PbS; the commonest ore of lead, occurring as grey cubic crystals, often associated with zinc-blende, in mineralised veins. Silver sulphide, argentite, which is isomorphous with galena, may be present to the extent of two or three ounces per ton, but may rise to 1%. See also **silver lead ore.**

galeric'ulate (*Bot.*). Covered by a cap-like lid.

galer'iform (*Bot.*). Cap-shaped.

galets (*Masonry*). See **spalls.**

gall (*Bot.*). An abnormal growth formed on a plant following attack by a parasite.

gall (*Vet.*). An injury of the skin of animals due to the pressure of harness.

gall flower (*Bot.*). An imperfectly developed flower of the fig tree, in which the eggs of the gall wasp are laid.

gall (*Mining*). Rent to the Crown for an area of mineral property.

gall (*Physiol.*). See **bile.**

gall-bladder (*Zool.*). In *Vertebrata*, a lateral diverticulum of the bile-duct in which the bile is stored.

gall sickness (*Vet.*). See **anaplasmosis.**

gall-stones (*Med.*). Biliary calculi. Pathological concretions in the gall-bladder and bile passages. They have not a uniform composition but some constituents may be preponderant; e.g. cholesterol, or calcium carbonate and phosphate.

gallery (*Build.*). An elevated floor projecting beyond the walls of a building and supported on pillars, brackets, or otherwise, so as to command a view upon the main floor, as at a theatre, etc.

gallery (*Elec. Eng.*). A device for attaching to a lampholder in order to provide a support for a glass shade or reflector which is too large or heavy to be supported by the shade-carrier ring.

gallery (*Mining*). A tunnel or passage in a coal-mine.

gallet (*Masonry*). A splinter of stone.

galleting (*Masonry*). See **garreting.**

galley (*Typog.*). A long steel tray open at one end, in which type matter is held after setting. Corrections and deletions are more easily made to type in galley form than in page form, and are generally marked on the galley proof or slip, itself commonly referred to as a *galley.*

gallic acid (*Chem.*). $C_6H_2(OH)_3COOH$, 3, 4, 5-trihydroxy-benzoic acid; crystallises with 1 H_2O; thin needles; decomposes at about 200° C. into CO_2 and pyrogallol. Occurs in nut-galls, tea, divi-divi, and other plants; it is obtained from tannin by hydrolysis.

Gallifor'mes (*Zool.*). An order of *Alectoromorphae*, possessing a schizognathous palate, a simple rhamphotheca, and ten carpal remiges; the feather tracts are well defined and the feet well adapted for running. Game birds (which seek their food—berries, seeds, buds, and insects—on the ground), Brush-turkeys, Curassows, Turkeys, Pheasants, Partridge, Grouse, and Quail.

gal'lium (*Chem.*). Symbol, Ga. A metallic element in the third group of the periodic system. At. no. 31, at. wt. 69·9, sp. gr. 5·885. The metal is grey.

galloon' (*Arch.*). Decorated work for a band or moulding, to which is applied a row of small round balls.

galloon (*Textiles*). Narrow tape woven from fine cotton yarns, or from a silk warp and cotton weft; used as bindings.

galloping (*I.C. Engs.*). An American term descriptive of the irregular running of a petrol-engine supplied with an over-rich mixture.

gal'lotan'nin (*Chem.*). See **tannin.**

Galloway boiler (*Eng.*). A cylindrical boiler of the Lancashire type, in which the two furnace tubes unite, at a short distance from the grates, into a single arched oval flue, crossed by water tubes.

Galloway tubes (*Eng.*). The inclined water tubes which cross the flue of a Galloway boiler in order to assist circulation and increase the heating surface.

gallows bracket (*Carp.*). A framed wooden bracket for carrying a load at its outer end.

gallows timber (*Mining*). A timber framework or set for roof support.

galmei (*Min.*). An obsolete name for the basic metasilicate of zinc, *smithsonite.*

galon' (*Textiles*). A narrow lace resembling insertion but having one or both edges scalloped.

Galton's laws (*Gen.*). (1) Of ancestral inheritance: 'Any organism of bisexual parentage derives one half of its inherited qualities from its parents (one fourth from each parent), one fourth from its grandparents, one eighth from its great-grandparents, and so on. These successive fractions, whose numerators are one and whose denominators are the successive powers of two, added together equal one, or the total inheritance of the organism, thus: $\frac{1}{2}+\frac{1}{4}+\frac{1}{8}+. . .=1$.'—(2) Of filial regression: 'The offspring of exceptional parents tend to regress toward mediocrity in proportion to the degree of parental exceptionalness' (Lull).

galvan'ic cell (or battery) (*Elec. Eng.*). An obsolete name for a *primary cell* or a battery of such cells; the name is derived from Galvani.

galvanic electricity (*Elec. Eng.*). An obsolete term for electric current, as opposed to static electricity.

galvanised iron (*Build.*). Iron which has been subjected to *galvanising* (q.v.); widely used, especially in corrugated form (see **corrugated iron**), for minor roofing purposes, e.g. on wooden buildings, etc.

galvanising (*Met.*). The coating of steel or iron with zinc, generally by immersion in a bath of zinc, covered with a flux, at a temperature of 425-500° C. The zinc may also be electrodeposited from cold sulphate solutions. The zinc is capable of protecting the iron from atmospheric corrosion even when the coating is scratched, since the zinc is preferentially attacked by carbonic acid, forming a protective coating of basic zinc carbonates.

gal'vanism. (1) An obsolete term for the science of electric currents.—(2) Curative treatment by unidirectional currents.

gal'vanocaut'ery (*Surg.*). Cautery by a wire heated by the passage of a galvanic current.

gal'vanochem'istry (*Chem.*). See **electrochemistry.**

galvanom'eter (*Elec. Eng., etc.*). An electrical instrument for measuring small electric currents.

See **absolute—**
astatic—
Ayrton-Mather—
ballistic—
Broca—
D'Arsonval—
differential—
Einthoven—
Helmholtz—
loop—
mirror—
moving-coil—
moving magnet—
potential—
reflecting—
sine—
string—
tangent—
thermo—
torsion—
vibration—

galvanometer constant (*Elec. Eng.*). A number by which the scale reading of a galvanometer must be multiplied in order to give a reading of current in amperes or other suitable units.

galvanometer shunt (*Elec. Eng.*). A shunt connected in parallel with a galvanometer in order to reduce its sensitivity. See **universal shunt, Ayrton shunt.**

gal'vanoplasty (*Met., etc.*). See **electroforming.**

gal'vanoscope (*Elec. Eng.*). A term sometimes used to denote an instrument for detecting, but not measuring, an electric current.

galvanos'tegy (*Chem.*). Electrolytic tinning, as a protection against hardening in the nitrite process.

gal'vanotax'is, gal'vanotro'pism (*Biol., Bot.*). Response or reaction of an organism to an electrical stimulus.—*adjs.* **galvanotac'tic, galvanotropic.**

Gambia fever (*Vet.*). A chronic trypanosomiasis of domestic animals of West Africa due to infection by *Trypanosoma dimorphon.*

gamboge gum (*Chem.*). A natural gum, of grey or brown colour; sp. gr. 1·03, acid value 68-89, saponification value 115-150; used as a pigment.

gambrel roof (*Build.*). A *mansard roof* (q.v.).

gametan'gium (*Bot.*). The organ in which the gametes are formed.

gam'etes (*Biol.*). Reproductive cells which will unite in pairs to produce zygotes; germ-cells.—*adj.* **gam'etal.**

game'tic number (*Cyt.*). The number of chromosomes present in the nucleus of a gamete.

gam'etids (*Zool.*). In *Protozoa*, cells budded off from the body of a sporont and destined to become gametes.

game'tocyst (*Zool.*). In *Protozoa*, a cyst in which union of gametes takes place. Also called GAMOCYST.

game'tocyte (*Zool.*) In *Protozoa*, a phase developing from a trophozoite and giving rise to gametes; a gamete mother-cell.

game'togen'esis (*Zool.*). The formation of gametes from gametocytes.

game'togo'nium (*Zool.*). See **gametocyte.**

game'tonu'cleus (*Zool.*). The nucleus of a gamete: a nucleus functioning as a gamete.

gam'etophyte (*Bot.*). The plant which bears the gametangia and gametes—*adj.* **gametophyt'ic.**

gam'etophyt'ic budding (*Bot.*). The formation of gemmae on a prothallus.

gametrop'ic (*Bot.*). Said of the movements of organs before or after fertilisation.

Gamlan Shales (*Geol.*). A series of grey shales, typically exposed in the valley of the Gamlan on the south side of the Harlech Dome; of Middle Cambrian age, and the highest division of the Harlech Series of North Wales.

gamma (*Photog.*). The slope of the linear portion of the H & D curve for a photographic emulsion, i.e. the measure of contrast obtained in a given film emulsion after a specified processing.

gamma brass, gamma constituent in brass (*Met.*). The γ constituent in brass is hard and brittle and is stable between 60% and 68% of zinc at room temperature. γ-Brass is an alloy consisting of this constituent.

gamma control (*Cinema.*). The necessity of adjusting the extent of development (in developing cinematograph films with sound-tracks) within fine limits in order to minimise amplitude distortion arising from non-linearity in the gamma curve of the emulsion.

gamma infinity (*Photog.*). Abbrev. for the maximum gamma obtainable with prolonged development.

gamma iron (*Met.*). The polymorphic form of iron stable between 906° C. and 1408° C. It has a face-centred cubic lattice and is non-magnetic. Its range of stability is lowered by carbon, nickel, and manganese, and it is the basis of the solid solutions known as austenite.

gamma rays (*Phys.*). Short, highly penetrating X-rays emitted by radioactive substances during their spontaneous disintegration.

gamo- (Greek *gamos*, marriage). A prefix used in the construction of compound terms; e.g. *gamogenesis* (q.v.).

gamo'bium (*Zool.*). In metagenesis, the sexual generation. Cf. *agamobium.*

gam'ocyst (*Zool.*). See **gametocyst.**

gamogast'rous (*Bot.*). Said of a syncarpous gynaeceum in which the ovaries are fused, the styles and stigmas free.

gamogen'esis (*Biol.*). Reproduction by union of sexual elements.—*adj.* **gamogenet'ic.**

gam'ogen'ic (*Bot.*). Formed after a sexual act.

gamog'ony (*Zool.*). In *Sporozoa*, formation of gametes or gametocytes by a gamont; sporogony.

gam'ont (*Zool.*). In *Sporozoa*, an individual destined to produce gametes; sporont.

Gamopet'alae (*Bot.*). See **Sympetalae.**

gamopet'aly (*Bot.*). The condition when the corolla consists of a number of petals united by their edges.—*adj.* **gamopet'alous.**

gam'ophase (*Bot.*). The haploid phase in the life-cycle.

gam'ophyll'ous (*Bot.*). Having the perianth members united.

gam'osep'alous (*Bot.*). Having the sepals united by their edges.

gam'oste'ly (*Bot.*). The fusion of steles.—*adj.* **gamoste'lic.**

gam'otro'pism (*Zool.*). The tendency shown by gametes to attract one another.

gam'ut (*Acous.*). The range of frequencies required in a specified type of reproduction; e.g. speech or music.

gang (*Mining*). A train or journey of tubs or trucks.

gang boarding (*Build.*). A board with battens nailed across to form steps; used as a gangway during building operations.

gang condenser (*Radio*). An assemblage of two or more variable condensers mechanically coupled to the same control mechanism.

gang milling (*Eng.*). The use of several milling cutters on one spindle to produce a surface with a required profile or to mill the face and sides of the work at one operation.

gang mould (*Build., Civ. Eng.*). A mould in which a number of similar concrete units may be cast simultaneously.

gang rider (*Mining*). See **dukey.**

gang saw (*Timber*). An arrangement of parallel saws secured in a frame to operate simultaneously in sawing a log into strips.

gang switches (*Elec. Eng*). A number of switches mechanically connected together so that they can all be operated simultaneously.

gang tool (*Eng.*). A tool holder having a number of cutters; used in lathes and planes, each tool cutting a little deeper than the one ahead of it. See also **gang milling.**

ganging (*Radio*). Mechanical coupling of the tuning controls of two or more resonant circuits.

ganging oscillator (*Radio*). An oscillator giving a constant output, whose frequency can be rapidly varied over a wide range; used for testing the accuracy of adjustment of a system of ganged circuits over their tuning range.

gang'lion (*Med.*). A localised cystic swelling formed in connexion with a tendon sheath, commonly on the back of the hand.

ganglion (*Zool.*). An aggregation of nerve cells from which nerve fibres lead out.—*adjs.* **gang'liar, gang'liate, gang'lionated, gang'lioid, gang'liform, ganglion'ic.**

ganglionec'tomy or **gangliec'tomy** (*Surg.*). Surgical removal of a nerve ganglion, or of a ganglion arising from a tendon sheath.

gang'lioneuro'ma (*Med.*). A tumour composed of ganglion nerve cells, nerve fibres, and fine fibrous tissue, usually arising in connexion with sympathetic nerves (e.g. in the medulla of the suprarenal gland).

ganglioni'tis (*Med.*). Inflammation of a nerve ganglion.

gango'sa (*Med.*). A progressive, destructive ulceration of the nose, the palate, and the pharynx, occurring as a late sequel of yaws.

gan'grene (*Med.*). Death of a part of the body, associated with putrefaction; due to infection or to cutting off of the blood supply.

gangue (*Met.*). The portion of an ore which contains no metal.—(*Mining*) Valueless minerals in a lode or vein.

Ganguillet and Kutter's formula, gahn^{g}-gee'yā, koo'ter (*Hyd*). An expression giving the value of *C* in *Chezy's formula* (q.v.) as:

$$C=\frac{41{\cdot}6+\dfrac{1{\cdot}811}{n}+\dfrac{0{\cdot}00281}{i}}{1+\left(41{\cdot}6+\dfrac{0{\cdot}00281}{i}\right)\dfrac{n}{\sqrt{m}}},$$

where n = a coefficient of roughness for the pipe or channel.

gangway (*Build.*). Rough planks laid to provide a footway for the passage of workmen on a site.

gangway (*Mining*). An elevated roadway: a main haulage road.

gann'ister (*Geol*). A particularly pure and even-grained siliceous grit or loosely cemented quartzite, occurring in the Upper Carboniferous of the Midlands, and highly prized in the manufacture of silica-bricks.

Gannister Measures (*Geol.*). A local name for the Lower Coal Measures of Upper Carboniferous age occurring in certain of the Midland coalfields, notably in the Sheffield district, in the York, Derby, and Notts coalfield. So called from the valuable gannisters occurring in this part of the succession.

ga'noid (*Zool.*). Formed of, or containing, ganoin. Said of fish scales of rhomboidal form, composed of an outer layer of ganoin and an inner layer of isopedin; hence said of Fish having these scales.

Ganoid'ei (*Zool.*). A name formerly used to indicate a group of Fish possessing ganoid scales and certain other common features; the group included the Sturgeons and Spoonbills, the Bow-fins, the Gar-pikes, and the Bichirs. See **Palaeopterygii, Ginglymodi, Protospondyli.**

ga'noin (*Zool.*). A calcareous substance secreted by the dermis and forming the superficial layer of certain fish scales; it was formerly supposed to be homologous with enamel, but this has now been disproved.

gantrees (*Weaving*). Wooden supports above a loom upon which the jacquard is carried.

gantry (*Build.*). A temporary erection having a working platform used as a base for building operations or for the support of cranes, scaffolding, or materials.

gap (*Aero.*). The vertical distance between one plane and that immediately below or above it.

gap (*Elec. Eng.*).

See **air- —**
anchor—
horn—
needle-point—
section—
spark—
sphere—

gap arrester (*Elec. Eng.*). A lightning arrester consisting essentially of a small air-gap connected between the circuit to be protected and earth; the gap breaks down on the occurrence of a lightning surge, and discharges the surge to earth. See **multigap arrester.**

gap bed (*Eng.*). A lathe bed having a gap near the headstock, to permit of turning large flat work of greater radius than the centre height.

gap bridge (*Eng.*). A bridge casting of the same cross-section as the bed in a gap-bed lathe, and used to close the gap.

gap extension coefficient (*Elec. Eng.*). See **extension coefficient.**

gap lathe (*Eng.*). A lathe with a *gap bed* (q.v.).

gap waxing (*Cables*). Waxing which occurs at the upper and lower boundaries of the helical space formed by consecutive turns of a paper tape. It is free from carbon.

gap window (*Build.*). A window which is long and narrow.

gape (*Zool.*). The width of the mouth when the jaws are open.

gapes (*Vet.*). See **syngamiasis.**

garage (*Build.*). A building designed to accommodate one or more automobiles.

garden-wall bonds (*Build*). Forms of bond used largely for building low boundary walls of single brick thickness when the load to be carried is that of the wall only and it is desired to show a fair face on both sides of the wall.

See **English—** **Sussex—**

garget (*Vet.*). See **mastitis.**

gargle (*Acous.*). A wow which has fluctuation changes ranging between about 30 and 200 per second.

gargoyle (*Build.*). A grotesquely shaped spout projecting from the upper part of a building, to carry away the rain water. Also spelt GURGOYLE.

garland (*Mining*). A collecting trough for water set in a colliery shaft. A frame to heighten and increase content of a truck.

garnet (*Min.*). A group of minerals which crystallise in the cubic system. Some species occur rarely in igneous rocks, but are characteristic of metamorphic rocks, such as garnet-mica-schist, garnet gneiss, and eclogite. Some species are of value as gems, rivalling ruby in colour. See also **andradite, grossularite, melanite, pyrope, spessartite.**

garnet hinge (*Join.*). A form of *strap hinge* (q.v.).

garnet paper (*Build.*). *Sandpaper* (q.v.).

gar'nierite (*Min.*). A bright-green nickeliferous silicate of magnesium, occurring in ultrabasic rocks as a decomposition product of olivine. In external form garnierite resembles chalcedony, and differs from chrysolite chiefly in this respect.

garnish bolt (*Build.*). A bolt whose head is chamfered or faceted.

garret (*Build.*). A top storey in a house, usually one built within the roof space.

garret window (*Build.*). A skylight of which the glazing is arranged to lie along the slope of the roof.

garreting (*Masonry*). A term applied to the process of inserting small stone splinters in the joints of coarse masonry. Also called GALLETING

Garstang Sandstone (*Geol.*). Another name for the St. Bees Sandstone, which represents the Bunter Sandstone in Cumberland, and is approximately 1000 ft. in thickness.

garter spring (*Eng.*). An endless band formed by connecting the two ends of a long helical spring; used to exert a uniform radial force on any circular piece round which it is stretched, as in a *carbon gland* (q.v.).

garth (*Arch.*). An enclosed area attached to a building and surrounded usually by a cloister.

Garth Hill Beds or **Garth Grit** (*Geol.*). The basal beds of the Arenig Series (Ordovician System) in North Wales. The typical Garth Grit is a pebbly grit containing the fossil *Bolopora undosa* and is often only a few inches thick. In Anglesey the basal beds representing the beach deposits of the Ordovician Sea thicken to 3000 ft.

Garton lightning arrester (*Elec. Eng.*). A form of gap lightning arrester in which the current flowing when the gap breaks down operates a solenoid which lengthens the gap and extinguishes the arc.

gas. (1) A state of matter in which a substance completely fills the region in which it is contained, no matter how small its amount.—(2) The term is sometimes reserved for a *gas* (1) at a temperature above the critical value. Also defined as a definitely compressible fluid. See **gas laws,** and the articles at **gases** (p. 368).

See also **blast-furnace—**
blue water—
carburetted water—
coal—
coke-oven—
commercial—*
Mond—
natural—
poison—
producer—
semi-water—
sewage—
town—

gas (*Automobiles, etc.*). Abbrev. (used especially in America) for *gasolene* or *petrol* (q v.).

gas (*Mining*). The mixture of natural explosive gases met with in most coal-mines.

gas amplification (*Photo-electronics*). See **cell amplification.**

gas analysis (*Chem.*). The quantitative analysis of gases by absorption. A measured quantity of gas, 100 c.c., is brought into intimate contact with the various reagents, and the reduction in volume is measured after each absorption process Carbon dioxide is absorbed in a concentrated caustic potash solution, oxygen in alkaline pyrogallol solution, carbon monoxide in ammoniacal cuprous chloride solution, unsaturated compounds by absorption in bromine water, etc, hydrogen by combustion with a measured quantity of air over palladium asbestos. Nitrogen is estimated by difference.

gas-bag (*Aero.*). Any separate gas-containing unit of a rigid airship.

gas barrel (*Eng.*). Wrought-iron tube, first used for conducting gas from street mains into buildings; now used for a variety of purposes.

gas battery (*Elec Eng.*). See **Grove's gas cell.**

gas black (*Paint.*). A substance produced by carbonising natural gas; used as an adulterant in carbon-, animal-, and vegetable-blacks, especially in America.

gas-blast circuit-breaker (*Elec. Eng.*). A high-power circuit-breaker in which a blast of gas is directed across the contacts at the instant of separation in order to extinguish the arc. See **air-blast switch.**

gas bottles. A colloquial term for *gas cylinders.*

gas cable (*Cables*). Cable in which the insulation is dry paper (condenser tissue) and ionisation is prevented by admitting nitrogen or carbon dioxide inside the cable, at a pressure of 200 lb./in.^{2}. The lead sheath is reinforced by tapes of copper or stout paper.

gas carbon (*Chem.*). A hard dense deposit of almost pure carbon which slowly collects on the inside of a coal-gas retort.

gas carburising (*Met.*). The introduction of carbon into the surface layers of mild steel by heating in a current of gas high in carbon—usually hydrocarbons or hydrocarbons and carbon monoxide.

gas cell (*Chem.*). A galvanic cell in which at least one of the reactants is a gas.

gas circulator (*Build.*). A gas water-heater for domestic use.

gas coal (*Fuels*). Coal containing a high percentage of volatile hydrocarbons, gas-yielding constituents; suitable for making town gas.

gas coke (*Fuels*). See **coke (gas), coke (metallurgical).**

gas colic (*Vet.*). See **tympanites.**

gas constant (*Chem.*). For definition, see **perfect gas.** Its value is 0·08209 litre-atmospheres per gram-molecule, or $8{\cdot}315 \times 10^7$ ergs per gram-molecule, or 1·988 calories per gram-molecule.

gas coulometer (*Elec. Eng.*). A voltameter (coulometer) in which the quantity of electricity passing is measured by determining the volume of gas evolved.

gas cylinders (*Gases*). Solid drawn steel cylinders in which gases (except acetylene) are stored under high pressure for convenience of transport; made in accordance with B.S.I. Specifications.

gas detector (*Mining*). An apparatus for detecting and estimating the amount of gas in a mine.

gas discharge lamp (*Illum.*). See **electric discharge lamp.**

gas-discharge tube (*Thermionics*). Generally, any tube in which an electric discharge takes place through a gas. Specially, a tube comprising a heated cathode, a grid, and an anode enclosed in an atmosphere of gas at low pressure, generally mercury vapour, argon, or neon. Also called GAS-FILLED RELAY, GAS-FILLED TRIODE, GRID GLOW TUBE. See also **thyratron.**

gas drain (*Mining*). A tunnel or borehole for conducting gas away from old workings.

gas-electric generating set (*Elec. Eng.*). A name often given to a small electric generating set driven by a gas or petrol engine.

gas engine (*Eng.*). An internal-combustion engine, running on the constant volume or Otto cycle, in which gaseous fuel, such as town or producer gas, is mixed with air to form a combustible mixture in the cylinder and fired by spark ignition.

gas evolution (*Met.*). The liberation of gas in the form of bubbles during the solidification of metals. It may be due to the fact that the solubility of a gas is less in the solid and molten metal respectively, as when hydrogen is evolved by aluminium and its alloys, or to the promotion of a gas-forming reaction, as when iron oxide and carbon in molten steel react to form carbon monoxide. See also **blowholes, unsoundness.**

gas exhauster (*Eng.*). A large low-pressure rotary vane pump or centrifugal blower for exhausting gas from the retorts in a gas-works.

gas-filled filament lamp (*Illum.*). A filament lamp in which the filament is mounted in a bulb containing an inert gas.

gas-filled photo-cell (*Photo-electronics*). A photo-electric cell in which the anode and the photo-cathode are enclosed in an atmosphere of gas at low pressure. It is more sensitive than the corresponding high-vacuum cell owing to the formation of positive ions by collision of the photo-electrons with the gas molecules.

gas-filled relay (*Elec. Eng.*). A grid-controlled thermionic tube, usually of the mercury-vapour type, when used as a relay. See also **gas-discharge tube.**

gas fire (*Build.*). A domestic heater in which hollow fireclay bars are rendered incandescent by Bunsen flames which they surround.

gas focusing (*Cathode Ray Tubes*). A means of focusing the beam in a cathode ray tube by the action of a small amount of residual gas in the envelope, which on becoming ionised by collision forms a core of positive ions along the centre of the beam and provides the necessary focusing field.

gas gangrene (*Med.*). Rapidly spreading infection of a wound with gas-forming anaerobic bacteria, causing gangrene of the infected part.

gas generator (*Chem.*). Chemical plant for producing gas from coal, e.g. water-gas by alternating combustion of coal and reduction of steam.

gas gland (*Zool.*). A structure in the wall of the air-bladder in certain Fish which is capable of secreting gas into the bladder. See **rete mirabile.**

gas governor (*Gas Fittings*). A form of automatic tap which controls the pressure, volume, or temperature of the gas supply on consumers' premises.

gasholder. See **gasometer.**

gas lamp (*Illum.*). A lamp in which the illumination is provided by the burning of gas, usually town gas.

gas laws (*Phys.*). Boyle's law, Charles' law, and the pressure law, which are included in the equation $Pv=RT$, where P is the pressure, v the volume of one gram-molecule, T the absolute temperature, and R the gas constant, the value of which is $8{\cdot}315\times10^7$ ergs. A gas which obeys the gas laws perfectly is known as a *perfect gas.*

gas-light paper (*Photog.*). Bromide paper so slow in its speed that it can be normally handled in gas or moderate electric light.

gas-lighter (*Elec. Eng.*). See **electric gas-lighter.**

gas lime (*Chem.*). The spent lime from gas-works after being used for the absorption of hydrogen sulphide and carbon dioxide in the gas purifiers.

gas liquor (*Chem.*). The aqueous solution of ammonia and ammonium salts condensed from coal-gas.

gas mantle or **incandescent mantle** (*Illum.*). A small dome-shaped structure of knitted or woven ramie or rayon, supported at the open end by a ring of refractory material. The structure is impregnated with a solution of the nitrates of cerium and thorium, then dried, and the textile fabric burned off. The structure that remains consists of a mixture of oxides, 1% cerium and 99% thorium.

gas mask (*Chem.*). A device for protection against poisonous gases, which are absorbed by activated charcoal or by other reactive substances, e.g. soda-lime. The choice of the absorbing material depends on the nature of the gas to be counteracted. See also **contex*.**

gas oil (*Fuels*). A petroleum distillate obtained after kerosene, flash point 168° F.; used for carburetting water-gas in gas plants, and for driving road and stationary diesel engines. Also called DIESEL OIL, SOLAR OIL.

gas-pipe tongs (*Gas Fittings*). A wrench used for turning pipes when screwing them into, or out of, coupling pieces.

gas pliers (*Eng.*). Stout pliers with narrow jaws, the gripping faces of which are concave and serrated, to provide a secure grip on pipes, nipples, etc.

gas pump (*Eng.*). See **Humphrey gas pump.**

gas purifiers (*Gas*). A section of a gas-works plant in which the gas is freed from hydrogen sulphide by passing it through layers of hydrated oxide of iron.

gas radiator (*Build.*). A flueless heater resembling a steam or hot-water radiator but equipped with Bunsen burners at the base.

gas regulator (*Eng.*). (1) An automatic valve for maintaining a steady gas pressure in supply mains.—(2) The throttle valve of a gas engine.

gas scrubber (*Chem.*). An apparatus for the purification of gas from tarry matter and other undesirable impurities, e.g. ammonia, hydrogen sulphide, etc.

gas show (*Geol.*). A surface indication of the escape of natural gas from underground reservoirs; of importance in oil-field exploration.

gas starter (*Aero.*). An engine starter working on the principle of supplying the normal explosive mixture to the cylinder from an external source and exploding it at the beginning of the power stroke.

gas stocks and dies (*Eng.*). Stocks and dies (see **dies** (2), **die-stock**) for cutting screw-threads on gas barrel or piping.

gas tar (*Chem., etc.*). Coal-tar condensed from coal-gas, consisting mainly of hydrocarbons. Distillation of tar provides many substances, e.g. ammoniacal liquor, 'benzole,' naphtha, and creosote oils, with a residue of pitch. Dehydrated, it is known as ROAD TAR, and used as a binder in road-making.

gas thermometer. See **air thermometer.**

gas thread (*Eng.*). See **British Standard pipe thread.**

gas turbine (*I.C. Engs.*). A machine consisting of a combustion chamber, to which air is supplied by a compressor and heated at constant pressure by oil fuel, and a turbine, in which the hot gases expand and do work. Still experimental.

gas warfare (*Mil.*). See **chemical warfare*.**

gas well (*Geol.*). A deep boring, generally in an oil-field, which yields natural gas rather than oil. See **natural gas.**

gases, density of (*Chem., Phys.*). According to the *gas laws* (q.v.), the density of a gas is directly proportional to the pressure and inversely proportional to the absolute temperature. At 0° C. and 76 cm. of mercury the densities of gases range from 0·0899 gm. per litre for hydrogen to 6·99 gm. per litre for phosphorus chlorofluoride.

gases, elasticity of (*Phys.*). See **elasticity of gases.**

gases, expansion of (*Phys.*). All gases have very nearly the same coefficient of expansion, namely ·00366 per °C. when kept at constant pressure. See **absolute temperature, gas laws.**

gases, kinetic theory of (*Phys.*). The conception of gas molecules as elastic spheres whose bombardment of the walls of the containing vessel due to their thermal agitation causes the pressure exerted by the gas. The theory gives a simple explanation of the gas laws and has yielded valuable results concerning gaseous viscosity and molecular dimensions.

gases, liquefaction of (*Phys.*). To liquefy a gas, it must be cooled below its critical temperature and, in some cases, compressed. For the so-called 'permanent' gases, oxygen, nitrogen, hydrogen, and helium, having very low critical temperatures, the problem of liquefaction becomes one of obtaining low temperatures. This is done mainly by allowing the compressed gas to expand through a nozzle, cooling occurring by the Joule-Thomson effect.

gaselier′ (*Gas Fittings*). An ornamental pendant for a number of lights.

gaseous fuel (*Eng.*). Any combustible gas which can be burned economically in an engine or furnace, such as coal gas, natural gas, producer gas, etc.

gash veins (*Geol.*). Veins formed in limestone joints that had been somewhat widened by solution prior to the deposition of the vein stuff, which may include blende and galena. The veins run also along the bedding planes.—(*Mining*) Mineralised veins of shallow depth, often of considerable width at surface (outcrop).

gasket (*Eng.*). (1) A flat sheet of asbestos compound, sometimes sandwiched between thin copper sheets; used for making gas-tight joints between engine cylinders and heads, etc.—(2) Jointing or packing material, such as cotton rope impregnated with graphite grease; used for packing stuffing-boxes on pumps, etc.

gasket (*Plumb.*). Hemp or cotton yarn wound round the spigot end of a pipe at a joint, and rammed into the socket of the mating pipe to form a tight joint.

gasket iron (*Plumb.*). A flat tool with blunt end, used for ramming a gasket into position.

gaskin (*Plumb.*). A *gasket* (q.v.).

gas′olene, gas′oline (*Chem.*). American term for low-boiling petroleum distillates, boiling range about 14° C. to 90° C. Also called PETROLEUM ETHER.

gasolene (or **gasoline**) **engine** (*Eng.*). American term for *petrol engine* (q v.).

gasom′eter or **gasholder** (*Gas*). A bell-shaped structure floating in a tank of water, in which gas is collected for distribution. When dry gasholders are used, they are sealed with tar or grease.

Gas′parcolor (*Photog.*). A subtractive colour photographic process using multi-coated base for positive prints.

gasserec′tomy (*Surg.*). Excision of the Gasserian ganglion, sometimes performed for the relief of trigeminal neuralgia (tic douloureux).

Gasse′rian ganglion (*Zool.*). In Vertebrates, a large ganglion of the fifth cranial nerve, near its origin.

gassing (*Aero.*). See **inflation.**

gassing (*Elec. Eng.*). The evolution of gas which takes place in an accumulator towards the end of its charging period.

gassing (*Textiles*). The process of passing yarns through a flame in order to remove outstanding fibres and enhance the appearance; generally applied to folded yarns.

gassing of copper (*Met.*). A process which denotes the brittleness produced when copper containing oxide is heated in an atmosphere containing hydrogen. The hydrogen diffuses into the metal and combines with oxygen, forming steam which cannot diffuse out. A high steam pressure is built up at the crystal boundaries and the cohesion is diminished.

gastero-. Prefix. See **gastr-, gastro-.**

Gas′teromyce′tes (*Bot.*). A subdivision of the *Autobasidiomycetes*, including about 800 species, in which the hymenium is enclosed in a peridium until after the spores are ripe.

gas′terozo′oid (*Zool.*). In colonial *Hydrozoa*, a hydroid person of normal structure with a mouth surrounded by tentacles.

gastr-, gastro- (Greek *gaster*, gen. *gastros*, stomach) A prefix used in the construction of compound terms; e g. *gastroduodenal* (q.v.).

gastrae′a (*Zool.*). The original hypothetical ancestor of the *Metazoa*, resembling a gastrula (Haeckel).

gastral (*Zool.*). See **gastric.**

gastral layer (*Zool.*). In *Porifera*, the inner cell-layer consisting of choanocytes.

gastral′gia (*Med.*). Pain in the stomach.

gastra′lia (*Zool.*). The abdominal ribs of some Vertebrates: sponge spicules occurring in the gastral layer.

gastrec′tomy (*Surg.*). Surgical removal of the whole, or part, of the stomach.

gas′tric (*Zool.*). Pertaining to, or in the region of, the stomach.

gastric filaments (*Zool.*). In some *Coelenterata*, endodermal filaments projecting into the enteron and containing cnidoblasts which kill any living prey that enters the stomach.

gastric juice (*Chem.*). Human gastric juice consists principally of water (99·44%), free HCl (0·2%), and small quantities of NaCl, KCl, $CaCl_2$, $Ca_3(PO_4)_2$, $FePO_4$, $Mg_3(PO_4)_2$, and organic matter including enzymes.

gastric mill (*Zool.*). In *Malacostraca*, the proventriculus, which is provided with muscles and ossicles for trituration of food and is sometimes known as the stomach.

gastric shield (*Zool.*). A hard plate in the stomach of *Pelecypoda*, against which the crystalline style is worn away.

gastri′tis (*Med.*). Inflammation of the mucous membrane of the stomach.

gas′trocele (*Med.*). Hernia of the stomach.

gas′trocen′trous (*Zool.*). Said of vertebrae in which the basiventrals are small or absent and their place as constituents of the centrum is taken by the interventrals.

gastrocnemius, gas-trŏ-nĕ′mi-us (*Zool.*). In land Vertebrates, a muscle of the shank.

gas′trocoel (*Zool.*). See **archenteron.**

gastrocol′ic (*Med.*). Pertaining to, or connected with, the stomach and the colon.

gas′trodu′ode′nal (*Med.*). Pertaining to, or connected with, the stomach and the duodenum.

gas′trodu′odeni′tis (*Med.*). Inflammation of the mucous membrane of the stomach and the duodenum.

gas′trodu′odenost′omy (*Surg*). A communication between the stomach and the duodenum, made by operation.

gas′tro-enteri′tis (*Med*). Inflammation of the mucous membrane of the stomach and the intestines.

gastro-enterost′omy (*Surg.*). A communication between the stomach and the small intestine, made by operation.

gas′trogastrost′omy (*Surg.*). A communication, made by operation, between the upper and lower parts of the stomach when these are pathologically separated by a stricture.

gas′trojeju′nal (*Med.*). Pertaining to, or connected with, the stomach and the jejunum.

gas′trojejunost′omy (*Surg.*). A communication between the stomach and the jejunum, made by operation.

gastrolienal, —li-ĕ′nal (*Med*). Pertaining to the stomach and the spleen.

gas′troliths (*Zool.*). In *Crustacea,* two calcareous masses found in the anterior part of the proventriculus prior to a moult.

gas′tromyot′omy (*Surg.*). Incision of the muscle of the stomach round a gastric ulcer.

gas′tropex′y (*Surg.*). The operation of suturing the stomach to the abdominal wall for the treatment of gastroptosis.

Gastrop′oda (*Zool.*). A class of asymmetrical *Mollusca,* in which the foot is broad and flat, the mantle is undivided, and the shell is in one piece only, usually conical. Limpets, Whelks, Snails, and Slugs.

gas′tropore (*Zool.*). In *Hydrocorallinae,* an opening in the common skeleton through which a gastrozooid protrudes.

gas′tropto′sis (*Med.*). Abnormal downward displacement of the stomach in the abdominal cavity.

gas′troscope (*Med.*). An instrument for inspecting the interior of the stomach and by means of which a photograph of the lining of the stomach may be taken.

gas′trostax′is (*Med.*). Bleeding or oozing of blood from the stomach, the mucous membrane of which is intact.

gastros′tegite (*Zool.*). In *Ophidia,* a ventral scale. Also called GASTROSTEGE.

gastrost′omy (*Surg.*). The operative formation of an opening into the stomach through which food may be passed when the normal channels are obstructed.

gastrot′omy (*Surg.*). Incision of the stomach wall.

Gas′trotrich′a (*Zool.*). A class of *Trochelminthes* having no crown, ciliary rings, or mastax; sensitive and locomotor peribuccal flagella occur; there are two ventral bands of cilia; the anus and the urinary and genital ducts open separately; the tail is short; all members of the group are hermaphrodite and occur in fresh water.

gas′trovas′cular (*Zool.*). Combining digestive and circulatory functions, as the canal system of Ctenophores.

gas′trula (*Zool.*). In development, the double-walled stage of the embryo which succeeds the blastula.

gastrula′tion (*Zool.*). The process of formation of a gastrula from a blastula during development.

gate (*Build.*). A hinged or sliding barrier closing an opening to an enclosure.

gate (*Cinema.*). The location of the film in a projector, printer, or camera when it is being acted on or scanned.

See **film—** **sound—**

gate (*Eng.*). (1) A valve controlling the supply of water in a conduit.—(2) A frame in which saws are stretched to prevent buckling.

gate (*Foundry*). In a mould, the channel or channels through which the molten metal is led from the runner, down-gate, or pouring-gate to the mould cavity. Also called GEAT, GIT, SPRUE.

See **bottom—** **spinner—**
drop— **spray—**
horn— **riser.**

gate (*Hyd. Eng.*). A movable barrier for stopping or regulating the flow in a channel.

gate-backed or **ladder-backed** (*Furn.*). Said of chairs and settees having back-frames of horizontal slats or bars.

gate by-pass switch (*Elec. Eng.*). A switch fitted in an electric lift-car so that the operator can render the gate or door locks inoperative in cases of emergency.

gate-chambers (*Hyd. Eng.*). Recesses in the side walls of a lock to accommodate the gates when open.

gate-change gear (*Automobiles*). A multi-speed gear-box in which the control lever is positioned by, for example, an H-shaped slot or gate, through which it works, the five members of the slot corresponding to three forward speeds, one reverse speed, and neutral.

gate closer (*Elec. Eng.*). A device for automatically closing the gates of a lift-car. Also called DOOR CLOSER.

gate contact (*Elec. Eng.*). See **gate switch.**

gate-end (*Mining*). The coal-face end of a gateway.

gate-end box (*Elec. Eng.*). A cable box used in mining work for making a joint between one of the main supply cables and a trailing cable for use near the coal face.

gate hook (*Build.*). The part of a gate hinge which is secured to the post and about which pivots the leaf supporting the gate.

gate interlock (*Elec. Eng.*). A combination of a gate or door switch with an automatic gate or door lock.

gate leg (*Furn.*). A framed and hinged leg to open out for the support of a table flap.

gate operator (*Elec. Eng*). A power-operated device for closing the gates of a lift-car.

gate pier (*Build.*). A post similar to a *gate post* (q.v.), but of brick, stone, or concrete instead of timber.

gate post (*Build.*). A timber post from which a gate is hung, or one against which it shuts. See also **gate pier.**

gate stick (*Moulding*). A stick placed vertically in the cope while it is rammed up; on removal it provides the gate or runner passage into the mould. Also called RUNNER STICK.

gate switch (*Elec. Eng.*). See **door switch.**

gateway or **gate road** (*Mining*). A road through the worked-out area (goaf) for haulage in longwall working of coal.

gated throttle (*Eng.*). On supercharged or super-compression aero engines, a slot interrupted by a stop, beyond which the throttle lever must not be moved below the rated altitude.

gatherer (*Glass*). A person who gathers a charge of glass on a blowpipe or gathering iron for the purpose of forming it into ware or feeding a charge to a machine for that purpose.

gathering (*Bind.*). Collecting and arranging in proper sequence the folded sections forming a volume.

gathering (*Build.*). The contracting portion of the chimney passage to the flue.

gathering (*Paint.*). A defect in distempered surfaces; owing to irregular absorption, the surfaces present a patchy appearance.

gathering ground (*Civ. Eng.*). A *catchment area* (q.v.).

gathering pallet (*Horol.*). In the striking mechanism of a clock or repeater watch, a revolving finger which lifts the rack one tooth for each blow struck; a single-toothed wheel.

gathering rack (*Horol*). See **rack.**

Gaucher's disease, gōsh′ā (*Med.*). A disease which occurs in families and is characterised by anaemia and haemorrhages, associated with enlargement of the spleen, in which peculiar large cells containing lipoid appear.

gauge, gāj. (1) An object or instrument for the measurement of dimensions, pressure, volume, etc. See **pressure-gauge, water-gauge.**—(2) An accurately dimensioned piece of metal for checking the dimensions of work or less precisely made gauges. See **limit gauge, master gauge, plug gauge, ring gauge.**—(3) A tool used for measuring lengths, as a *micrometer gauge* (q.v.).—(4) The diameter of wires and rods. See **Birmingham Wire Gauge, Brown & Sharpe Wire Gauge.**—(5) The distance between the inside edges of the rails of a permanent way.—(6) The proportion of gypsum in a lime plaster.—(7) The position of one ship with regard to another.

gauge (*Build.*). (1) The distance between centres (as measured across the courses) of the nails securing the slates on, for example, a roof.—(2) The margin or exposed width of a slate or tile in coursed work.

gauge (*Textiles*). The term relates to the fineness of a woven or knitted fabric and generally indicates the number of needles per inch in hosiery.

gauge cocks (*Eng*). Small test cocks fitted to the side of a vessel in order to ascertain the liquid level therein, as on many steam boilers.

gauge-concussion (*Rail.*). The lateral impact of the wheel flanges against the rails due to side-sway of the carriage.

gauge door (*Mining*). A door underground for controlling the supply of air to part of the mine.

gauge glass (*Eng.*). The glass tube, or pair of flat glass plates, fitted to a water-gauge to provide a visual indication of the water-level in the tank or boiler. See **water-gauge.**

gauge glass tubing (*Glass*). Glass tubing, sometimes of special composition, able to resist the action of pressure of steam and water at high temperatures.

gauge pile (*Civ. Eng.*). A *guide pile* (q.v.).

gauge pot (*Build.*). A small receptacle for cement grout, facilitating pouring of small quantities.

gauge pressure (*Eng.*). (Of a fluid) the pressure as shown by a pressure-gauge, i.e. the amount by which the pressure exceeds the atmospheric pressure, the sum of the two giving the absolute pressure.

gauge rod (*Build.*). A rod used in laying gradnated courses of slates.

gauged arch (*Build.*). An arch built from special bricks cut with a bricklayer's saw and rubbed to exact shape on a stone.

gauged mortar (*Build.*). Mortar made of cement, lime, and sand, suitable proportions for general building work being 1 : 1 : 5.

gauged stuff (*Plast.*). A stiff plaster used for cornices, mouldings, etc.; made with lime putty to which plaster of Paris is added to hasten setting. Also called PUTTY AND PLASTER.

gauging-board (*Build.*). A platform on which the constituents of a concrete may be mixed.

gaul (*Plast*). A hollow spot in the *setting* (q.v.).

Gault (*Geol*). A blue-to-grey clay lying between the Lower Greensand and the Chalk in the Cretaceous System. Minutely zoned by means of the ammonites it contains. Of great value in brick-making. The type sections are on the coast at Folkestone. See also **Upper Greensand.**

gaults (*Build*). Very hard, heavy, and durable bricks, white or whitish in colour; made from Gault clay.

gauss, gows (*Elec. Eng.*). The c.g.s. electromagnetic unit of magnetic flux density; it is equal to one line (or maxwell) per sq. cm.

Gauss eyepiece (*Light*). A form of eyepiece used in optical instruments, such as spectrometers and refractometers, to facilitate setting the axis of the telescope at right-angles to a plane reflecting surface. Light enters the side of the eyepiece and is reflected down the telescope tube by a piece of unsilvered glass, being then reflected back into the eyepiece by the plane surface.

gauton (*Mining*). A narrow groove cut in the floor of a roadway in a coal-mine.

gauze (*Textiles*) A light-weight fabric of open texture in which the crossing ends pass from one side to the other of the standing ends; used as a dress fabric, for mosquito netting, etc. See **leno** and (for *imitation gauze*) **mock leno.**

gauze brushes (*Elec. Eng.*). Brushes (made of copper gauze) for collecting current from the commutator of an electric machine; they carry a higher current density than carbon brushes, but give less satisfactory commutation, and are little used.

gavel (*Masonry*). A mallet used for setting stones.

gavelock. An iron crowbar. Also spelt GABLOCK.

gawl (*Mining*). An irregular or uneven line of coal face.

Gay-Lussac tower (*Chem.*). Name for a tower of a sulphuric acid plant used for the recovery of the nitrogen oxides from the gases which leave the lead chambers.

Gay-Lussac's law. (1) GAY-LUSSAC'S LAW OF VOLUMES. When gases react, they do so in volumes which bear a simple ratio to one another and to the volumes of the resulting substances in the gaseous state, all volumes being measured at the same temperature and pressure.—(2) *Charles's law* (q.v.).

Gay-Lussite or **gaylussite** (*Min.*). A rare grey hydrated carbonate of sodium and calcium, occurring in lacustrine deposits.

gaze′bo (*Build.*). A summerhouse resembling a temple in form and commanding a wide open view.

G.B. surface contact system (*Elec. Eng.*). A surface contact system used for tramway traction; in it a magnetised contact chain under the car causes the operation of a finger in the stud and makes the stud alive.

Gd (*Chem.*). The symbol for *gadolinium.*

Gd. A. (*Build.*). Common abbrev. for *gauged arch* (q.v.).

Ge (*Chem.*). The symbol for *germanium.*

gean′ticline (*Geol.*). A major geological structure of the largest size, essentially anticlinal, resulting from mountain-building movements operating on the site of a former geosyncline.

gear (*Eng.*). (1) Any system of moving parts transmitting motion; e.g. levers, gear-wheels, etc.—(2) A set of tools for performing some particular work.—(3) A mechanism built to perform some special purpose; e.g. *steering gear,* *valve gear*.—(4) The position of the links of a steam-engine valve motion, as ***astern gear***, ***mid-gear***, etc.—(5) The actual gear ratio in use, or the gear-wheels involved in transmitting that ratio, in an automobile gear-box, as ***first gear***, *third gear*, etc.

See **bevel—**
differential—
epicyclic—
friction—
helical—
internal—
skew bevel—
spiral—
spur—
synchromesh—
worm—

gear cluster (*Eng.*). A set of gear-wheels integral with, or permanently attached to, a shaft, as on the lay shaft of an automobile gear-box.

gear cutters (*Eng.*). Milling cutters, hobs, etc., having the requisite tooth form for cutting teeth on gear-wheels.

gearman (*Mining*). One who rides on a *donkey* (q.v.).

gear pump (*Eng.*). A small pump consisting of a pair of gear-wheels in mesh, enclosed in a casing, the fluid being carried round from the suction to the delivery side in the tooth spaces; used for lubrication systems, etc.

geared lathe (*Eng.*). A lathe provided with a *back gear* (q.v.) or a multi-speed gear-box between the driving motor and the head.

geared locomotive (*Elec. Eng.*). An electric locomotive in which the motors drive the axles through reduction gears.

geared quill drive (*Elec. Eng.*). A form of quill drive used in electric locomotives; the quill, instead of carrying the motor armature, carries a gear-wheel which is geared to a pinion on the armature shaft.

geared turbo-generator (*Elec. Eng.*). An electric generator driven through a reduction gear from a steam-turbine, the object being to enable both machines to operate at their most economical speeds.

gearing (*Eng.*). Any set of gear-wheels transmitting motion. See **gear.**

gearing-down (*Eng.*). A reduction in speed between a driving and a driven wheel or unit; e.g. between the engine of an automobile and the road wheels.

gearing-up (*Eng.*). Raising the speed of a driven unit above that of its driver by the use of gears; opposite of *gearing-down*.

gearless locomotive (*Elec. Eng.*). An electric locomotive in which the motor armatures are mounted directly on the driving axle.

gearless motor (*Elec. Eng.*). A traction motor mounted directly on the driving axle of an electric locomotive.

geat (*Foundry*). See **gate.**

Gedin'nian Stage (*Geol.*). The lowest division of the marine Devonian rocks in the Ardennes and Rhineland.

gegenions, gā'gen-ī'onz (*Chem.*). The simple ions, of opposite sign to the colloidal ions, produced by the dissociation of a colloidal electrolyte.

gegenpol, gā'gen-pōl (*Cyt.*). The pole of a resting nucleus which lies farthest from the centrosome. Cf. *pol*.

gegenschein, gā'gen-shin (*Astron.*). (*Ger.*, counter-glow). A term applied to a faint illumination of the sky sometimes seen in the ecliptic, diametrically opposite the sun, and connected with the zodiacal light.

gehlenite, gā'len-īt (*Min.*). A tetragonal silicate of calcium and aluminium ($Ca_2Al_2SiO_7$); an end-member of an isomorphous series collectively known as mellilite.

Gehrcke oscilloscope, gār'ke (*Elec. Eng.*). A form of oscilloscope in which the discharge between two aluminium electrodes contained in a tube at low pressure is viewed by means of a rotating mirror, which indicates the wave form of the voltage producing the discharge.

Geissler discharge, gis'ler (*Elec. Eng.*). The electric discharge taking place in a Geissler tube.

Geissler pump (*Chem.*). A glass vacuum pump which operates from the water supply.

Geissler tube (*Elec. Eng.*). A vacuum tube having a moderate degree of exhaustion (about 0·01 atmosphere), so that an electric discharge taking place in it will be brightly luminous but broken up by dark spaces.

geit'onogam'y (*Bot.*). Cross pollination between two flowers on the same plant.

gel (*Chem.*). The apparently solid, often jelly-like, material formed from a colloidal solution on standing. A gel offers little resistance to liquid diffusion and may contain as little as 0·5% of solid matter. Some gels, e.g. gelatin, may contain as much as 90% water, yet in their properties are more like solids than liquids.

gel'atine, gel'atin (*Chem.*). A colourless, odourless, and tasteless glue, prepared from albuminous substances, e.g. bones and hides. Used for foodstuffs, photographic films, glues, etc.

gelatine, bichromated (*Photog.*). See **bichromated gelatine.**

gelatine filter (*Photog.*). A filter which has the dye performing the filter action carried in gelatine. This is affected by moderate heat.

gelat'ino-chloride process (*Photog.*). The use of gelatine emulsion on printing-out paper (P.O.P.).

gem gravels (*Geol.*). Sediments of the gravel grade containing appreciable amounts of gem minerals, and formed by the disintegration and transportation of pre-existing rocks, in which the gem minerals originated. They are really placers of a special type, in which the heavy minerals are not gold or tin, but such minerals as garnets, rubies, sapphires, etc. As most of the gem minerals are heavy and chemically stable, they remain near the point of origin, while the lighter constituents of the parent rocks are washed away, a natural concentration of the valuable components resulting.

gem'el window (*Build.*). A two-bay window.

geminate (*Bot.*). (1) Paired, twinned.—(2) With two branches arising from the same node, on the same side of the stem.

Gemini (*Astron.*). Twins. Third sign of the *Zodiac* (q.v.).

gem'ini (*Bot.*). Bivalent chromosomes.

gemma (*Bot.*). (1) A small multicellular body, consisting of thin-walled cells, produced by vegetative means, and able to separate from the parent plant and form a new individual.—(2) A non-motile asexual spore in some algae.—(3) A thick-walled resting spore formed by some fungi.—*pl.* **gemmae.**

gemma (*Zool.*). A bud that will give rise to a new individual.

gemma cup (*Bot.*). A cup-shaped or crescent-shaped outgrowth from the thalli of some liverworts, with gemmae in the hollow.

gemma'ceous or **gem'miform** (*Bot.*). Like a small bud.

gemma'tion (*Bot.*, *Zool.*). Budding; gemma-formation. See **gemma.**

gemmif'erous or **gemmip'arous** (*Bot.*, *Zool.*). (1) Producing gemmae.—(2) Producing buds.

gem'miform (*Zool.*). A term applied to pedicellariae having a long stiff stalk, the jaws of which are each provided with a poison gland; found in *Echinoidea*.

gem'mule (*Zool.*). In fresh-water *Porifera*, an aggregation of embryonic cells within a resistant case, which is formed at the onset of hard conditions when the rest of the colony dies down and which gives rise to a new colony when conditions have once more become favourable.—*n.* **gemmula'tion.**

-gen (*Chem.*). Suffix meaning *producer, generator*; used to denote the parent substance of a compound or group; e.g. hydrogen, chromogen, antigen.

ge'na (*Zool.*). In general, the side of the head; in *Insecta*, a lateral cephalic sclerite extending from the eye to the gular region.—*adj.* **ge'nal.**

genes, jēnz (*Cyt.*, *Gen.*). In the modern chromosome theory, hypothetical units supposed to be arranged in linear fashion on the chromosomes, each representing a unit character.

gene-mutation (*Gen*). A heritable variation caused by spontaneous changes at single points in the chromosomes.

gene string (*Cyt.*, *Gen.*). A hypothetical component of a chromosome, consisting of a series of genes arranged like a string of beads.

gen'era. *Pl.* of *genus.*

general inference (*Meteor.*). A description of the existing pressure distribution over a wide area, together with a general forecast of the weather.

general lighting (*Elec. Eng.*). A system of lighting employing fittings which emit the light in approximately equal amounts in an upward and a downward direction.

general paralysis of the insane (*Med.*). G.P.I A form of insanity, due to a syphilitic infection of the brain, in which there is progressive deterioration of mental and physical powers and of morals, delusions of grandeur being a prominent feature.

general stain (*Microscopy*). A stain which gives the same depth of colour to all structures in the specimen. Cf. *specific stain.*

generalised root system (*Bot.*). A root system in which the tap root and the lateral roots are all well developed.

generating circle (*Eng.*). Any circle in which a point on the circumference is used to trace out a curve when the circle rolls along a straight line or curve. See **cycloid.**

generating line (*Eng.*). A straight or curved line rotated about some axis in order to generate a surface.

generating plant (*Elec. Eng.*). The equipment necessary for the generation of electrical energy, including the electrical equipment as well as the prime movers. See **automatic generating plant.**

generating set (*Elec. Eng.*). An electric generator, together with the prime mover which drives it.

See **gas-electric—** **steam-electric—**
hydro-electric—

generating-station (*Elec. Eng.*). A building containing the necessary equipment for generating electrical energy. Also called **SUPPLY-STATION.**

See **hydro-electric—** **steam—**
internal-combustion—

generation (*Biol.*). Origin: production: the individuals of a species which are separated from a common ancestor by the same number of broods in the direct line of descent.

generative apogamy (*Bot.*). See **reduced apogamy.**

generative cell (*Bot.*). A cell in a pollen grain of Gymnosperms which divides to give a stalk cell and a body cell.

generator (*Elec. Eng.*). See **electric generator.**

generator bus-bars (*Elec. Eng.*). Bus-bars in a generating-station to which all the generators can be connected.

generator-field control (*Elec. Eng.*). See **variable-voltage control.**

generator panel (*Elec. Eng.*). A panel of a switchboard upon which are mounted all the switches, instruments, and other apparatus necessary for controlling a generator.

genesis (*Biol.*). The origin, formation, or development of a group, a species, an individual, an organ, a tissue, or a cell.—*adj.* **genet'ic.**

genet (*Furs*). The dressed skin of the genet, one of the cat family; the Mediterranean genet is grey with black blotches, and has a long tail, ringed white and black.

genet'ics (*Biol.*). The study of variation and heredity.

genetic complex (*Gen.*). The sum-total of the hereditary factors contained in the chromosomes and in the cytoplasm; it is equivalent to the sum of the *genom* and the *plasmon.*

genetic spiral (*Bot.*). A hypothetical line drawn on a stem passing by the shortest path through the points of insertion of successive leaves.

genetic variation (*Gen.*). Variation due to differences in the gametes.

Geneva movement (*Cinema.*). Intermittent drive for projection machines, involving a star-wheel and cam.

Geneva stop work (*Horol.*). See **stop work.**

genial (*Zool.*). Pertaining to, or situated on, the chin.

genic balance (*Gen.*). The hypothesis that the characters of an organism are each determined by the interactions of a large but unknown number of genes, some affecting development in one direction and some in another, so that the ultimate result is a balance struck between the total effects.

genic'ular (*Zool.*). Pertaining to, or situated in, the region of the knee.

genic'ulate (*Bot.*, *Zool*) Bent rather suddenly, like the leg at the knee; as *geniculate antennae.*

geniculate ganglion (*Zool*). In higher Vertebrates, a ganglion of the facial nerve.

ge'nio- (Greek *geneion*, chin). A prefix used in the construction of compound terms; e.g. *genioglossal*, pertaining to the chin and the tongue.

ge'niohy'oid (*Zool*). In some Vertebrates, a muscle running from the hyoid to the tip of the lower jaw.

ge'nioplas'ty (*Surg.*). Plastic surgery of the chin.

genit-, genito- (Latin *gignere*, *genitum*, to beget) A prefix used in the construction of compound terms; e.g. *genitoanal*, pertaining to the genitals and the anus.

genita'lia (*Zool.*). The gonads and their ducts and all associated accessory organs.

gen'itals (*Zool.*). The reproductive organs: the external parts of the reproductive organs.—*adj.* **genital.**

genital atrium (*Zool.*). In *Platyhelminthes* and some *Mollusca*, a cavity into which open the male and female genital ducts.

genital bursae (*Zool.*). In *Ophiuroidea*, cavities open to the exterior into which the gonads open.

genital operculum (*Zool.*). In some *Arachnida*, a small plate covering the openings of the genital ducts.

genital plate (*Zool.*). In *Echinoidea*, the interradial plates which bear the genital openings.

genital pleurae (*Zool.*). In *Balanoglossida*, a pair of lateral folds in the branchial region of the trunk, behind which the gonads are situated.

genital rachis (*Zool.*). In *Echinodermata*, a ring of primary genital cells from which the gonads arise.

genital stolon (*Zool.*). In *Echinodermata*, a collection of primary genital cells in the axial organ connected with the genital rachis.

genito-urinary (*Med.*). Pertaining to the genital and the urinary organs.

Genoa cord (*Textiles*). A cotton fabric of corduroy type, with a twill back.

Genoa velvet (*Textiles*). A silk fabric with a cut warp pile, formed by means of wires upon a foundation texture similar in appearance to a twill.

Genoa velveteen (*Textiles*). A cotton fabric with a cut weft pile and twill back.

genom (*Cyt.*, *Gen.*). The total chromosome content of the nucleus of a gamete.

gen'omere (*Gen.*). A hypothetical particle, which, with other similar particles, make up a gene.

gen'otype (*Bot.*, *Zool.*). A group of individuals all of which possess the same factorial constitution.

genotyp'ic (*Gen.*). Determined by the genes.

genre, zhahn^{g}r (*Photog.*). Pictorial composition, with natural figures and objects of emotional value in excess of photographic values.

ge'nu (*Zool.*). A knee-like structure, i.e. a bend in a nerve tract.

genu recurva'tum (*Med.*). The condition in which there is hyperextension of the knee-joint.

genu valgum (*Med.*). Knock-knee. The condition in which the angle between the femur and the tibia is so altered that the leg deviates laterally from the mid-line.

genu varum (*Med.*). Bow leg. The reverse of genu valgum, the altered angle between the femur and the tibia being such that the legs bow outwards at the knee.

genuine tissue (*Bot.*). Tissue derived from the division of a mass of related cells, with subsequent differentiation of the daughter cells.

ge'nus (*Biol.*). A taxonomic category of closely related forms, which is further subdivided into species.—*pl.* **gen'era.**—*adj* **gener'ic.**

gen'ys (*Zool.*). In Vertebrates, the lower jaw.

geo- (Greek *gē*, earth, land). A prefix used in the construction of compound terms; e.g. *geobiotic* (q.v.).

ge'obiot'ic (*Zool.*). Terrestrial: living on dry land.

ge'ocarp'y (*Bot.*). The ripening of fruits underground, the young fruits being pushed into the soil by a post-fertilisation curvature of the stalk.

geocen'tric (*Astron.*). The term applied to any system or mathematical construction which has as its point of reference the centre of the earth.

geocentric altitude (*Surv.*). The *true altitude* (q.v.) of a heavenly body as corrected for *geocentric parallax* (q.v.).

geocentric latitude. See under **latitude and longitude (terrestrial).**

geocentric (or **diurnal**) **parallax** (*Astron.*). The apparent change of position of a heavenly body due to a shift of the observer by the rotation of the earth; hence only observed in bodies (e.g. the moon and sun) sufficiently close for the earth's radius to subtend a measurable angle when seen from the body.—(*Surv.*) The correction which must be applied to the altitude of a heavenly body in the solar system as observed, in order to give the altitude corrected to the earth's centre. Its value is given by

$$p = +P \cdot \cos a,$$

where p=geocentric parallax, P=*horizontal parallax* (q.v.), and a=observed altitude corrected for refraction.

ge'ochem'istry (*Chem.*). The study of the chemical composition of the earth's crust.

ge'odes (*Geol.*). Large cavities in rocks, lined with crystals that were free to grow inwards.—(*Mining*) Rounded nodules of ironstone with hollow interior.

geod'esy or **geodet'ic surveying.** The branch of surveying concerned with extensive areas, in which, in order to obtain accurate results, allowance must be made for the curvature of the earth's surface.

Geodetic (*Aero.*). A proprietary term referring to the principle of having only fully stressed metal in the construction of girders; unstressed metal is removed from panels, leaving a lattice structure.

geog'nosy (*Geol.*). An old term for absolute knowledge of the earth, as distinct from geology, which includes various theoretical aspects.

geographical latitude. See under **latitude and longitude (terrestrial).**

geographical mile. The length of one minute of latitude, a distance varying with the latitude, and having a mean value of 6076·8 ft.—(U.S.) One minute of longitude at the equator, i.e. 6087·1 ft.

geographical race (*Zool.*). A collection of individuals within a species, which differ constantly in some slight respects from the normal characters of the species, but not sufficiently to cause them to be classified as a separate species, and which are peculiar to a particular area.

ge'oid (*Surv.*). The figure of the mean sea-level surface assumed to be continued across the land. It is approximately an oblate ellipsoid of revolution.

geo-isotherms (*Geol.*). Surfaces of equal temperature in the lithosphere below ground-level.

geological time (*Geol.*). The time extending from the end of the Formative Period of earth history to the beginning of the Historical Period. It is conveniently divided into several Periods, each being the time of formation of one of the Systems into which the Stratigraphical Column is divided. Thus the *Carboniferous Period* is the interval of time during which the rocks including the Carboniferous Limestone, Millstone Grit, and Coal Measures in Britain, and the Mississippian and Pennsylvanian strata in the U.S.A., were in the process of formation. The complete list of Periods from the oldest to the youngest is:—Pre-Cambrian, Cambrian, Silurian, Devonian, Carboniferous, Permian, Triassic, Jurassic, Cretaceous, Tertiary, and Quaternary. The position of any rock in this time sequence is fixed by the fossils it contains. The absolute measurement of geological time is a baffling problem, but the ages of igneous rocks can be measured by highly specialised chemical methods, one being based on the estimation of the minute quantities of helium spontaneously generated in certain radioactive minerals (see **pleochroic haloes**). Baron G. de Geer has used the examination of the laminations in varve clays to measure the time which has elapsed since the Pleistocene glaciation.

geology. The science which investigates the history of the earth's crust, from the earliest times to the commencement of the Historical Period. It deals with the compositions, arrangement, and origins of the rocks of the earth's crust, and with the processes involved in the evolution of its present structure. Geology is now divided into several branches: *physical geology*, the study of the processes of sedimentation and denudation, the work of the atmosphere, water, ice, rivers, and the sea, the study of rock structures; *petrology*, the study of the nature, composition, textures, and origins of igneous, metamorphic, and sedimentary rocks and of the metallic ores; *mineralogy*, the study of the compositions, physical characters (including crystal form) of the natural minerals; *stratigraphy* or *historical geology*; and *palaeontology* (with *palaeobotany*), which traces the history of life on this planet and the structures and relationships between the several kinds of organisms.

geometrical attenuation (*Acous.*). The reduction in intensity of a sound-wave solely on account of the distribution of energy in space; e.g. due to inverse-square law, or progression area along the axis of a horn.—(*Radio*) The reduction in field strength of an electromagnetic wave as it progresses from the source on account of spreading out.

geometrical optics (*Light*). The study of optical problems based on the conception of light rays. See **physical optics.**

geometrical stair (*Build.*). A stair arranged about a well-hole and curved between the successive flights.

ge'onas'ty (*Bot.*). Curvature towards the ground.

ge'ophi'lic (*Bot.*). Growing in soil.

ge'ophi'lous (*Bot.*). Having a short stout stem with rather large leaves, borne at soil level.—(*Zool.*) Living on, or in, the soil.

geophys'ics. The science concerned with the physical characteristics and properties of the earth; it makes use of the data available in geodesy, seismology, meteorology, and oceanography, as well as that relating to atmospheric electricity, terrestrial magnetism, and tidal phenomena. Applied geophysics has, by means of electrical, magnetic, gravitational, seismic, and other methods, achieved many discoveries of geological and economic importance below the earth's surface.

geophysical prospecting (*Mining*). Prospecting by measuring differences in the density, electrical resistance, or magnetic properties of the earth's crust.

ge'ophyte (*Bot.*). A plant which perennates by means of subterranean buds.—*adj.* **ge'ophyt'ic.**

geopla'giotrop'ic (*Bot.*). Growing in a direction at an angle to the ground surface.

georgette' (*Textiles*). A light-weight silk fabric with a crêpe effect, used as dress material. A similar material is made from fine hard-twisted cotton yarns.

Georgian glass (*Build.*). A reinforced fire-resisting glass.

Georgian Series (*Geol.*). See **Waucobian Series.**

geosyn'cline (*Geol.*). A long, relatively narrow area of marine sedimentation, within which the maximum thickness of sediment is found in the central zone, which also experiences the maximum depression. Thus the floor of the geosyncline is synclinal in form, but ultimately it may be silted up to sea-level, even in the centre. Buckling of a geosyncline, involving intense folding and transportation along thrust-planes during earth movements, is believed to be the prime cause of mountain-building.

geotax'is, geotax'y (*Biol.*). The response of an organism to the stimulus of gravity.—(*Bot.*) The movement of the entire plant from one place to another as a reaction to the stimulus of gravity.—*adj.* **geotac'tic.**

geothermal gradient (*Mining*). The rate at which the temperature of the earth's crust increases with depth.

ge'otome (*Bot.*). An instrument used for taking soil samples without disturbing the surrounding soil.

geotro'pism (*Biol.*). Geotaxis.—(*Bot.*) The reaction of a plant member to gravity, shown by a curvature caused by one side growing faster than the other, tending to bring the axis of the member into line with the direction of gravity.—*adj.* **geotropic.**

Gephyre'a (*Zool.*). A loose term used by some zoologists to embrace the *Echiuroidea* and the *Sipunculoidea*, to which are sometimes added the *Priapuloidea*. Owing to the dubious nature of the affinities between these groups, the *Gephyrea* are now considered to be an obsolete group.

gephy'rocer'cal (*Zool.*). (Of a secondarily simplified type of tail-fin) resembling the diphycercal type but derived from the homocercal or heterocercal type by reduction.

geranial (*Chem.*). See **citral.**

Gerhardt's test (*Chem.*). A test for detecting diacetic acid in the urine, based upon the formation of a deep-red colour when ferric chloride is added and all precipitated phosphates are filtered off.

Gerlach compensator (*Acous.*). The realisation of an acoustic pressure by balancing it against the pressure arising in a gold foil in a magnetic field carrying a current which is adjustable in magnitude and phase.

Gerlier's disease, jer-lyā (*Med.*). Paralysing vertigo. A disease, endemic in the Canton of Geneva and in the north of Japan, in which a sudden attack of pain in the neck and back is accompanied by dizziness and temporary paralysis.

germ (*Zool.*). The primitive rudiment which will develop into a complete individual, as a fertilised egg or a newly formed bud.

germ band (*Zool.*). In Insects, a ventral plate of cells, produced in the egg by cleavage, which later gives rise to the embryo.

germ cells (*Zool.*). In *Metazoa*, special reproductive cells which are liberated by the organism and in which the qualities of the organism are inherent. Gametes; spermatozoa and ova, or the cells which give rise to them.

germ centre (*Zool.*). See **Flemming's germ-centres.**

germ layers (*Zool.*). The three primary cell-layers in the development of *Metazoa*, i.e. ectoderm, mesoderm, and endoderm.

germ nucleus (*Zool.*). See **pronucleus.**

germ plasm (*Gen.*). In early theories of inheritance, a specific nuclear substance which was supposed to be the bearer of the hereditary characters and to remain unchanged in spite of the differentiation of the body. Also called GONOPLASM.

germ pore (*Bot.*). (1) A thin, usually rounded area in the wall of a pollen grain through which the pollen tube emerges.—(2) A similar spot in a spore wall from which the germ tube develops.

germ sporangium (*Bot.*). A sporangium formed at the end of a germ tube produced by a zygospore.

germ stock (*Zool.*). The stolon of *Urochorda.*

germ track (*Zool.*). The sequence of cell-generations through which the germ cells are connected with the fertilised ovum.

germ tube (*Bot.*). The tubular outgrowth put out by a germinating spore, from which the thallus develops by subsequent branching or on which a germ sporangium is formed.

germ vitellarium (*Zool.*). An organ of some *Turbellaria*, part of which functions as a gonad and part as a vitelline gland.

germ yolk gland (*Zool.*). See **germ vitellarium.**

german (*Mining*). A straw tube filled with gunpowder and used as a fuse. Not used in coal-mines.

German lapiz (*Min.*). See **Swiss lapiz.**

German measles (*Med.*). See **rubella.**

German nozzle (*Eng.*). See **parabolic nozzle.**

German siding (*Build.*). Weather-boards finished with a hollow curve along the outside of the top edge, and rebated along the inside of the lower edge.

German silver (*Met.*). A series of alloys containing copper, zinc, and nickel within the limits, copper 52-80%, zinc 10-35%, and nickel 5-35%. Large numbers of compositions are made, and the alloys are used for fittings of all kinds in ships, trains, automobiles, and buildings, as base metals for electroplating, and, on account of their low temperature coefficient, for electrical resistances. Also called NICKEL SILVER.

germa'nium (*Chem.*). Symbol, Ge. A very rare metallic element in the fourth group of the periodic system. Greyish-white in appearance. At. no. 32, at. wt. 72·5, sp. gr. 5·47, m.p. about 950° C. Germanium occurs only in a few rare minerals, such as argyrodite.

ger'marite (*Min.*). A name (which should not be used) applied to a slightly altered hypersthene.

germa'rium (*Zool.*). The formative area of an ovary, in which the growth and maturation of the germ cells takes place.

germen (*Bot.*). See **ovary** (1).—(*Zool.*) The primary mass of undifferentiated cells which will give rise to the germ cells. Cf. *soma*.

germinable (*Bot.*). Able to germinate if placed under suitable conditions.

germinal aperture or **germinal pore** (*Bot.*). See **germ pore.**

germinal cells (*Zool.*). See **germ cells.**

germinal disc (*Zool.*). The flattened circular region at the top of a megalecithal ovum, in which cleavage takes place.

germinal epithelium (*Zool.*). A layer of columnar epithelium which covers the stroma of the ovary.

germinal layers (*Zool.*). See **germ layers.**

germinal spot (*Zool.*). The nucleolus of the *germinal vesicle* (q.v.).

germinal vesicle (*Zool.*). The nucleus of the oöcyte.

germination (*Bot.*). The beginnings of growth in a spore or seed.

germipar'ity (*Zool.*). Reproduction by formation of germs.

geron'tic (*Zool.*). Pertaining to the senescent period in the life-history of an individual.

gerontol'ogy (*Med.*). The scientific study of old age and of diseases peculiar to this period of life.

gers'dorffite (*Min.*). Metallic grey sulphide-arsenide of nickel, occurring as cubic crystals or in granular or massive forms.

ges'so. A pasty mixture of whiting, prepared with size or glue, applied to a surface as a basis for painting or gilding.

gestalt (*Psychol.*). German, 'form,' 'pattern,' 'configuration.' An organised whole, e.g. a living organism, a melody, a picture, the solar system, in which each individual part affects every other, the whole being more than a sum of its parts. The *Gestalt School of Psychology* was founded by Wertheimer, Köhler, and Koffka, who conducted experiments, on humans and animals, in the fields of perception, learning, and intelligence. They demonstrated the tendency of the mind to perceive situations as a whole (a 'pattern,' *gestalt*), rather than as a number of isolated elements or sensations.

gestation (*Zool.*). In Mammals, the act of retaining and nourishing the young in the uterus; pregnancy.

get (*Mining*). To win or mine.

getter (*Build.*). A familiar name applied to a workman engaged in loosening the earth in an excavation.

getter (*Thermionics*). A substance used in the manufacture of high-vacuum devices for the removal of the last traces of gas after pumping. Generally a piece of magnesium which is electrically heated to incandescence.

geyser, gā'— *or* gī'— (*Build.*). A water-heating appliance providing supplies of hot water rapidly for domestic purposes, the source of heat being gas or electricity.

geyser or **gusher** (*Geol.*). A volcano in miniature, from which hot water and steam are erupted periodically instead of lava and ashes during the waning phase of volcanic activity. Named from the Great Geyser in Iceland, though the most familiar example is probably 'Old Faithful' in the Yellowstone Park, Wyoming. The eruptive force is the sudden expansion which takes place when locally heated water, raised to a temperature above boiling-point, flashes into steam. Until the moment of eruption this had been prevented by the pressure of the super-incumbent column of water in the pipe of the geyser, which is usually terminated upwards by a sinter crater.

gey'serite (*Min.*). See **sinter.**

ghaut (*Build.*). A landing-stage stair on a riverside.

Ghon's focus (*Med.*). The first part of the lung to be infected in pulmonary tuberculosis, constituting the primary lesion of the disease.

ghost (*Cinema.*). Vertical streaks on high-lights in a projected picture, arising from incorrect phasing of the rotary shutter with respect to the moving film.

ghost or **ghost line** (*Met.*). In steel, a band in which the carbon content is less than that in the adjacent metal and which therefore consists mainly of ferrite.

ghost circuit (*Teleph.*). A double phantom circuit made from one phantom circuit in each leg.

ghost crystal (*Min.*). A crystal within which may be seen an early stage of growth, outlined by a thin deposit of dust or other mineral deposit.

ghost image (*Light*). The image arising from a mirror when the rays have experienced reflection within the glass between the surface and the silvering.—(*Television*) See **double image.**

giant cells (*Zool.*). Cells of unusual size, as the myeloplaxes of bone-marrow: certain cells of the excitable region of the cerebrum: certain cells sometimes found in lymph-glands: large multinucleate cells of the thymus gland and of the spleen pulp: abnormally large neurocytes in *Annelida*.

giant fibres (*Zool.*). In some *Invertebrata*, certain enlarged nerve-fibres of the ventral nerve cord, which are believed to serve for the occasional violent discharge of nervous energy in case of emergency.

giant star (*Astron.*). See **dwarf star.**

gi'antism, gigan'tism (*Med.*). Uniformly excessive growth of the body, due to overactivity of the anterior lobe of the pituitary gland.

Gianuzzi's crescents, jan-oot'sē (*Zool.*). Groups of serous or mucous cells lying next to the basement membrane, in the salivary glands of Vertebrates.

giardiasis, jar-di'a-sis (*Med.*). Infestation of the intestinal tract with the flagellate protozoon *Giardia lamblia*, sometimes causing severe diarrhoea.

gib (*Eng.*). (1) A metal piece used to transmit the thrust of a wedge or cotter, as in some connecting-rod bearings.—(2) A brass bearing surface let into the working face of a steam-engine cross-head.

gibs (*Mining*). See **sprags.**

gib-headed key (*Eng.*). A key for securing a wheel, etc. to a shaft, having a head formed at right-angles to its length.

Gibbs' adsorption theorem (*Chem.*). Solutes which lower the surface tension of a solvent tend to be concentrated at the surface, and conversely.

Gibbs' function (*Chem.*). See **thermodynamic potential.**

Gibbs' phase rule (*Chem.*). See **phase rule.**

Gibbs-Helmholtz equation (*Chem.*). An equation of thermodynamics,

$$-\Delta A = -\Delta U + T \cdot \frac{d(-\Delta A)}{dT},$$

where $-\Delta A$=decrease in free energy; $-\Delta U$=decrease in intrinsic energy; T=the absolute temperature. It is applied to the voltaic cell in the form

$$yFE = -q + yFT \cdot \frac{dE}{dT}.$$

where y=the number of gram equivalents of chemical change; F=the faraday; E=the e.m.f. of the cell; $-q$=the heat of reaction.

gibbous, gib'us (*Astron.*). The word applied to the phase of the moon, or of a planet, when it is between either quadrature and opposition, and appears less than a circular disc but greater than a half disc.

gibbous, gibbose (*Bot.*). (1) Swollen, especially to one side.—(2) Pouched.—(3) Convex above and flat below; hump-backed.

gibbsite (*Min.*). Hydrated oxide of aluminium, $Al_2O_3 \cdot 3H_2O$, occurring as minute mica-like crystals, concretional masses, or incrustations. An important constituent of bauxite. Also called HYDRARGILLITE.

giblet check (*Build.*). An exterior rebate for a door which opens outwards.

Gibraltar fever (*Med.*). See **undulant fever.**

gid (*Vet.*). See **coenurosis.**

Gies' biuret reagent (*Chem*). A reagent for testing the presence of proteins by the biuret reaction; it consists of a solution of 10% KOH and 0·075% copper sulphate.

Giffard's injector (*Eng.*). The original steam *injector* (q.v.).

gig (*Mining*). A mine cage or skip.

gig stick (*Plast.*). A rod pivoted at one end and carrying a horsed-up mould at the other, to facilitate running circular work.

gigan'tism (*Bot*). Abnormal increase in size, often associated with polyploidy.—(*Med.*) See **giantism.**

giggering (*Bind.*). A method of producing lines on the back of a volume by means of a catgut cord.

gilbert (*Elec. Eng.*). The c.g.s. unit of magnetomotive force; it is equal to $4\pi/10$ ampere-turns.

gilder's wax (*Dec.*). Wax dressing for protecting and improving brilliance of gilding.

gilding (*Bind.*). The application, to the back of a book, of wording or designs executed from gold-leaf. Also, the application of *gilt edges* (q.v.).

gilding (*Dec.*). The operation of finishing painted surfaces with oil gold-size and finally coating with gold-leaf.

gilding metal (*Met.*). Copper-zinc alloy containing 5% zinc.

Giles valve (*Elec. Eng.*). A form of lightning arrester in which condensers are used in conjunction with ordinary spark-gaps.

gill (*Bot.*). One of the vertical plates of tissue that bears the hymenium in an agaric.

gill (*Zool.*). A membranous respiratory outgrowth of aquatic animals, usually in the form of thin lamellae or branched filamentous structures: in *Salpida*, the dorsal hyperpharyngeal bar which represents the remnant of the branchial chamber.

gills (*Heating*). Ribs which project from heating surfaces and serve to increase the effective radiation area.

gill arch (*Zool.*). In Fish, the incomplete jointed skeletal ring supporting a single pair of gill slits: one segment of the branchial basket.

gill bars (*Zool.*). See **gill rods.**

gill basket (*Zool.*). In Fish and Cyclostomes, the skeletal framework which supports the gills and gill slits.

gill book (*Zool.*). The book-like respiratory lamellae of *Xiphosura* borne by the opisthosoma, of which they represent the appendages. Also called BOOK GILL.

gill cavity (*Bot.*). A ring-shaped hollow in the young fruit body of an agaric, within which the early stages of the organisation of the gills are completed.

gill clefts (*Zool.*). See **gill slits.**

gill cover (*Zool.*). See **operculum.**

gill net (*Ocean.*). A fixed vertical net, having the head-rope buoyed and the bottom-rope weighted, in the meshes of which fish become entangled by their gill covers.

gill plume (*Zool.*). See **ctenidium.**

gill pouch (*Zool.*). One of the pouch-like gill slits of *Cyclostomata*.

gill rakers (*Zool.*). In some Fish, small processes of the branchial arches, which strain the water passing out via the gill slits and prevent the escape of food-particles.

gill rods, gill bars (*Zool.*). In *Cephalochorda*, chitinoid bars which support the pharynx.

gill slits, gill clefts (*Zool.*). In Vertebrates, the openings leading from the pharynx to the exterior on the walls of which the gills are situated.

gil'sonite (*Min.*). See **uintaite.**

gilt-edges (or **-top**) (*Bind.*). Said of a book having all three edges (or merely the top) decorated with burnished gold.

gil'vous (*Bot.*). Brownish.

gimbals (*Horol.*). See **gymbals.**

gimlet (*Carp.*). A small hand tool for boring holes in wood. It has a grooved shank with rough-pitch screw at the point, and is held and operated by a wooden cross-handle.

gimp (*Acous.*). A type of extraneous noise arising in wax recording, becoming apparent on reproduction.

gimp (*Textiles*). A fancy yarn consisting of a core of hard twisted thread, the covering being formed by one or more soft spun threads.

gimped (*Bot.*). Crenate.

gin. A colourless potable spirit, containing about 80% of proof spirit. It is prepared by rectifying the distillate obtained in the manufacture of whisky, and then further distilling with aromatic substances such as juniper berries, coriander, orris, almonds, etc.

gin (*Eng.*). (1) A hand hoist which consists of a chain or rope barrel supported in bearings and turned by a crank.—(2) A portable tripod carrying lifting tackle.

gin (*Mining*). A drum framework and pulleys for hoisting mineral from a shallow shaft.

gin-pit (*Mining*). A shallow shaft operated by a gin.

ginger-beer plant (*Bot.*). A symbiotic association of a yeast and a bacterium, which ferments a sugary liquid containing oil of ginger, giving ginger beer. Often known popularly as CALIFORNIAN BEES, and by similar names.

gingham (*Textiles*). A coloured cotton cloth, generally with a check pattern; used for summer dresses, aprons, etc.

ginging (*Civ. Eng.*, *Mining*). The process of lining a shaft with bricks or masonry: the lining itself.

gin'gival (*Zool.*). (In Mammals) pertaining to the gums.

gingivi'tis (*Med.*). Inflammation of the gums.

Ginglymo'di (*Zool.*). An order of *Neopterygii*, characterised by the possession of a cylindrical elongate body, a rounded tail fin, small dorsal and anal fins at the extreme hinder end of the body, ganoid scales and opisthocoelous vertebrae. North American fresh-water forms. Gar Pikes.

gingly'mus (*Zool.*). An articulation which allows motion to take place in one plane only; a hinge-joint.—*adj.* **gingly'moid.**

ginney (*Mining*). A journey set or train of tubs, trams, or trucks, or a self-acting incline, in a coal-mine.

ginney tender (*Mining*). A man working on an endless chain haulage.

Giorgi units, jor'ji. See **metre-kilogram-second system of units.**

gir'andole (*Furn.*). A large candelabra: a tall stand for candelabra or lamp.

gir'asol (*Min.*). A variety of fire opal of a bright hyacinth-red colour; the finest specimens show a faint bluish opalescence emanating from the centre of the stone.

girder (*Bot.*). An arrangement of the mechanical tissue of a stem or leaf in such a way that effective support is given to the member.

girder (*Eng.*). A beam, usually steel, to bridge an open space. Girders may be rolled sections, built up from plates, or of lattice construction.

See **box—** **plate—**
box plate— **H-beam.**
lattice—

girder bridge (*Civ. Eng.*). A bridge in which the loads are sustained by beams (generally compound) resting across the bridge supports.

girder casing (*Build.*). Material totally enclosing the projecting part of a girder below the general ceiling surface.

girdle (*Zool.*). In *Vertebrata*, the internal skeleton to which the paired appendages are attached, consisting typically of a U-shaped structure of cartilage or bone with the free ends facing dorsally.

girdles (*Mining*). A thin bed or layer of stone.

girdle structure (*Bot.*). A type of leaf structure in which the tubular photosynthetic cells are arranged in radial rows or in a curved pattern converging towards the central strands of vascular tissue.

girdling (*Bot.*). The condition when a leaf trace arises in the stem on the opposite side from the leaf to which it belongs, and curves widely through the cortex before entering the leaf base.

Girod furnace, zhē-rō (*Elec. Eng.*). An old form of direct-current arc furnace in which the arc is maintained between an electrode and the charge.

girt (*Struct.*). A small girder.

girt (*Timber*). The circumference of a round timber.

girt strip (*Carp.*). See **ribbon strip.**

git (*Foundry*). See **gate.**

give-and-take lines (*Surv.*) Straight lines drawn on a plan of any area having irregular boundaries, each line following the trend of a part of the boundary so that any small piece that it cuts off the area is balanced by an equal piece added by it. See **equalisation of boundaries.**

Givetian Stage, zhē-vet'— (*Geol.*). A division of the marine Devonian System which includes the massive Middle Devonian limestones, well exposed at the type locality of Givet-sur-Meuse. The limestones of Brixham, Torquay, and Plymouth are of the same age.

gizzard (*Zool.*). See **proventriculus.**

Gjer's kiln, gyer (*Met.*). A shaft furnace in which ores are calcined.

Gl (*Chem.*). The symbol for *glucinum*, an alternative name for *beryllium.*

glabres'cent (*Bot.*). (1) Almost but not quite without hairs.—(2) Becoming almost hairless as it matures.

glab'rous (*Bot.*). Without hairs on the surface; hairless.—(*Zool.*) Having a smooth surface.

glacé kid, glas'ā (*Leather*). Goat skin chrome-tanned and finished with a gloss; used for boot-uppers and fancy goods.

glacial acetic acid (*Chem.*). Pure concentrated acetic acid. Owing to its comparatively high m.p. (16·6° C.) it solidifies easily, forming ice-like crystals.

glacial action (*Geol.*). This comprises: (1) the grinding, scouring, plucking, and polishing effected by the ice, armed with rock fragments frozen into it; (2) the accumulation of the rock debris resulting from these processes. The extent to which melt-waters derived from the ice are responsible for both aspects of glacial action is an open question.

glacial denudation (*Geol.*). Disintegration of rocks consequent upon glacial conditions. The extent to which the enormous amount of erosion in the Pleistocene Period was directly the work of ice is a disputed question, some believing that ice affords a protective covering, and that the erosion is effected by melt-waters, chiefly during the retreat of the ice-sheets. See also **frost (geological action of).**

glacial deposits (*Geol.*). These include spreads of boulder clay, sheets of sand and gravel occurring as outwash fans, outwash deltas, and kames; also deposits of special topographical form, such as drumlins and eskers.

glacial phosphoric acid (*Chem.*). A name sometimes used for *meta-phosphoric acid.*

glacial sands (*Geol.*). These cover extensive areas in advance of sheets of boulder clay, and together with glacial (largely fluvioglacial) gravels represent the outwash from great ice-sheets. During the interglacial periods, too, much sand and gravel was deposited during the Pleistocene.

glaciation (*Geol.*). The subjection of an area to glacial conditions, with the development of an ice-sheet on its surface. Britain was subjected to glaciation during the Pleistocene Period, the area north of a line joining the Thames to the Severn being covered by ice-sheets which originated in the mountainous areas of Scotland and Wales. Three great ice-sheets, the Cordilleran, the Keewatin, and the Labradoran, covered the northern half of N. America to beyond the Canadian border, with a marked protrusion southwards in the region of the Great Lakes. In this period four distinct glaciations were experienced, separated by Interglacial Periods. In countries near the Equator, glacial conditions were widespread in the Permo-Carboniferous Period. See **glacial action, glacier.**

glacier (*Geol.*). Usually defined as a river of ice. Three varieties may be recognised: (1) the valley glacier, such as the Mer de Glace; (2) the corrie glacier; (3) the Piedmont glacier, which overflows from a valley that it occupies and spreads out over the plain at its foot. A glacier is constantly fed by the accumulation of snow, which is compressed by pressure into ice that moves slowly downhill, carrying large amounts of detritus on its surface and embedded in the ice. This load of detritus forms the moraines.

glacier lake (*Geol.*). See **lakes.**

gla'cis (*Civ. Eng.*). An inclined bank.

glad'iate (*Bot.*). Shaped like a sword blade.

gladio'lus (*Zool.*). In some Mammals, a large bone formed by the fusion of the sternebrae.

glair (*Bind.*). A preparation made from the white of egg and vinegar, used as the adhesive for gold-leaf in gold-finishing and blocking.

gland (*Bot.*). A cell or group of cells, inside or on the surface of the plant, or a multicellular outgrowth of special form, secreting some substance, often oily or resinous, sometimes containing digestive enzymes.

gland (*Eng.*). (1) A device for preventing leakage at a point where a rotating or reciprocating shaft emerges from a vessel containing a fluid under pressure.—(2) A sleeve or nut used to compress the packing in a *stuffing-box* (q.v.).

gland (*Zool.*). A single epithelial cell, or an aggregation of epithelial cells, specialised for the elaboration of a secretion useful to the organism, or of an excretory product.

gland bolts (*Eng.*). Bolts for holding and tightening down a gland.

gland cell (*Zool.*). A unicellular gland, consisting of a single goblet-shaped epithelial cell producing a secretion, usually mucus.

glanders (*Med., Vet.*). A contagious disease of horses, mules, and asses, due to infection with *Bacillus mallei*; inflammatory thickenings appear in the nasal and upper respiratory passages and also in other parts of the body. It is communicable to man. See also **farcy.**

glan'dular (*Bot., Zool.*). Bearing glands: ending in a gland; of the nature of a gland.

glandular epithelium (*Zool.*). Epithelial tissue specialised for the production of secretions.

glandular fever (*Med.*). See **mononucleosis.**

glandular serrate (*Bot.*). Having a margin consisting of short teeth tipped with glands.

glandular tissue (*Zool.*). See **glandular epithelium.**

glans (*Bot.*). A hard, dry, indehiscent fruit, containing one or a few seeds, derived from an inferior ovary, and more or less surrounded by a cupule; the acorn is a familiar example.

glans (*Zool.*). A glandular structure.

Glase'rian fissure (*Zool.*). In Mammals, a fissure of the temporal bone, which receives the Folian process of the malleus.

glass. A hard, amorphous, brittle substance, made by fusing together one or more of the oxides of silicon, boron, or phosphorus, with certain basic oxides (e.g. sodium, magnesium, calcium, potassium), and cooling the product rapidly to prevent crystallisation or devitrification. The melting-point varies between 800° C and 950° C. Heat-resisting glass generally contains a high percentage of boric oxide. The tensile strength of glass resides almost entirely in the outer skin; if this is scratched or corroded the glass is much more easily broken.—(*Diel.*) Glass is used for insulating envelopes (lamp-bulbs, etc.), and also for line insulators. See also **natural glass** and **safety glass.**

glass (*Photog.*). See **black— focusing—**

glass-bulb rectifier (*Elec. Eng.*). A mercury-arc rectifier in which the arc takes place within a glass bulb. Cf. *steel-tank rectifier.*

glass, cover (*Microscopy*). See **cover glass.**

Glass-crete (*Build.*). A form of glass construction used for pavement lights, etc., in which glass blocks are reinforced by, and framed in, steelwork.

glass-cutter (*Build.*). A tool for cutting glass to size.

glass eye (*Vet.*). Blindness of animals.

glasspaper. Paper coated with glue on which is sprinkled broken glass of a definite grain size; used for rubbing down surfaces. Cf. *sandpaper.*

glass silk (*Acous.*). See **Euphon quilt.**

glass support-rod (*Illum.*). The glass rod which supports the filament of an electric filament lamp.

glass tile (*Build.*). A small glass sheet in a roof, bonded in with slates, plain tiles, or pantiles, to admit light within the roof space.

glassed (*Build.*). A term applied to stones such as granite and marble which are highly polished by being held against a revolving disc covered with felt.

glassine or **transparent parchment** (*Paper*). A transparent glazed wrapper paper; also used in manifold books.

glassy feldspar (*Min.*). Two varieties of potash feldspar occur as transparent colourless crystals: sanidine and adularia. They differ in crystal habit and various physical characters, but not in chemical composition. Transparent yellow orthoclase is also known, but is very rare.

Glauber salt, glow'ber (*Min.*). Properly termed *mirabilite* (hydrated sodium sulphate, $Na_2SO_4 \cdot 10H_2O$). A monoclinic mineral formed in salt lakes, deposited by hot springs, or resulting from the action of volcanic gases on sea water. Obtained from Austria and the Great Salt Lake (Utah).

glau'berite (*Min.*). Monoclinic sulphate of sodium and calcium, occurring with rock salt, anhydrite, etc. in saline deposits.

glauces'cent (*Bot.*). See **glaucous.**

glau'codote (*Min.*). A tin-white orthorhombic sulph-arsenide of iron and cobalt, occurring with cobaltite in Huasco Province, Chile. Also spelt GLAUCODOT.

glaucō'ma (*Med.*). An eye-condition in which, from various causes, the intra-ocular pressure rises, making the eyeball hard and causing partial or total loss of sight.

glau'conite (*Min.*). Hydrated silicate of potassium and iron, a green mineral that forms on submerged banks, such as the Agulhas Bank. Its occurrence in sands and sandstones is regarded, therefore, as a certain indication of accumulation under marine conditions. It occurs in pigmentary form, also commonly as casts of foraminiferal shells.

glauconit'ic sandstone (*Geol.*). See **Greensand.**

glau'cophane (*Min.*). A rare monoclinic amphibole, essentially metasilicate of sodium, magnesium, and aluminium, occurring in schists resulting from the regional metamorphism of soda-rich igneous rocks, such as spilites in Anglesey and elsewhere.

glau'cous (*Bot.*). Covered with a dull greenish grey waxy bloom.—*dim.* **glaucescent.**

glaze (*Build.*). A brilliant glass-like surface given to tiles, bricks, etc.—(*Paint.*) The colours employed in the operation of graining.—(*Pot.*) A more or less transparent, thin, glass-like, clear or coloured film, applied to the surface. See also **salt glaze.**

glazed boards (*Paper*). Similar to cardboards; made from wood pulp, etc., and given a high glaze by rolling.

glazed brick (*Build.*). A brick having a glassy finish to the surface produced by spraying it with special surface preparations before firing.

glazed door (*Build.*). A door fitted with glass panels.

glazed frost (*Meteor.*). A smooth layer of ice which is occasionally formed when rain falls and the temperature of the air and the ground is below freezing-point.

Glazement (*Build.*). A proprietary facing material for concrete or brickwork; it gives a glazed waterproof surface.

glazier (*Build.*). A workman who cuts panes of glass to size and fits them in position.

glazier's putty (*Build.*). A mixture of whiting and linseed oil, sometimes including white lead, forming a plastic substance for fixing panes of glass into frames.

glazing (*Build.*). The operation of fitting panes of glass into sashes.

glazing (*Photog.*). The application of a shining surface to photographic prints by first hardening with formalin and then squeegeeing on to plate-glass or ferrotype.

glazing (*Plumb.*). The process of passing a hot iron over the lead of a *wiped joint* (q.v.) in order to produce a smooth finish.

glazing bead (*Build.*). A bead nailed, instead of putty, into a sash rebate to secure a pane.

glazing colour (*Dec.*). A covering of transparent wash on a ground coat of paint.

gle'ba (*Bot.*). The spore-bearing tissue enclosed within the peridium of the fructification of *Gasteromycetes* and in truffles.

gleb'ulose (*Bot.*). Bearing rounded humps on the surface of the thallus.

gleeds (*Mining*). A glowing coal or small coke such as that used in nail-making.

gleet (*Med.*). Chronic discharge from the urethra as a result of gonococcal infection.

gleet (*Vet.*). A catarrh of the frontal and maxillary sinuses of the horse.

Glénard's disease, glā-nar (*Med.*). See **enteroptosis.**

Glengarriff Grits (or **Beds**) (*Geol.*). A great series, several thousand feet in thickness, of alternating bands of fine-grained grit and slate, of Devonian age, occurring typically in the Glengarriff district in Ireland.

Glenkiln Shales (*Geol.*). The lowest of the four stages into which Prof. C. Lapworth divided the Moffat Shales occurring in the central parts of the Southern Uplands of Scotland. Of Ordovician age, they are approximately equivalent to the Llandeilo Series.

gle'noid (*Zool*.). Socket-shaped: any socket-shaped structure; as the cavity of the pectoral girdle which receives the basal element of the skeleton of the fore-limb.

Glen Rose Limestone (*Geol.*). The calcareous member of the Trinity succession in U.S.A., reaching 650 ft. in Arizona.

Glenroy, Parallel Roads of (*Geol.*). The strand-lines of a glacial lake which occupied Glenroy during the Pleistocene Period, when the lower part of the valley was blocked by ice.

glia (*Zool.*). See **neuroglia.**

gli'adin (*Chem.*). A prolamin obtained from wheat and rye.

glider (*Aero.*). A heavier-than-air flying-machine not power-driven within itself, although it may be towed by a power-driven aeroplane.

gliders (*Furn.*). Dome-shaped metal pieces fastened to the feet of chairs, settees, etc., in place of casters.

gliding (*Aero*.). (1) Flying a heavier-than-air craft without assistance from its engine, either in a spiral or as an approach glide before flattening-out antecedent to landing.—(2) An aeronautic sport in which an engineless aeroplane (*glider*, q.v.) is catapulted or otherwise launched from a height or towed on level ground, and makes use of rising currents before finally landing.

gliding growth (*Bot*.). A process of adjustment in growing tissues in which the ends of elongating cells slide past one another, often becoming interlocked as elongation ceases.

gliding planes (*Geol.*). In minerals, planes of molecular weakness along which movement can take place without actual fracture. Thus calcite crystals or cleavage masses can be distorted by pressure and pressed into quite thin plates without actual breakage.

glioma, gli-o'ma (*Med.*). A general term applied to a variety of tumours arising from nervous tissue in the brain and, more rarely, in the spinal cord.

gliomato'sis (*Med.*). Diffuse overgrowth of neuroglia in the brain or in the spinal cord.

Glisson's capsule (*Zool*.). In higher Vertebrates, a coat of loose connective tissue enclosing the portal vein, the hepatic artery, and the bile-duct and their branches in the liver.

globe photometer (*Illum.*). See **Ulbricht globe photometer.**

globigeri'na ooze (*Geol.*). A deep-sea deposit covering a large part of the ocean floor (one-quarter of the surface of the globe); it consists chiefly of the minute calcareous shells of the foraminifer, *Globigerina*.

globoid (*Bot.*). A rounded inclusion in an aleurone grain, consisting of a double phosphate of calcium and magnesium, combined with globulins.

glob'ular, glob'ose, glob'ulose (*Bot.*). Nearly spherical.

globular cementite (*Met.*). In steel, cementite occurring in the form of globules instead of in lamellae (as in pearlite) or as envelopes round the crystal boundaries (as in hyper-eutectoid steel). Produced by very slow cooling, or by heating between 600° C. and 700° C.

globular lightning (*Meteor.*). See **ball lightning.**

globular pearlite (*Met.*). See **granular pearlite.**

glob'ulins (*Chem.*). Proteins insoluble in water but soluble in dilute salt solution, from which they can be salted out with magnesium sulphate. Globulin, fibrinogen, fibrin, myosin, legumin, edestin, and conglutin are globulins.

glob'ulites (*Geol.*). Crystallites (i.e. incipient crystals) of minute size and spherical shape occurring in natural glasses such as pitchstones.

glo'bus (*Zool*.). Any globe-shaped structure; as the *globus pallidus* of the Mammalian brain.—*adj.* **globate.**

globus hystericus (*Med.*). The sensation as of a lump in the throat experienced in hysteria.

glochid'iate (*Bot*.). Bearing bristles with hooked tips.

glochid'ium (*Bot.*). A hair with a hooked tip, formed on the spore masses of the water fern *Azolla*.

glochidium (*Zool*.). The modified larval form of *Unionidae* (fresh-water Mussels), characterised by a toothed bivalve shell and a prominent byssus thread; incubated within the gills of the mother, and afterwards parasitic on the gills or fins of Fish.—*adj.* **glochidiate.**

gloeocystid'ium, glē-ō-sis— (*Bot.*). A cystidium of horny or of gelatinous consistency.

Gloger's law (*Zool.*). Southern races of warm-blooded animals tend to be dark-coloured, especially black, brown, and dark-red, while northern races tend to be light-coloured and greyish.

glomer'ulate (*Bot.*). Bearing glomerules.

glom'erule (*Bot.*). A small ball-like cluster of spores.

glomeruli'tis (*Med*.). Inflammation of the glomeruli of the kidney.

glomer'ulonephri'tis (*Med.*). Inflammation of the kidney, the glomeruli being mainly affected.

glomer'ulus (*Bot.*). A cymose inflorescence in the form of a crowded head of small flowers.

glomerulus (*Zool.*). In *Hemichorda*, an organ containing a blood-plexus, situated in the proboscis; believed to be excretory: a capillary blood-plexus, as in the Vertebrate kidney: a nest-like mass of interlacing nerve-fibrils in the olfactory lobe of the brain.—*adj.* **glomer'ular.**

glo'mus (*Zool.*). In the pronephros, the glomeruli of the separate somites aggregated to form a single capillary mass.

glonoin (*Chem.*). Spirits of glonoin, a 1% solution of trinitroglycerine in alcohol.

glory (*Meteor.*). A small system of coloured rings surrounding the shadow of the observer's head, cast by the sun on a bank of mist, as in the *Brocken Spectre* (q.v.). The *glory* is produced by diffraction caused by the water droplets in the mist.

glory-hole (*Glass*). A subsidiary furnace, in which articles may be re-heated during manufacture.

gloss (*Dec.*). A brilliantly shiny surface on paint or varnish.

gloss-, glosso- (Greek *glossa*, tongue). A prefix used in the construction of compound terms; e.g. *glossoepiglottic*, pertaining to the tongue and epiglottis.

gloss paint (*Paint.*). Paint to which varnish is added as an ingredient in the manufacturing process.

glossa (*Zool.*). In Insects, one of an inner pair of lobes arising from the prementum, or the median structure formed by the fusion of these lobes: in Vertebrates, the tongue: any tongue-like structure.—*adjs.* **glossate, glossal.**

glossa'rium (*Zool.*). In certain *Diptera*, the glossa, which is narrow-pointed.

glossec'tomy (*Surg.*). Surgical removal of the tongue.

glossi'tis (*Med.*). Inflammation of the tongue.

glossody'nia (*Med.*). Pain in the tongue.

glossohy'al (*Zool.*). In some Fish, an anterior extension of the basihyal lying within the tongue.

glossophagine, —sof′a-jēn (*Zool.*). Securing food by the agency of the tongue.

glossophar′ynge′al (*Zool.*). Pertaining to the tongue and the pharynx: the ninth cranial nerve of Vertebrates, running to the first gill-cleft in lower forms, to the tongue and the gullet in higher forms.

glossople′gia (*Med*) Paralysis of the tongue.

glos′sospasm (*Med.*). Spasm of the muscles of the tongue.

glossothec′a (*Zool.*). In some pupal Insects, that part of the integument which covers the proboscis.

glost oven (*Pot.*). A furnace in which biscuit, after being dipped in slip, is fired and so glazed.

glottis (*Zool.*). In higher Vertebrates, the opening from the pharynx into the trachea.

glove leather (*Leather*). Usually goat and kid skins, prepared by tanning or chrome-tanning, or by a combination of these processes.

Glover tower (*Chem*). A tower of a sulphuric acid plant used to recover the nitrogen oxides from the Gay-Lussac tower, to cool the gases from the burners, to concentrate the acid trickling down the tower, to partly oxidise the gases from the sulphur burners, and to introduce the necessary nitric acid into the chambers by running nitric acid down the tower along with the nitrated acid from the Gay-Lussac tower.

glow discharge (*Elec. Eng.*). A silent discharge of electricity through a gas in a vacuum tube, the pressure being such that the discharge is luminous.

glow tube (*Thermionics*). A gas discharge tube in which the discharge is accompanied by a visible glow.

glu′cinum (*Chem.*) *Beryllium* (q.v.).

gluco. See **glyc-.**

***d*-glucon′ic acid** (*Chem.*). $CH_2OH(CHOH)_4COOH$, an oxidation product of *d*-glucose.

glu′cophore (*Chem.*). A group of atoms which causes sweetness of taste.

glucopro′teins (*Chem.*). Compounds formed by a protein with a substance containing a carbohydrate group other than a nucleic acid, e.g. mucin.

***d*-gluco′samine** (*Chem.*). $CH_2OH(CHOH)_3CHNH_2\cdot CHO$, an amino-sugar, it represents a link between the carbohydrates and the proteins.

glu′cosans (*Chem.*). The anhydrides of glucose, comprising cellulose, starch, dextrin, glycogen, etc.

***d*-glucose** (*Chem.*). Dextrose, grape-sugar; $C_6H_{12}O_6+H_2O$. It crystallises from water in six-sided plates, m.p. 86° C.; from methyl alcohol in small anhydrous prisms, m.p. 146° C. It is dextro-rotatory and is prepared by the hydrolysis of starch and other carbohydrates.

glu′cosides (*Chem.*). A group of complex organic compounds occurring in vegetable tissues, characterised by the formation on hydrolysis of a sugar, usually *d*-glucose.

glucosuria (*Med.*). See **glycosuria.**

glucuron′ic acid (*Chem.*). Glycuronic acid, $CHO\cdot(CHOH)_4\cdot COOH$. It can be prepared by reduction of the lactone of saccharic acid, and occurs in small amounts in the urine. It forms ethers or esters with phenols or aromatic acids, which are in this form removed from the body.

glue (*Carp., etc.*). A substance used as an adhesive agent between surfaces to be united. Glue is obtained from various sources, e.g. bones, gelatine, starch, resins, etc. Well-dried glue contains about 12-15% of moisture.

glue pot (*Carp., etc.*). A vessel in which glue is heated to a condition suitable for use. A mixture of glue and water is placed in an inner vessel, which is then suspended in water contained in an outer vessel, to which the heat is applied.

gluing (*Carp., etc.*). The operation of making one surface adhere to another by running glue between them, applying pressure, and then allowing the glue to set.

gluma′ceous (*Bot.*). Thin, brownish, and papery in texture.

glume (*Bot.*). A dry membranous bract associated with the flower of a grass. Several glumes, with the associated flowers, make up the *spikelet* (q.v.).

glumel′la (*Bot.*). See **palea.**

glumif′erous (*Bot.*). Having flowers enclosed by glumes.

glut (*Build.*). A *closer* (q.v.).

glutam′ic acid (*Chem.*). $HOOC\cdot CH_2\cdot CH_2\cdot CH(NH_2)\cdot COOH$, α-aminoglutaric acid, a mono-amino-dicarboxylic acid, obtained by the hydrolysis of albuminous substances.

glu′tamine (*Chem.*). The mono-amide of glutamic acid, $(NH_2)\cdot CO\cdot CH_2\cdot CH_2\cdot CH(NH_2)\cdot COOH$.

glute′al (*Zool.*). Pertaining to the buttocks.

glu′telins (*Chem.*). Simple proteins, insoluble in water and in neutral salt solutions, but soluble in dilute acids and alkalies; e.g. glutenin or oryzenin.

glu′ten (*Bot*). (1) A reserve protein found in plants.—(2) A sticky coating on the pilei of some agarics.*

glu′tenin (*Chem.*). A protein of the glutelin group, found in wheat.

glute′us (*Zool.*). In land Vertebrates, a retractor and elevator muscle of the hind-limb.

glu′tinous (*Bot.*). Covered by a sticky or clammy exudation.

glutton (*Furs*). See **wolverene.**

glyc-, glyco-, gluco- (Greek *glykos*, sweet). A prefix used in the construction of compound terms; e.g. *glycosuria.*

glycerides, glis′— (*Chem.*). A term for glycerine esters, the most important of which are the *fats* (q.v.).

glycerine, glycerin (*Chem.*). Glycerol, $CH_2OH\cdot CHOH\cdot CH_2OH$, a thick syrupy hygroscopic colourless liquid, m.p. 17° C., b.p. 290° C., obtained by the hydrolysis of oils and fats, or by the alcoholic fermentation of glucose in the presence of sodium sulphite solution, which reacts with the aldehydes formed, thus liberating a larger amount of glycerine. Glycerine is a trihydric alcohol, forming alcoholates, esters, and numerous derivatives. It is a raw material for *nitro-glycerine* (q.v.). printing inks, foodstuff preparations, etc.

glycerine litharge cement (*Chem.*). A mixture of litharge (lead oxide) and glycerine which rapidly sets to a hard mass of great strength. Time of setting depends largely on the quality and age of the litharge.

glycerol (*Chem.*). See **glycerine.**

glycerol-phthalic resins (*Plastics*). See **glyptal resins.**

gly′cine (*Chem.*). Aminoacetic acid.

gly′cocoll (*Chem.*). Aminoacetic acid.

gly′cogen (*Chem.*). $(C_6H_{10}O_5)x$, a starch found in the liver; sometimes called ANIMAL STARCH. Its hydrolysis by acids or by enzymes finally yields glucose. Glycogen plays an important rôle in animal metabolism.

glycogen mass (*Bot.*). See **epiplasm.**

gly′cols (*Chem.*). Dihydric alcohols, of the general formula $C_nH_{2n}(OH)_2$, viscous liquids with a sweet taste or crystalline substances. They give all the alcohol reactions and, having two hydroxyl groups in the molecule, they can also form mixed compounds; e.g. ester-alcohols.

glycol (*Chem.*). See **ethylene glycol.**

glycoproteins (*Chem.*). Glucoproteins.

glycosu′ria, glucosuria (*Med.*). The presence of sugar in the urine.

glycuronic acid (*Chem.*). Glucuronic acid.

glyox′al (*Chem.*). $CHO\cdot CHO$, a dialdehyde, existing in four modifications, viz. polyglyoxal $(CHO\cdot CHO)_n$ from which, by heating with P_2O_5, glyoxal $CHO\cdot CHO$ is obtained. This substance is a yellow liquid, m.p. 15° C., b.p. 51° C. (776 mm.), forming green vapours, but it is not stable, and polymerises to insoluble paraglyoxal, $(\mathrm{CHO{\cdot}CHO})_x$. There is also known a trimolecular form, $(\mathrm{CHO{\cdot}CHO})_3$.

glyoxal'ic acid (*Chem.*). $\mathrm{CHO{\cdot}COOH+H_2O}$ or $\mathrm{CH(OH)_2{\cdot}COOH}$, an aldehyde monobasic acid occurring in unripe fruit; rhombic prisms, soluble in water, volatile in steam, which can be obtained by the oxidation of ethyl alcohol with nitric acid, or by the hydrolysis of dichloracetic acid.

glyox'alines (*Chem.*). *Iminazoles* (q.v.).

glyoxyl'ic acid (*Chem.*). Glyoxalic acid.

glyph (*Arch*). A short upright flute.

glyptal resins (*Plastics*). Almost colourless, tacky, adhesive resins manufactured by heating together glycerol and phthalic anhydride at about 200° C. They are used as bonding materials for mica, and as additions to stoving lacquers. Modified glyptal resins, made by replacing part of the phthalic anhydride with other acids, are employed in the paint and varnish trade.

Glyptanite (*Diel.*). Micanite using glyptal as the bond.

gm. An abbrev. for *gram.*

Gmelin test, gmā'lin (*Chem.*). A test for the presence of bile pigments; based upon the formation of various coloured oxidation products on treatment with concentrated nitric acid.

gmelinite, gmel'— (*Min.*). A pseudohexagonal zeolite, white in colour and rhombohedral in form, resembling chabazite. Chemically it is hydrated silicate of aluminium, sodium, and calcium.

gnath-, gnatho-, nath-ō— (Greek *gnathos*, jaw) A prefix used in the construction of compound terms; e.g. *gnathopod* (q.v.).

gnathic (*Zool.*). Pertaining to the jaws: masticatory.

gnathites (*Zool.*). Mouth-parts, especially those of *Insecta.*

gnath'obase (*Zool.*). In *Arthropoda*, a masticatory process on the inner side of the first joint of an appendage.

Gnathobdel'lida (*Zool.*). An order of *Hirudinea* the members of which are all terrestrial or freshwater forms possessing botryoidal tissue; they have jaws but the proboscis is not protrusible; the blood is red; on animals of all kinds.

gnathochila'rium (*Zool.*). In *Diplopoda*, a flat plate forming the lower lip and representing the fused second pair of mouth-parts.

gnath'opod (*Zool.*). In *Arthropoda*, any appendage modified to assist in mastication.

gnathop'odite (*Zool.*). See **maxilliped.**

gnathoso'ma (*Zool.*). In *Acarina*, the segments of the mouth and its appendages.

gnathos'tegite (*Zool.*). In some *Crustacea*, a covering plate associated with the mouth-parts.

gnathosto'matous (*Zool.*). Having the mouth provided with jaws.

gnathotheca, —thē'ka (*Zool.*). The horny part of the lower beak of a Bird.

gneiss, nis (*Geol.*). A metamorphic rock of coarse grain size, characterised by a mineral banding, in which the light minerals (quartz and feldspar) are separated from the dark ones (mica and/or hornblende). The layers of dark minerals are foliated, while the light bands are granulitic. See also **metamorphism.**

gneissose texture, gneissic texture (*Geol.*). A rock texture in which foliated and granulose (granulitic) bands alternate; typical of rocks which have been recrystallised under directed pressure, during regional metamorphism.

gnomon, nō'mon (*Surv.*). An early instrument for determination of time and latitude, involving the measurement of the shadow of an upright rod as cast by the sun.

go (*Build.*). The *going* (q.v.

go-out (*Hyd. Eng.*). A sluice in an embankment impounding tidal waters, which can pass through it when the tide is out.

go-through machine (*Lace*). A lace machine of the Levers type but with extended combs, larger bobbins, and greater speed.

goaf (*Mining*). See **gob.**

goat pox (*Vet.*). An epidemic disease of goats due to infection by a filterable virus; characterised by fever and a papulo-vesicular eruption of the skin and mucous membranes.

gob or **goaf** (*Mining*). The space left by the extraction of a coal-seam, into which waste is packed.

gob fire (*Mining*). A fire occurring in a worked-out area, due to ignition of timber or broken coal left in the gob.

gob heading, gob road (*Mining*). A roadway driven through the gob after the filling has settled.

gob stink (*Mining*). A smell indicating spontaneous combustion or a fire in the goaf or gob.

gobber (*Mining*). A man employed to pack rubbish or waste into the gob.

gobbet (*Build.*). A stone block.

Gobelins tapestry, gō-blan^{g} (*Textiles*). A famous type of tapestry made in Paris since the reign of Louis XIV and named after its first supervisors, Giles and Jean Gobelins. Noted for its smooth surface, wonderful blend of colours, and its handsome borders.

goblet cell (*Zool.*). A goblet- or flask-shaped epithelial gland cell, occurring usually in columnar epithelium.

gobo (*Cinema.*). Sound-absorbing panel used in sound-film production for regulating the reflection of sound-waves on the set; intended to be outside the camera angle.

godroon' (*Arch.*). An ornamentation taking the form of a cable or bead.

goesover, gō-zō-ver (*Cinema.*). A shade to prevent light from the top lighting of a set from getting into the lens of a camera and causing fog.

goethite, gė'tīt (*Min.*). Orthorhombic hydrated oxide of iron with composition $\mathrm{Fe_2O_3{\cdot}H_2O}$. Externally resembles limonite, with which it is frequently misidentified. See **iron ores, limonite.**

going (*Build.*). The horizontal interval between consecutive risers in a stair.

going-barrel (*Horol.*). A barrel in which the winding takes place from the arbor. Power is transmitted direct from such a barrel to the train by teeth on the barrel.

going bord (*Mining*). A roadway to the coal face in bord and pillar working.

going fusee (*Horol.*). A fusee with maintaining power.

going light (*Vet.*). Emaciation; the term is frequently applied to tuberculosis of birds.

going part (*Weaving*). The part of a loom known as the *sley* or *batten.* It swings to and fro when the loom is at work and beats up the weft to the edge of the woven cloth.

going road (*Mining*). A working place in a coal-mine which is being pushed forward, as distinct from an old or disused place.

going rod (*Build.*). A rod used for setting out the going of the steps in a flight.

goitre, goiter (*Med.*). Morbid enlargement of the thyroid gland.

goitre, exophthalmic (*Med.*). See **Basedow's disease.**

goitrogenous, —troj'en-us (*Med.*). Producing, or tending to produce, goitre.

goitrous (*Med.*). Affected with, or pertaining to, goitre.

gold (*Met.*). A heavy, yellow, metallic element in the first group of the periodic system. Symbol, Au. At. no. 79, at. wt. 197·2, sp. gr. at 20° C. 19·3, m.p. 1063° C., specific electrical resistivity 2·42 microhms per cm. cub. Most of the metal is retained in gold reserves but some is used in jewellery, dentistry, and for decorating pottery and china. In coinage and jewellery the gold is alloyed with varying amounts of copper and silver. *White gold* is usually an alloy with nickel, but as used in dentistry this alloy contains platinum or palladium.

gold amalgam (*Min.*). A variety of native gold containing approximately 60% of mercury; discovered in Colombia and occurs also in the Mariposa district of California.

gold blocking (*Bind.*). The process of pressing a design upon gold leaf spread out on the cover of a book, the tools or dies, which are heated, leaving the desired impression. Also carried out by machine, the gold-leaf being fed from a spool.

gold cushion (*Bind.*). A small board, covered with rough calfskin, which is padded with a soft material. The gold leaf required for gold blocking is placed on the cushion ready for use.

gold-leaf (*Dec.*). Pure gold beaten out into extremely thin sheets, so that it may be applied to surfaces which are to be gilded.

gold-leaf electroscope (*Elec. Eng.*). An electroscope consisting of a glass jar which contains two pieces of gold-leaf attached to a metal rod passing through the top of the jar; if the metal rod becomes charged, the leaves repel each other and diverge.

gold number (*Chem.*). The weight in milligrams of a lyophilic colloid which is just insufficient to prevent the change from red to blue in 10 c.c. of colloidal gold solution after the addition of 1 c.c. of 10% sodium chloride solution.

gold paints (*Dec*). Paints made of bronze powders mixed with transparent varnish or amyl acetate.

gold-size (*Paint.*). A preparation, made up in different ways, which is used as a basis to secure gold-leaf on to surfaces which are to be gilded.

gold spring (*Horol.*) The delicate spring forming part of the detent escapement. One end is anchored to the detent, and the other end rests against the detent horn and projects just beyond it. On one vibration of the balance, the discharging pallet presses against the end of the gold spring and moves the whole detent, bringing about unlocking of the escape wheel. On the return vibration, the discharging pallet merely lifts the gold spring without causing movement of the detent.

gold toning (*Photog.*). The addition, by chemical means, of a gold film to the surface of the silver image of a photographic print.

golden beryl (*Min.*). A clear yellow variety of the mineral beryl, prized as a gemstone. Heliodor is a variety from S.W. Africa.

golden number (*Astron.*). A term derived originally from medieval church calendars, and still used to signify the place of a given year in the Metonic Cycle of nineteen years.

Goldschmidt alternator (*Radio*). A high-frequency alternator in which the stator and rotor carry a number of windings each tuned to successively higher frequencies. Currents of one frequency in one winding in, say, the rotor generate currents of higher frequency in the stator, which in turn generate currents of still higher frequency in the rotor, and so on. Frequencies up to 100 K.C. can be thus attained.

Goldschmidt process (*Chem.*). See **aluminothermic process.**

Golgi apparatus (*Cyt.*). A protoplasmic cell-inclusion which takes the form of scattered particles (*Golgi bodies*), or a continuous network, undergoes changes of form and position in secreting cells, and is actively concerned with cell-metabolism.

Golgi-Mazzoni corpuscles,—mat-sŏ′nē (*Zool.*). In Vertebrates, a type of sensory nerve-ending resembling an end bulb.

Golgi's organs (*Zool.*). In Vertebrates, a type of sensory nerve-ending occurring in tendons near the point of attachment of muscle fibres, and consisting of a terminal arborisation with irregular varicosities, enclosed in a fibrous capsule.

goliath Edison screw-cap (*Elec. Eng.*). An Edison screw-cap having a screw thread about 1½-in. diameter, with 4 threads per inch; used with large metal-filament lamps.

gompho′sis (*Zool.*). A type of articulation in which a conical process fits into a cavity; as the roots of teeth into their sockets.

gon-, go′no- (Greek *gonos*, offspring, birth) A prefix used in the construction of compound terms; e.g. *gonoduct* (q.v.)

gonad (*Zool.*). A mass of tissue arising from the primordial germ cells and within which the spermatozoa or ova are formed; a sex gland; ovary or testis.—*adj.* **gona′dial.**

gonal (*Zool.*). Forming or giving rise to a gonad; as the *gonal* ridge.

gonan′gium (*Zool.*). See **gonotheca.**

gonapoph′yses (*Zool.*). The external organs of reproduction in Insects; they consist usually of two pairs of chitinous processes in the male and three pairs in the female, arising from the ninth (male) or the eighth and ninth (female) somites of the abdomen; in the female they may be modified to form an ovipositor or a sting.

gones, gōnz (*Cyt.*). The groups of four nuclei or of four cells which are the immediate results of meiosis.

gong (*Horol.*). Rectangular steel strip bent into the form of a spiral which, after blueing, provides a deep note when struck; used in clocks when striking the hours.

go′ni- (Greek *gōnia*, angle; *gony*, knee). A prefix used in the construction of compound terms; e.g. *goniometer* (q.v.). Not to be confused with the prefix *gon-*, *gono-* (q.v.).

goniale, gŏ-ni-ah′le (*Zool.*). See **antarticulare.**

gonid′ial layer (*Bot.*). See **algal layer.**

gonid′iophore (*Bot.*). An old term for *conidiophore.*

gonid′ium (*Bot.*). (1) An algal cell occurring as part of the thallus of a lichen.—(2) An old term for *conidium.*—(3) A non-motile spore formed by some *Myxophyceae.*—(4) A gemma in some liverworts.

gonim′ic layer (*Bot.*). See **algal layer.**

gonim′ium (*Bot.*). A cell of one of the *Myxophyceae* when it occurs as a part of the thallus of a lichen.

gonim′oblast (*Bot.*). A short spore-bearing filament formed from the fertilised carpogonium of red algae, and bearing one or more carpospores.

go′nioautoi′cous (*Bot.*). Bearing the antheridium as a bud-like outgrowth from a branch bearing archegonia.

goniom′eter (*Min.*). An instrument for measuring the angles between crystal faces. For elementary purposes the contact goniometer, accurate to half a degree, is used; but for more precise work a reflecting goniometer is necessary. This utilises the reflection of light by crystal faces, arranged vertically and successively brought into alignment by rotating the crystal on the turntable of the instrument, the angle of rotation being accurately measurable by appropriate scales.

goniometer (*Radio*). A device used in connexion with the Bellini-Tosi direction-finding system. It comprises two coils placed at right-angles and connected to the two crossed loops respectively; a third rotatable coil, connected to the receiver, provides the variable relative coupling of the two loops to the receiver.

goni'tis (*Vet.*). Inflammation of the stifle joint of animals.

go'no-. Prefix See **gon-**.

go'noblast (*Zool.*). A reproductive cell.

gonoblast'id (*Zool.*). See **blastostyle.**

gonoca'lyx (*Zool.*). In some Centipedes, a pair of modified appendages belonging to the same somite as the genital opening

go'nocheme, —kēm (*Zool.*). A sexual medusoid of *Hydrozoa.*

gonochor'ism (*Zool.*). Sex-determination.

gonochoris'tic (*Zool.*). Having separate sexes.

gonococ'cus (*Med.*). The causative organism of *gonorrhoea* (q.v.) —*adj.* **gonococ'cal.**

go'nocoel, —sēl (*Zool.*). That portion of the coelom the walls of which give rise to the gonads: hence, the cavity of the gonads.

go'nocyte (*Zool.*). In *Porifera*, a sexual cell which will produce ova or spermatozoa.

gonoden'dra (*Zool.*). In some of the *Siphonophora*, branched and mouthless zooids bearing gonophores.

go'noduct (*Zool.*). A duct conveying genital products to the exterior: a duct leading from a gonad to the exterior.

go'nophore (*Zool.*). A sexual individual in metagenetic *Coelenterata.*

go'noplasm (*Bot.*). In some *Oömycetes*, the protoplasm which passes through the fertilisation tube and unites with that of the oösphere.—(*Zool.*) See **germ plasm.**

go'nopore (*Zool.*). The aperture by which the reproductive elements leave the body.

gonorrhoe'a, gonorrhe'a (*Med.*). A contagious infection of the mucous membrane of the genital tract with the gonococcus, contracted usually through promiscuous sexual intercourse.

go'nosome (*Zool.*). In colonial animals, all the individuals concerned with reproduction.

go'nostyle (*Zool.*). In *Siphonophora*, a process of the main stem of the colony bearing gonophores, and sometimes representing a mouthless polyp.

gonothe'ca (*Zool.*). The vase-like expansion of the perisarc which surrounds a blastostyle and gonophores.

gono'tokont (*Zool.*). See **auxocyte.**

go'notome (*Zool.*). A somite in an embryo which contains the anlage of a gonad.

gonozo'oid (*Zool.*). In *Siphonophora*, an individual bearing gonophores.

go'nys (*Zool.*). In Birds, the edge of the lower beak, reaching from the angle of the chin to the myxa.—*adj.* **gonyd'ial.**

Gooch crucible, Gooch filter (*Chem.*). A filter used in laboratories, which consists usually of a small porcelain cup the bottom of which is perforated with numerous small holes and covered with a thin layer of washed asbestos fibres, which act as a filtering medium.

good (*Paper*). Also known as *insides* (q.v.). A term used to describe the best sheets from the inside of a ream of paper.

good colour (*Print.*). A term which indicates consistent distribution of ink throughout a book. Every page must be of uniform blackness.

goods wagon (*Rail.*). A specially designed wagon intended for the transit of goods by rail.

goodness (*Radio*). See **mutual conductance.**

goose flesh. See **horripilation.**

gooseberry stone (*Min.*). The literal translation of the Latinised form *grossularite* (q.v.), so called from the occurrence of this green garnet in rounded crystals somewhat vaguely resembling gooseberries in form and colour.

Gordon's formula (*Civ. Eng.*). An empirical formula giving the collapsing load for a given column. It states that

$$P=\frac{fc\,.\,A}{1+c\left(\frac{l}{d}\right)^2},$$

where P = the collapsing load; fc = safe compressive stress for very short lengths of the material; A = area of cross-section; l = the length of the pin-jointed column; d = the least breadth or diameter of the cross-section; c = a constant for the material and the shape of cross-section.

gore (*Aero.*). One of the sector-like sections of the canopy of a parachute.

gorge (*Geol.*). A general term for all steep-sided, relatively narrow valleys, including canyons, overflow channels, etc.

gorge (*Build.*). A *drip* (q.v.).

gorse (*Mining*). A barrel or tub for carrying water underground

gos'larite (*Min.*). Zinc sulphate, a rare mineral precipitated from water seeping through the walls of lead-mines; formed by the decomposition of sphalerite.

gossan (*Mining*) The oxidised upper portion of a vein or lode of sulphide minerals. Sometimes devoid of values owing to action of circulating water.

gos'sypine (*Bot.*). Cottony.

goth (*Mining*). A sudden bursting or breaking of the roof or face.

Gothic (*Typog.*). Originally a term applied to black letter, or Old English type, it is now used to include all bold sanserif faces.

Gothlandian (*Geol.*). A proposed synonym for *Silurian*; but the latter claims precedence, and is more commonly used.

Gott's method (*Elec. Eng.*). A bridge method of finding the capacitance of a cable. The cable is made to form one arm of the bridge, the others being a standard condenser and two sections of a slide wire.

gotten (*Mining*). (1) An abandoned or exhausted mine.—(2) Coal ready to be filled underground into tubs or trains.

gouache, goo-ash' (*Dec.*). Opaque colours mixed with water, honey, and gum, applied in impasto style.

goufing (*Build.*). The process of strengthening wall foundations.

gouge, gowj (*Bind.*). A hand tool used to form curved lines.

gouge (*Carp., etc.*). A tool similar to a chisel, but having a curved blade and a cutting edge capable of forming a rounded groove.

gouge (*Mining*). See **salvage.**

gouge (*Surg.*). A hollow chisel for removing and cutting bone.

gouge-bit (*Carp.*). A wood-boring bit shaped like a gouge with a rounded end.

gouge slip (*Carp., etc.*). A shaped piece of oil-stone on which the concave side of the cutting edge of a gouge may be rubbed for sharpening purposes.

goundou (*Med.*). Dog nose; gros nez. Symmetrical bony overgrowth at the sides of the nose, thought to be a late sequel of yaws.

gourmandi'ser (*Bot.*). A strong, coarsely growing sucker, especially from the stock of a grafted plant.

gout (*Med.*). A disorder of metabolism in which there is an excess of uric acid in the blood; this is deposited, as sodium biurate, in the joints, bones, ligaments, and cartilages. In acute gout there is a sudden very painful swelling of the joint, usually of the big toe.

gout, avian (*Vet.*). A disease of domesticated birds characterised by the deposit of urates in the serous membranes and joints, and associated with excess protein in the food.

goutte d'eau, goot-dō (*Min.*). Literally 'drop of water'; an old term applied to the whitest of the Brazilian topaz crystals, which when cut and polished rival diamond in brilliancy, but lack the fire of the latter gem.

Goux pail, goo (*San. Eng.*). A pail lined with absorbent material; used in a conservancy closet.

governor (*Eng.*). A device for controlling the fuel or steam supply to an engine in accordance with the power demand, so that the speed is kept constant under all conditions of loading.

See **pendulum— shaft— spring-loaded—**

governor (or strapping) motion (*Cotton Spinning*). A mechanism forming part of a mule spinning-frame; it functions in regulating the revolutions of the spindle in building the cop bottom.

gowl (*Mining*). Said of roof and sides which cannot be kept from falling.

G.P.I. (*Med.*). Abbrev. for *general paralysis of the insane*.

G.P.M. (*Hyd.*). Abbrev. for *gallons per minute*.

Graafian follicle, grahf'i-an (*Zool.*). A vesicle, containing an ovum surrounded by a layer of epithelial tissue, which occurs in the ovary of higher *Vertebrata*.

grab, grab-bucket (*Civ. Eng.*). A steel bucket or cage made of two halves hinged together, so that they dig out and enclose part of the material on which they rest; used in mechanical excavators and dredgers. See **grabbing crane, grab-dredger.**

grab-dredger (*Civ. Eng.*). A dredging appliance consisting of a grab or grab-bucket suspended from the jib-head of a crane, which does the necessary raising and lowering. Also called a GRAPPLE DREDGER.

grabbing crane (*Civ. Eng.*). An excavator consisting of a crane carrying a large grab or bucket in the form of a pair of half-scoops, so hinged as to scoop or dig into the earth as they are lifted.

grab'en (*Geol.*). A geological structure resulting from the subsidence of a strip of country lying between two normal faults, hading towards one another. Cf. *horst faults*.

Gra'ber's organ (*Zool.*). A curious structure of unknown function, but believed to be sensory, found in Tabanid larvae.

gracilis, gras'il-is (*Zool.*). A thigh muscle of land Vertebrates.

gradate sorus (*Bot.*). A fern sorus in which the sporangia develop from the apex of the receptacle downwards.

grade (*Civ. Eng.*). The degree of slope, e.g. of a highway or railway. Better, GRADIENT.

grade of service (*Auto. Teleph.*). The proportion of calls in the busy hour which must fail to be completed through insufficiency of apparatus. See **overall grade of service.**

grade pegs (*Surv.*). Pegs driven into the ground as references, to establish gradients in constructional work. Better, GRADIENT PEGS.

graded brush (*Elec. Eng.*). A brush for collecting current from the commutator of an electrical machine; made up of layers of different materials, or of material which has different values of lateral and longitudinal resistance.

gradient (*Bot.*). The condition when the intensity of a stimulus acting on a plant gradually increases or decreases towards the position where the plant is.

gradient (*Phys.*). The rate of change of a quantity with distance, e.g. the temperature *gradient* in a metal bar is the rate of change of temperature along the bar.

gradient (*Surv.*). The ratio of the difference in elevation between two given points and the horizontal distance between them, or the distance for unit rise or fall. Also called INCLINE.

gradient post (*Rail.*). A short upright post fixed at the side of a railway at a point of change of gradient. It has arms set at slopes representing the gradients; the latter are indicated on the arms by figures giving the rise or fall in feet per 100 feet.

gradient pegs (or **posts**). *Grade pegs* (q.v.).

gradient wind (*Meteor.*). In a depression or an anticyclone, a flow of air, parallel to the isobars, which balances the pressure gradient by the centrifugal force exerted on account of the curved path of the air.

gra'dienter (*Surv.*) A micrometer head fitment to the vertical circle tangent screw of a theodolite by which the line of sight may be rotated through a known small angle, enabling the instrument to be used for tacheometric purposes.

gradine, grad-ēn' (*Arch.*). A tier of seats rising above one another in an amphitheatre.

grading (*Auto. Teleph.*). The scheme of connecting trunks or outlets so that a group of selectors is given access to individual trunks, while larger groups of selectors share trunks when all the individual trunks are found to be in use.

See **symmetrical— unsymmetrical— grade of service.**

grading (*Build.*). (1) The proportions of the different sizes of stone used in mixing concrete.—(2) The selection of these proportions.

grading (*Civ. Eng.*). The operation of preparing a surface to follow a given gradient.

grading (*Textiles*). The classification of textile fibres according to their condition, fineness, strength, and staple.

grading coefficient (*Elec. Eng.*). A figure denoting the ratio of the lower to the upper limit of current for motor starters.

grading group (*Auto. Teleph.*). The group of selectors which are concerned in one grading scheme.

grading instrument (*Surv.*). A general name for any instrument of the *gradiometer* (q.v.) class.

grading shield (*Elec. Eng.*). A circular conductor placed concentric with a string of suspension insulators on an overhead transmission line in order to equalise the potential across the individual insulator units. Also called an ARCING SHIELD.

grading, size- (*Chem.*). See **size-grading.**

gra'diograph (*Build.*). An instrument incorporating a level tube and straightedge; used to measure gradients in laying drain-pipes.

gradiom'eter (*Surv.*). An instrument for setting out long uniform gradients; it consists of a level that may be elevated or depressed, by known amounts, by means of a vertical tangent screw.

gradom'eter (*Surv.*). A name formerly applied to the type of instrument now known as a *gradiometer* (q.v.).

graduated circle (*Surv.*). A circular plate, marked off in degrees and parts of degrees, used on surveying instruments as a basis for the measurement of horizontal or vertical angles. See **horizontal circle, vertical circle.**

graduated courses (*Build.*). Courses of slates laid so that the gauge diminishes from eaves to ridge.

graduated vessels (*Chem.*). Vessels which are used for measuring liquids and are adapted to measure or deliver definite volumes of liquid.

graffito (*Dec., Pot., etc.*). See **sgraffito.**

graft (*Bot.*). A plant consisting of a rooted part (the *stock*) into which another part (the *scion*) has been inserted so as to make organic union.

graft (*Surg.*). A piece of skin, bone, or other tissue, taken from one part of the body and grafted to another.

graft hybrid, graft chimaera (*Bot.*). A plant composed of two sorts of tissue, differing in genetic constitution, and assumed to have arisen as a result of association following grafting.

grafting (*Bot.*). The insertion of a part of one plant into a part of another so that organic union followed by growth ensues.

grafting (*Carp.*). The operation of lengthening a timber by jointing another piece on to it.

Graham escapement (*Horol.*). The dead-beat clock escapement.

Graham's law (*Chem.*). The velocity of diffusion of a gas is inversely proportional to the square root of its density.

grain (*Bot.*). (1) See **caryopsis.**—(2) The pattern on the surface of worked wood due to variations in the size, in the shape and arrangement, and in the composition, of the cells forming the wood.

grain (*Geol.*). See **rift and grain.**

grain (*Photog.*). The element in the sensitive emulsion used for photographic purposes, its size depending on the temperature of deposition. On exposure, each grain becomes completely developable on the absorption of at least one photon of light. Hence the size of the grain and the concentration of silver salt in it largely determines the speed. The size of grain limits the possible magnification of the projected image.

grain (*Met.*). In pure metals *grain* is synonymous with *crystal*, and the same applies to alloys consisting of one constituent. When two constituents are present the grain is difficult to define, except when a *network structure* (q.v.) is formed.

grain (*Timber*). The arrangement of the fibres in a piece of timber.

grain growth (*Met.*). Associated with recrystallisation, this refers to an increase in the average grain size resulting from some crystals absorbing adjacent ones.

grain leather (*Leather*). The grain split of the hide of an ox or cow, grained and oiled; used for uppers of sports shoes of heavy type. See **grain split, graining.**

grain size (*Geol.*, *Met.*). The average size of the grains or crystals in a sample of metal or rock.

grain-size classification (*Geol.*). A scheme of rock classification based upon the average size of certain chosen components: thus each *clan* (q.v.) comprises *coarse-grained*, *medium-grained*, and *fine-grained* members.

grain-size control (*Met.*). Specifically, control of the rate at which the austenite grains grow when steel is heated above the critical range, by the addition of aluminium before casting.

grain split (*Leather*). The upper or hair-side section of a split hide or skin. See **flesh split.**

grains, brewers' (*Brew.*). Insoluble residue remaining in the mash tun after the wort has been run off; used for cattle food and as a manure.

grainer (*Paint.*). The brush used for graining.

graining (*Leather*). The process of bringing up the natural grain of a tanned skin by rolling it while damp.

graining (*Paint.*). The operation of brushing, combing, or otherwise marking a painted surface while the paint is still wet, in order to produce an imitation of the grain of wood.

graining boards (*Bind.*). Boards or metal plates with parallel lines in relief, running diagonally. Used to produce a diced effect on covers.

graining comb (*Paint.*). A steel or leather comb used in the operation of graining.

graith (*Mining*). A set of tools, picks, shovels, wedges, hammers, etc. used for work underground.

gram or **gramme.** The unit of *mass* (q.v.) in the metric system. It was originally intended to be the mass of 1 c.c. of water at 4° C. but it is now defined as one-thousandth of the mass of the International Prototype Kilogramme, a cylinder of platinum-iridium kept at Sèvres.

gram-atom (*Chem.*). The quantity of an element whose mass in grams is equal to its atomic weight.

gram-calorie (*Heat*). See **calorie.**

gram-equivalent (*Chem.*). The quantity of a substance or radical whose mass in grams is equal to its equivalent weight.

gram-molecular volume (*Chem.*). The volume of one gram-molecule of a gas at N.T.P.; for an ideal gas it is equal to 22·412 litres. Also called MOLAR VOLUME.

gram-molecule (*Chem.*). The quantity of a substance whose mass in grams is equal to its molecular weight.

Gram positive (*Bot.*). A term applied to bacteria which stain when treated with methyl violet, followed by iodine, and then by acetone or ethyl alcohol.

gramina'ceous, gramin'eous (*Bot.*). Relating to grasses.

gram'inico'lous (*Bot.*). Living on grasses; said especially of parasitic fungi.

graminiv'orous (*Zool.*). Grain-eating.

gram'matite (*Min.*). An obsolete name (which should not be used) for the mineral *tremolite*.

Gramme ring armature (*Elec. Eng.*). See **ring armature.**

Gramme winding (*Elec. Eng.*). See **ring winding.**

gramophone (*Acous.*). See **acoustic— radio—**

gramophone audiometer (*Acous.*). A quick method of testing the hearing of a large number of subjects, who are required to write down numbers perceived at diminishing intensities through head-telephones, the sounds being obtained from a gramophone record.

gramophone pick-up (*Radio*). The form of reproducer carried on the tone arm of a gramophone and connected to the low-frequency amplifying part of a radio receiver, enabling the record to be reproduced electrically through the loud-speaker.

gramophone record (*Acous.*). See **record.**

Grampound Grits (*Geol.*). Coarse arenaceous sedimentary rocks, occurring at Grampound and Probus and correlated with the Lower Devonian Meadfoot Beds in Devonshire.

Gramscatho Group (*Geol.*). See **Portscatho Beds.**

grand mal, grahn^{g} mal (*Med.*). General convulsive epileptic seizure, with loss of consciousness. See also **epilepsy, petit mal.**

grand period of growth (*Bot.*). The period in the life of a plant, or of any of its parts, during which growth begins slowly, gradually rises to a maximum, gradually falls off, and comes to an end; it is assumed that external conditions remain constant.

grand swell (*Acous.*). A swell-like balanced pedal for bringing in, as it is depressed, all the stops in an organ in a graded series.

Grand Canyon Series (*Geol.*). The Pre-Cambrian rocks exposed in the lowest parts of the Grand Canyon of Colorado. See also **Belt Series.**

grandfather-clock (*Horol.*). A long-case clock, about 6 ft. high, weight-driven, with seconds pendulum.

granddaughter-clock (*Horol.*). A long-case clock about 3½ ft. high, with movement usually provided with lever escapement; a grandfather-clock in miniature.

grandmother-clock (*Horol.*). 'Grannie.' A long-case clock, about 5 ft. high, suitable for the modern smaller type of house.

grandifo'liate (*Bot.*). Said of plants in which the leaves are much more conspicuous than the usually shortened stems.

grandrelle or **grandrille** (*Textiles*). Folded yarns composed of two or more cotton threads of different colours twisted together; used for shirting.

Grandry's corpuscles (*Zool.*). In Vertebrates, sensory nerve-endings in which the nerve loses its medullary sheath on reaching the capsule, and expands to plates which are inserted between tactile cells enclosed in a connective tissue sheath.

granell'ae (*Zool.*). In some *Sarcodina*, small oval strongly refracting particles mainly composed of barium sulphate.

granella'rium (*Zool.*). In some *Sarcodina*, the system of tubules containing granellae.

granite (*Geol.*). A coarse-grained igneous rock containing megascopic quartz, averaging 25%, much feldspar (orthoclase, microcline, sodic plagioclase), and mica or other coloured minerals. In the wide sense granite includes alkali-granites, adamellites, and granodiorites, while the *granite clan* includes the medium- and fine-grained equivalents of these rock types. Because of its extreme hardness granite is used largely for heavy engineering and building works and for road metalling.

granite-aplite (*Geol.*). See **aplite.**

granite-porphyry (*Geol.*). Porphyritic microgranite, a rock of granitic composition but with a groundmass of medium grain-size in which larger crystals (phenocrysts) are embedded. Occurs usually as minor intrusions.

granit'ic finish (*Build.*). A surface finish, resembling granite, given to cement work by the use of a suitable face mix.

granitic texture (*Geol.*). See **granitoid texture.**

gran'itoid texture (*Geol.*). A rock fabric in which the minerals do not possess crystal outlines but occur in shapeless interlocking grains. Such rocks are in the coarse grain-size group. Also called XENOMORPHIC GRANULAR.

granoblas'tic texture (*Geol.*). An arrangement of mineral grains in a rock of metamorphic origin similar to that of a normal granite but produced by recrystallisation in the solid and not by crystallisation from a molten condition.

granodi'orite (*Geol.*). An igneous rock of coarse grain-size, containing abundant quartz and a large excess (more than ⅔ of the total feldspar) of plagioclase over orthoclase, in addition to coloured minerals such as hornblende and biotite. Cf. *diorite.*

granolith'ic (*Build.*). A rendering of cement and fine granite chippings, used as a covering for concrete floors, on which it is floated in a layer 1 in. to 2 in. thick.

gran'ophyre (*Geol.*). An igneous rock of medium grain-size, in which quartz and feldspar are intergrown as in graphic granite.

Granton Sandstone (*Geol.*). An important sandstone (used as a building-stone) reaching a maximum thickness of 800 ft., and occurring in the Lower Carboniferous Series (Calciferous Sandstone Group) in the eastern parts of the Midland Valley of Scotland.

granular, granulate, granulose (*Bot.*). (1) Having the surface covered by tiny projecting points or very small warts.—(2) Composed of, or filled with, minute granules.

granular (or **globular**) **pearlite** (*Met.*). Pearlite in which the cementite occurs as globules instead of as lamellae. Produced by very slow cooling through the critical range, or by subsequent heating just below the critical range.

granularity (*Cinema.*). The extent of visibility of emulsion grains in a projected image.

granulated sugar (*Chem.*). A term for loose sugar crystals of grain-like appearance.

granulation tissue (*Med.*). A new formation of vascular connective tissue which grows to fill up the gap of a wound or ulcer; when healing is completed a white scar is left.

granules (*Astron.*). See **willow leaves.**

granules, carbon (*Teleph.*). See **carbon granules.**

gran'ulite (*Geol.*). A granular-textured metamorphic rock, a product of regional metamorphism, similar in composition to one or other of the several kinds of schists or gneisses but lacking the distinctive mineral banding of these rock types.

granulit'ic texture (*Geol.*). The texture of a granulite, sometimes referred to as *granulose* or *granoblastic*, is an arrangement of shapeless interlocking mineral grains resembling the granitic texture but developed in metamorphic rocks.

gran'ulitisa'tion (*Geol.*). The process in regional metamorphism of reducing the components of a solid rock to grains. If the reduction of the size of the particles goes farther, rock flour or mylonite is produced.

gran'ulocy'tope'nia (*Med.*). An abnormal diminution in the number of granulocytes in the blood.

granulo'ma (*Med.*). A localised collection of granulation tissue occurring in certain chronic infections, such as tuberculosis and syphilis.

granuloma annular'e (*Med.*). A condition in which rings of white cellular nodules appear on the back of the hands, and occasionally elsewhere.

granuloma inguina'le (*Med.*). Ulcerating granuloma; granuloma venereum. A chronic disease, occurring in the tropics, in which ulcerating nodules appear on the genital organs, the perineum, and the groins.

granulo'matous (*Med.*). Of the nature of, or resembling, granuloma.

granum (*Bot.*). A minute globule of pigment in the colourless stroma of a chromoplast.

grape-sugar (*Chem.*). *d-Glucose* (q.v.).

grapes (*Vet.*). Tuberculous granulomata on the pleura or peritoneum of cattle. In horses, the term is a synonym for *seborrhoea.*

grapher (*Elec. Eng.*). See **graphic instrument.**

graphic formula (*Chem.*). A formula in which every atom is represented by the appropriate symbol, valency bonds being indicated by dashes; e.g. H—O—H, the graphic formula for water.

graphic granite (*Geol.*). Granite of pegmatitic facies, in which quartz and alkali-feldspar are intergrown in such a manner that the quartz simulates runic characters. Also called RUNITE.

graphic instrument (*Elec. Eng.*). An electrical instrument in which the pointer consists of a pen moving over a paper chart so that a graphic record of the quantity measured is obtained. Also called RECORDING INSTRUMENT, RECORDER, GRAPHER, CHART-RECORDING INSTRUMENT.

graphic tellurium (*Min.*). An obsolete name applied in 1814 to the mineral *sylvanite* (q.v.). The crystals are frequently twinned in such a fashion as to resemble runic characters. See **graphic texture.**

graphic texture (*Geol.*). A rock texture in which one mineral intimately intergrown with another occurs in a form simulating ancient writing, especially runic characters; produced by simultaneous crystallisation of two minerals present in eutectic proportions. See **runite.**

graphical methods. The name given to those methods in which items, such as forces in structures, are determined by drawing diagrams to scale.

graphical reconstruction (*Zool.*). A method of preparing diagrammatic reconstructions or stereograms of the anatomy of an organ or animal in any desired plane from a given series of serial sections.

graphite (*Min.*). One of the two naturally occurring forms of crystalline carbon, the other being diamond. Sp. gr. 2·25; graphite contains also up to 5% of silica. It occurs as black, soft masses and, rarely, as crystals (of flaky structure and apparently hexagonal) in igneous rocks; in larger quantities in schists, particularly in metamorphosed carbonaceous clays and shales; also in contact metamorphosed coals and in meteorites. A well-known British locality is Borrowdale in Cumberland, where the amount available was sufficient for exploitation in the manufacture of black lead. Also called BLACK LEAD, PLUMBAGO (qq.v.). See **colloidal graphite***.

graphite (*Acous.*). The variety of fine carbon which is brushed on cut waxes in order that the surface may become conducting and may be electroplated.

graphite brush (*Elec. Eng.*). A brush, made of graphite, for collecting the current from the commutator of an electric machine. It has a higher conductivity and better lubricating properties than an ordinary carbon brush.

graphite paint (*Paint.*). Made of graphite, preferably silica-graphite, ground in oil; used for painting steel and iron structures as protection against corrosion from the atmosphere.

graphite resistance (*Elec. Eng.*). A resistance unit consisting of a rod of graphite, which has a high ohmic value; also a variable resistance made up of piles of graphitised discs of cloth under a variable pressure.

graphit'ic acid (*Chem.*). Graphite which has been treated with nitric acid and potassium chlorate for a prolonged period.

graphitic carbon (*Met.*). In cast-iron, carbon occurring as graphite instead of as cementite.

graphitic lubricants (*Lubricants*). Graphite used in various forms as a lubricant, especially where film lubrication is not feasible; used in natural flake form, or suspended in oil, grease, distilled water, or other medium in colloidal form

graphitised filament (*Illum.*). See **metallised filament.**

grappel (*Mining*). An extracting tool used in boring operations.

grapple dredger (*Civ. Eng.*). See **grab-dredger.**

grappler (*Build.*). A wedge-shaped spike with an eye at one end; it is driven into a joint of the brickwork as a support for the hooked end of one of the brackets in a bracket scaffold.

grap'tolite (*Geol.*). An animal of lowly organisation, extinct since the Silurian Period, belonging to a class *Graptolithina*, of the phylum *Coelenterata*. Graptolites are of the greatest value to stratigraphers for dating the Ordovician and Silurian Systems.

grass (*Mining*). At surface; at grass roots.

grass-bleached (*Paper*). A term applied to tissues of a specially white colour. The expression suggests the whiteness obtained in air-bleached linen.

grass disease (*Vet.*). A disease of milch cows, of unknown cause; characterised by tetany and deficiency of magnesium salts in the blood serum.

grassland climax (*Bot.*). A climax community consisting of grassland.

grass table (*Build.*). A *ground table* (q.v.).

grassing (*Linen*). A method of effecting mild bleaching by spreading linen material on grass and leaving it exposed to the atmosphere.

Grassot fluxmeter, gras'ō (*Elec. Eng.*). See **fluxmeter.**

grate (*Build.*). The cast-iron fire bars and frame of a fireplace.

grate (*Eng.*). That part of a furnace which supports the fuel. It consists of fire bars or bricks so spaced as to admit the necessary air. See **fire bars.**

grate area (*Eng.*). The area of the grate in a furnace burning solid fuel; for a boiler furnace, a measure of the evaporative capacity of the boiler.

grathe (*Mining*). To repair, or put in order, the plant in a coal-mine.

grat'icule (*Surv.*). See **reticule.**

grating (*Build.*). A perforated cover across a drain, gulley, air duct, etc.

grating (*Light*).
See **concave—** **diffraction—**

Gratz rectifier (*Elec. Eng.*). A circuit for connecting rectifying units (valves or metal rectifiers); the units are connected in the four arms of a bridge, in order to give full-waver ectification.

grave accent, grahv (*Typog.*). An indication of pronunciation (\`) used mostly in French and Italian. It should never be used over the last letter of a French word, where it is often put in mistake for the acute accent (´). In English poetry it marks a syllable ordinarily not pronounced: 'loathèd Melancholy.'

gravel (*Build.*). A natural mixture of sand, flints, and loam.

gravel (*Geol.*). The name of the aggregate consisting dominantly of pebbles, though usually a considerable amount of sand is intercalated. In the Stratigraphical Column gravels of different ages and origins occur abundantly, for example in South-Eastern England, where they consist chiefly of well-rounded flint pebbles originally derived from the Chalk. These gravels are mainly of fluviatile and fluvioglacial origin, but marine gravels are also common in the littoral zone. The indurated equivalent of gravel is conglomerate.

gravel (*Vet.*). Small calculi in the ureters or urinary bladder of animals.

gravel board or **gravel plank** (*Build.*). A long board standing on its edge at the bottom of a wooden fence, so that the upright boards of the fence do not have to reach down to the ground.

grav'eolent (*Bot.*). Having a strong rank odour.

graver (*Engraving*). See **burin.**

Graves's disease (*Med.*). See **Basedow's disease.**

grav'id (*Med., Zool.*). Pregnant: carrying eggs or young.

grav'ida (*Med.*). A pregnant woman.

gravid'ity (*Med.*). The state of being pregnant.

grav'imet'ric analysis (*Chem.*). The chemical analysis of materials by the separation of the constituents and their estimation by weight.

graving dock (*Civ. Eng.*). See **dry dock.**

grav'ipercep'tion (*Bot.*). The perception of gravity by plants.

gravitation (*Phys.*). The name given to that force of nature which manifests itself as a mutual attraction between masses, and whose mathematical expression was first given by Newton, in the law which states: 'Any two particles of matter attract one another with a force directly proportional to the product of their masses and inversely proportional to the square of the distance between them.' This may be expressed by the equation:

$$F = G\frac{m_1 m_2}{d^2},$$

where F is the force of gravitational attraction between bodies of mass m_1 and m_2, separated by a distance d. G is the constant of gravitation and has the value $6{\cdot}6576 \times 10^{-8}$ c.g.s. units.

gravitational astronomy (*Astron.*). The branch of astronomy which deals with the motions of the heavenly bodies under the forces of gravitation. It originated with Newton, and includes the theory of the motions of planets, satellites, comets, etc. within the solar system, and also the orbital motions of binary stars. Also called CELESTIAL MECHANICS.

gravitational differentiation (*Geol.*). The production of igneous rocks of contrasted types by the early separation of crystals such as olivine, pyroxenes, etc., which, sinking on account of their high specific gravity, become concentrated in the basal parts of intrusions. The ultramafic rocks such as peridotites and picrites originate in this way.

gravitational induction (*Bot.*). The development of a structure from the under side of a plant member.

gravity cell (*Elec. Eng.*). A two-fluid cell in which the electrodes are horizontal and the two electrolytes lie in separate layers on account of their difference in specific gravity.

gravity, centre of (*Mech.*). See **centre of gravity.**

gravity-controlled instruments (*Elec. Eng.*). Electrical measuring instruments in which the controlling torque is provided solely by the action of gravity.

gravity conveyor (*Eng.*). A conveyor in which the weight of the articles handled is sufficient to effect their transport from a higher to a lower point; as when they are allowed to slide down an inclined runway.

gravity dam (*Civ. Eng.*). A dam which is prevented by its own weight from overturning.

gravity diecasting (*Met.*). A process by means of which castings of various alloys are made in steel or cast-iron moulds, the molten metal being poured by hand. See **diecasting, pressure diecasting.**

gravity escapement (*Horol.*). An escapement in which a constant impulse is given to the pendulum by a weight which is lifted and which always falls through a constant distance. The best-known gravity escapement is the *double three-legged*, in which pivoted arms are lifted a constant height to give on falling a constant impulse to the pendulum. This escapement is used in the clock of Big Ben.

gravity fuel system (*I.C. Engs.*). The system by which petrol is supplied to a carburettor by placing the fuel tank above the level of the carburettor float chamber.

gravity plane (*Mining*). An inclined plane on which the descending full trucks pull up the ascending empty ones.

gravity switch (*Teleph.*). See **switch hook.**

gravity tanks (*Aero.*). See under **fuel tanks.**

gravity water system. A system in which flow occurs under the natural pressure due to gravity.

Grawitz's tumour, grah′vits (*Med.*). See **hypernephroma.**

gray. See **grey** and succeeding articles.

grease (*Lubricants*). A semi-solid form of lubricant, composed of emulsified mineral lubricating oil and soda or lime soap. Greases are known as cup grease, railway wagon axle grease, rolling mill grease, block grease, etc.; largely used in industrial plants, especially where leakage of lubricants must be prevented, and for lubrication under water.

grease (*Vet.*). Eczema on the posterior aspect of the fetlock of horses.

grease cup (*Eng.*). A lubricating device consisting of a cylindrical cup threaded internally and filled with grease. It is screwed down on to a drilled pad which has a nipple screwed into the bearing housing, thus feeding grease into the bearing.

grease gun. A device for forcing grease into bearings under high pressure. It consists of a cylinder from which the grease is delivered by hand pressure on the piston, intensified by a second plunger which forms the delivery pipe and which is pressed against a nipple screwed into the bearing.

greaseproof paper (*Paper*). (1) A vegetable parchment prepared by chemical treatment.—(2) An imitation vegetable parchment, transparency and grease-resisting properties being imparted by prolonged beating of the pulp.

grease-spot photometer (*Light*). A simple means of comparing the intensities of two light sources. A screen of white paper, rendered partially translucent by a spot of grease, is illuminated normally by the two sources, one on each side. The position of the screen is adjusted until the grease-spot is indistinguishable from its surround, when the illuminations on the two sides may be assumed to be equal. Also called BUNSEN PHOTOMETER. See **photometer.**

grease trap (*San. Eng.*). A trapped gulley receiving sink wastes, and specially designed to prevent obstruction of gulley or drain by congealed fatty matter.

greasy heels (*Vet.*). See **grease.**

great (*Acous.*). The principal division of a straight (church or concert) organ. It comprises ranks of pipes, not enclosed in chambers with swell shutters, which are most powerful and brilliant and which are normally played from the *great manual*, usually placed below the *swell manual* and above the *choir* or *accompaniment* manual, if such are present. The name *great* is retained in unit and cinema organs, in which, however, since here all ranks can be drawn on any manual, the word has no real meaning.

great circle (*Maths.*). The intersection of a sphere by a plane passing through its centre. The shortest distance between two points on the surface of a sphere is along the great circle passing through them.

Great Ice Age (*Geol.*). See **Pleistocene Period.**

Great Oölite Series (*Geol.*). Equivalent to the Bathonian Stage, so named to distinguish it from the Inferior Oölite beneath. Consists chiefly of oölitic limestones, well exposed on the long dip slope of the Mid-Cotteswolds. The Great Oölite proper lies between the Stonesfield Slate and the Bradford Clay.

great primer (*Typog.*). The old name for a type size now standardised as 18-point.

Great Scar Limestone (*Geol.*). Massive bedded Carboniferous Limestone occurring in the western part of the Pennine Hills, being well exposed on Ingleborough.

great wheel (*Horol.*). The first wheel in the train of a watch or clock; in going barrels it forms part of the barrel. The largest wheel in a watch or clock train.

Greaves-Etchell furnace (*Elec. Eng.*). A form of direct-arc electric furnace used in steel manufacture.

Grecian honeycomb (*Textiles*). A type of honeycomb structure woven from coarse soft cotton yarns; the material is used for towels and quilts.

green (*Civ. Eng.*). A colloquial term for concrete in the hardening stage, after pouring and before setting.

green algae (*Bot.*). See **Chlorophyceae.**

green bricks (*Build.*). Moulded clay shapes which after undergoing a burning process will become bricks.

green carbonate of copper (*Min.*). See **malachite.**

green cell (*Bot.*). A cell of the alga *Chlorella* living inside certain simple animals.

green flash (*Astron.*). A phenomenon sometimes seen in clear atmospheres at the instant when the upper rim of the sun finally disappears below the horizon as a bright green blob of light; green is the last apparent colour from the sun, because the more greatly refracted blue is dispersed.

green glands (*Zool.*). The antennal excretory glands of decapod *Crustacea.*

greenheart (*Timber*). A very strong yellowish-green timber from South America; it is largely used for piles and under-water work on account of its considerable resistance to the attack of the teredo.

green lead ore (*Min.*). An obsolete name for *pyromorphite*.

green sand (*Foundry*). Moulding sand rich in organic matter; the mould is poured in a moist state. Most suitable for small and medium-size work.

green sickness (*Med.*). See **chlorosis.**

greenstick fracture (*Med.*). Fracture of rickety bones, which break like a green stick.

greenstone (*Geol.*). An omnibus term lacking precision and applied indiscriminately to basic and intermediate igneous rocks of Lower Palaeozoic age in which much chlorite has been produced at the expense of the original coloured minerals, staining the rocks green.

green vitriol (*Min.*). A popular name for *melanterite* (q v.).

green wood (*Timber*). (1) Newly felled timber —(2) Timber which has not been fully seasoned.

Greenland spar (*Min.*). See **cryolite.**

green'ockite (*Min.*). Crystalline cadmium sulphide, occurring, as small yellow hexagonal crystals exhibiting polar symmetry, in cavities in altered basic lavas at Bishopton, Renfrewshire, Scotland.

Greensand (*Geol.*). See **Lower— Upper—**

Greenwich Civil Time, Greenwich Mean Time (*Astron.*). See **mean solar time, universal time.**

gregale, greg-ah'le (*Meteor.*). A north-easterly winter wind blowing in the central Mediterranean.

Greg'arinid'ea (*Zool.*). An order of *Telosporidia*, in which the adult trophozoite is an extra-cellular parasite, and in which reproduction is usually by sporogony only.

gregarin'iform (*Zool.*). Resembling the *Gregarinidea*; said of certain types of swarm-spores which lack organs of locomotion.

gregarin'ulae (*Zool.*). Zoospores without organs of locomotion.

grega'rious (*Bot.*). Growing in close companies, but not matted together.

Gregorian Calendar. The name commonly given to the civil calendar now used in Western Europe, which is the Julian calendar as reformed by decree of Pope Gregory the Great in 1582. The Gregorian reform omitted certain leap years, and brought the length of the year on which the calendar is based nearer to the true astronomical value. In England the Gregorian calendar was adopted by Act of Parliament which shortened the year 1752 by eleven days (by the omission of September 3-13 inclusive). Under the same Act, the year 1752 began on January 1 (instead of March 25, as formerly); this change had been effected in Scotland in 1600. See **New Style, Old Style.**

Gregorian telescope (*Astron.*). A form of reflecting telescope, very similar in principle to the Cassegrainian, in which the large mirror is pierced at the centre and the light is reflected back into an eye-piece in this centre by a small concave mirror on the principal axis and a little outside the focus.

greisen, gri'zen (*Geol.*). A pneumatolytic derivative of granite, in which feldspar has been suppressed and white mica produced in its place. A constant accessory is topaz, while fluorite is usually present. Common in some of the Cornish granites. See also **greisenisation, pneumatolysis.**

greisenisation (*Geol.*). A pneumatolytic process effected chiefly by fluoric flux rising along regional joints in granite and converting the latter over a limited distance into greisen.

grena (*Mining*). Uncleaned coal or ore.

grenade (*Ammunition*). A small H.E. smoke or signal bomb which is thrown by hand or projected by a rifle. See **rifle grenade.**

gren'adine (*Textiles*). An open-texture light-weight dress fabric with a stripe or check effect produced by the weave. Made from worsted or cotton yarn combined with silk or rayon.

Grenville Series (*Geol.*). Enormous sheets of limestone, marble, and dolomite with interbedded quartzites, sometimes graphitic, and hornblende-schists; over 90,000 ft. in thickness; occurring in Ontario, Quebec, and the Adirondacks, and considered to be the equivalents of the Huronian Series.

grey. In Britain the more commonly used of the variants *gray, grey*. In America the former is preferred.

grey (*Photog.*). Said of colours which possess only brilliance, i.e. they have no hue and are completely desaturated.

grey (*Textiles*). The term applied to yarn or cloth in the natural colour.

greys (*Mining*). A grey-coloured compact sandstone.

grey copper ore (*Min.*). See **tetrahedrite.**

grey iron (*Met*). Pig- or cast-iron in which nearly all the carbon not included in pearlite is present as graphitic carbon. See **mottled iron, white iron.**

grey key image (*Photog.*). A neutral image obtained in addition to the three images corresponding to the primary colours in colour photography; used to regulate the saturation or assist registration.

grey matter (*Zool*). An area of the central nervous system, mainly composed of cell bodies

grey metal (*Mining*). Greyish-coloured shale.

grey scale (*Photog*) A number of steps of grey, taken as an object, to be followed through a colour photographic process in order to ascertain whether the theoretical criteria are being achieved.

grey sour (*Textiles*). The name applied to one of the processes in preparing cotton goods for bleaching and dyeing. The material is treated with dilute acid to remove all traces of alkali.

grey surface (*Acous.*). A defect in gramophone-record pressing, resulting from insufficient temperature or pressure or from wearing of the sides of the grooves by the needle.

greywacke (*Geol*). An anglicised form of the German *Grauwacke*, a term applied to indurated sedimentary rocks, chiefly Palaeozoic, consisting of unsorted detritus of the grain-size of sandstone but containing fragments of feldspars and ferromagnesian minerals.

greywethers (*Geol.*). Grey-coloured rounded blocks of sandstone or quartzite left as residual boulders on the surface of the ground when less resistant material was denuded away. From a distance they resemble sheep grazing. See **sarsen.**

grid (*Build.*). A *grating* (q.v.).

grid (*Civ. Eng.*). A timber framework so built that a vessel may be floated in at high water and repairs undertaken as the tide falls.

grid (*Elec. Eng.*). A colloquial term used to denote the national network of 132 kV and 33 kV transmission lines interlinking the various generating stations and distribution companies in Great Britain. See **accumulator grid, resistance grid, damper.**

grid (*Eng.*). A grating made up of a number of parallel bars, such as that required to prevent foreign matter from entering a pump intake.

grid (*Surv.*). A network of lines superimposed upon a map and forming squares for referencing, the basis of the network being that each line in it is at a known distance either east or north of a selected origin.

grid (*Struct.*). The plan lay-out of a given steel-frame building.

grid (*Thermionics*). An electrode in a discharge tube whose primary function is to control the flow of current between two other electrodes. In a triode, it is the electrode between the cathode and the anode. It is usually in the form of a mesh or grid of wires.

grid base (*Thermionics*). The range of grid potential extending from the point at which the anode current is cut off to that at which grid current commences to flow.

grid bearing (*Surv.*). The horizontal angle between any given survey line shown on a map and the right- or left-hand border of the map. As the latter does not always represent the true meridian, the grid bearing of a line is not always the same as the true bearing.

grid bias (*Thermionics*). The mean potential of the grid over an a c. cycle.

grid bias modulation (*Radio*). A system of modulation in which the modulating signal is caused to control the grid bias of a valve to the grid of which a high-frequency carrier voltage is applied. Cf. *grid current modulation.*

grid bias resistance (*Radio*). A resistance included between the cathode and the negative terminal of the high-tension supply voltage, to which point the grid circuit is returned. The potential drop produced by the flow of anode current through this resistance furnishes the negative grid bias.

grid circuit (*Radio*). The circuit connected between the grid and the cathode of a thermionic valve.

grid condenser (*Radio*). A condenser connected between the grid and the remainder of the grid circuit.

grid conductance (*Thermionics*) The in-phase component of the grid input admittance, due to grid current, Miller effect, etc.

grid control (*Thermionics*). The control of anode current by means of the potential of the grid, especially in gas discharge tubes.

grid current (*Thermionics*). The current which flows from the grid to the cathode when the grid is made positive, or only slightly negative, with respect to the cathode.

grid current characteristic (*Thermionics*). The curve relating the grid current to the grid potential of a thermionic tube.

grid current modulation (*Radio*). A system of modulation in which the modulating signal is caused to control the flow of grid current in a valve to the grid of which is applied a high-frequency carrier voltage. Cf. *grid bias modulation.*

grid emission (*Thermionics*). The emission of electrons from the grid due to heating by the cathode or to electronic bombardment.

grid glow tube (*Thermionics*). See **gas discharge tube.**

grid-iron pendulum (*Horol.*). A form of compensation pendulum consisting of five parallel rods of iron and four of brass, the total length of each metal being in the inverse ratio of its coefficient of linear expansion.

grid leak (*Radio*). A high resistance connected across the grid condenser, or between the grid and the cathode, to provide a d.c. path from grid to cathode and prevent the accumulation of charge on the grid.

grid modulation (*Radio*). Any system of modulation in which the modulating signal is applied to the grid circuit of the modulated valve.

grid rectification (*Radio*). Rectification of high-frequency currents and voltages by means of the non-linearity of the grid current characteristic, more current flowing during the positive half-cycles than during the negative half-cycles.

grid resistance (*Elec. Eng.*). A resistance unit for heavy current work, e g. starters for railway motors; it is made up of a number of resistance grids placed side by side and mounted in a metal frame.

grid sweep (*Thermionics*). The range of voltage covered by the grid potential in going from its maximum positive (or minimum negative) to its maximum negative (or minimum positive) value. Cf. *grid swing.*

grid swing (*Thermionics*). The maximum excursion of the grid potential about its mean value. Cf. *grid sweep.*

gridaw (*Mining*). The framing at the top of a shaft for the pulley wheels or sheaves for the hoisting rope.

griffe (*Weaving*). A series of horizontal knives in a frame, which serve to raise and lower the warp threads in jacquard machines and in some dobby machines

Griffith's white (*Paint*). A white paint made with oxy-sulphide of zinc, instead of white lead, as a base.

Grignard reagents, grēn-yar′ (*Chem.*). Mixed organo-metallic compounds prepared by dissolving dry magnesium ribbon or filings in an absolutely dry ethereal solution of an alkyl bromide or iodide. Numerous compounds can be synthesised with Grignard reagents; e.g. hydrocarbons, ethers, alcohols, acids, ketones, aldehydes, etc.

grikes (*Geol*). Joint-fractures widened by solution, occurring in limestone terranes, of which they are characteristic, the surface in some cases resembling a much-crevassed glacier.

grill (*Struct.*). A layer of joists in a grillage foundation.

grillage foundation (*Struct.*). A type of foundation often used at the base of a column. It consists of one, two, or more tiers of steel beams superimposed on a layer of concrete, adjacent tiers being placed at right-angles to each other, while all tiers are encased in concrete.

grille (*Build.*) A plain or ornamental openwork of wood or metal, used as a protecting screen or grating.

grimes (*Mining*). A series of fractures in a seam, accompanied by pulverisation of the coal.

grinder (*Paper*). A large thick circular stone made from grit-stone, used in the manufacture of mechanical wood pulp.

grinder (*Radio*). A type of atmospheric disturbance of relatively long duration, best characterised by its name. Cf. *clicks, crashes.*

grinder's rot (*Med.*). Lung disease caused by inhalation of metallic particles by steel-grinders.

grinding (*Textiles*). Sharpening the wire teeth of a carding engine by means of revolving rollers covered with emery.

grinding-in (*Eng.*). The process of obtaining a pressure-tight seal between a conical-faced valve and its seating by grinding the two together with an abrasive mixture such as carborundum and oil.

grinding machine (*Eng.*). A machine tool in which flat, cylindrical, or other surfaces are finished by the abrasive action of a high-speed grinding wheel.

See **centreless grinding** **profile grinding**
cylindrical do. **thread** do.
surface grinding machine.

grinding slip (*Carp., etc.*). A shaped piece of oil-stone on which the curved sides of the cutting edges of tools may be rubbed for sharpening purposes.

grinding teeth (*Zool.*). The molars and premolars of Mammals.

grinding wheel (*Eng.*). An abrasive wheel for cutting and finishing metal. It is composed of an abrasive powder, such as carborundum or emery, held together by a bond or binding agent, which may be either a vitrified material or a softer material, such as shellac or rubber.

grip (*Build.*). A small channel cut to carry away rain water during construction of foundations. *

grip length (*Civ. Eng.*). The minimum length of reinforcing bar which requires to be embedded in concrete to ensure that the bond is sufficient for anchorage purposes.

gripes (*Vet.*). See **colic.**

grippers (*Print.*). Attachments which grip the edge of a sheet of paper when it is fed into the printing machine.

gripper edge (*Print.*). The edge of a sheet of paper caught by the grippers when it is fed into a cylinder machine.

grisaille, grē-zī'y' (*Dec.*). A process of painting in shades of grey, to give the appearance of modelling in relief.

grist (*Brew.*). A mixture of malts sufficient for one brewing.

grist case (*Brew.*). A conical chamber into which the mixture of malts passes, after being ground, preparatory to brewing.

grit (*Geol.*). Siliceous sediment, loose or indurated, the component grains being angular. Contrast *sand* and *sandstone*, in which the grains are rounded.

grit cell (*Bot.*). A stone cell occurring in a leaf or in the flesh of a fruit.

grit chamber (*Sewage*). A *detritus chamber* (q.v.).

grizzle (*Mining*). Coal so intermixed with iron pyrites as to make it of little value.

grizzle bricks (*Build.*). Bricks which are underburnt and of bad shape. They are soft inside and unsuitable for good work, but are often used for the inside of walls. Also called PLACE BRICKS, SAMEL BRICKS.

grizzly (*Mining*). Strong parallel iron bars for sizing broken rock.

grog (*Build.*). Bricks or waste from a clay-works broken down and added to clay to be used for brick manufacture.

grog (*Pot., etc.*). A refractory material consisting of graded broken ceramic, etc., mixed with clays, for making hard bodies.

grogginess (*Vet.*). Arthritis of the navicular joint of horses.

groin (*Build.*). The line of junction of the two constituent arches in a *groined arch* (q.v.).

groin rib (*Build.*). A projecting member following the line of a groin.

groined arch (*Build.*). An arch which is intersected by other arches cutting across it transversely.

Grolier, grō-lyā' (*Bind.*). The term used to designate a book ornamented with designs in gilt characterised by geometrical forms, arabesques, and leaf sprays; introduced by Jean Grolier (1479-1565).

grooved bit (*Carp.*). A wood-boring bit with a cylindrical shank in which is a helical groove.

grooved wire (*Elec. Eng.*). A special form of wire used for the overhead contact wire of electric traction systems, with grooves into which the supporting ears can be clipped. See **figure-eight wire.**

grooving (*Eng.*). Cracking of the plates of steam boilers at points where stresses are set up by the differential expansion of hot and colder parts.

grooving (*Furs*). Striping whole skins with grooves and stripes, two inches apart, to give the effect of reversal.

grooving (*Join.*). The operation of cutting a groove in the surface of work.

grooving plane (*Carp., etc.*). A plane specially adapted to the work of cutting grooves.

grooving saw (*Carp., etc.*). A circular saw which may be of the drunken type, used for cutting grooves.

gros nes, grō-nā (*Med.*). See **goundou.**

gross'ularite (*Min.*). A green garnet, the composition being represented by $3CaO{\cdot}Al_2O_3{\cdot}3SiO_2$; formed in the contact-metamorphism of impure limestone. Also called GOOSEBERRY STONE (q.v.).

ground (*Elec. Eng., Radio*). A term commonly used in America to denote *earth.*

ground (*Lace*). The mesh which forms a foundation for a pattern.

ground (*Mining*). The mineralised deposit and the rocks in which it occurs, e.g. payground, payable reef; barren ground, rock without value.

ground (*Paint.*). The first coat of paint applied as a basis for succeeding coats.

grounds (*Join.*). Strips of wood which are nailed to a wall or partition (fixing plugs being used when necessary) as a basis for the direct attachment of joinery.

ground air (*San. Eng.*). The air contained in the upper layers of the subsoil; it has a variable composition, including carbon dioxide, ammonia, and other gases resulting from oxidation of organic matters, and may be noxious.

ground auger (*Tools*). An auger specially adapted for boring holes in the ground, for artesian wells, etc.

ground engineer (*Aero.*). An individual, selected by the licensing authorities, who has power to certify the safety for flight of an aircraft, or certain specified parts of it, according to regulations laid down at the time.

ground floor (*Build.*). The tier of rooms in a building for which the flooring is on, or nearly on, a level with outside ground-level.

ground joist (*Carp.*). A horizontal timber supported off the ground at a basement or ground-floor level.

ground-laying (*Pot.*). Covering a surface with an even coat of colour, usually by dusting powder over an oiled surface.

ground-level (*Surv.*). The *reduced level* (q.v.) of the ground surface at a given point.

groundmass (*Geol.*). In igneous rocks which have crystallised in two stages the groundmass is the finer-grained portion, in which the phenocrysts are embedded. It may consist wholly of minute crystals, wholly of glass, or partly of both.

ground meristem (*Bot.*). Those parts of an apical meristem which give rise to ground tissue.

ground mould (*Civ. Eng.*). A timber piece or frame used as a templet to bring earthworks such as embankments to the required form.

ground noise (*Acous.*). Extraneous noise accompanying reproduced sound. It arises from the grain in photographic film, abrasive in gramophone records, thermionic valves, irregularities in magnetic tape records, etc.

ground plan (*Build., Civ. Eng.*). A drawing showing a plan view of the foundations for a building or of the layout of rooms, etc., on the ground floor.

ground plane. A term applied to any horizontal plane.

ground plate (*Build.*). The bottom horizontal timber to which the frame of a building is secured.

ground ray (*Radio*). See **direct ray.**

ground return (*Elec. Comm.*). See **earth return circuit.**

ground sill (*Carp.*). A *sleeper* (q.v.).

ground sills (*Hyd. Eng.*). Underwater walls built at intervals across the bed of a channel in order to prevent excessive scour of the bed or to increase the width of flow.

ground speed (*Aero.*). The speed of an aircraft relative to a point on the earth's surface. The actual speed of an aircraft is always relative to the air, which itself is usually moving relative to the ground.

ground table (*Build.*). The course of stones at the foundation of a building.

ground tissue (*Bot*). The general mass of parenchymatous tissue outside and between the vascular strands in a young stem or root.

ground water (*San. Eng.*). Water naturally contained in, and saturating, the subsoil.

ground wave (*Radio*). See **direct ray.**

groundwork (*Civ. Eng.*). The work involved in preparing a site for a foundation or to conform to a required profile.

groundwork (*Paint.*). The *ground* (q.v.).

ground glass (*Photog.*). A sheet of glass which has been uniformly sand-blasted to make it translucent; used in cameras, etc., for receiving real images while they are being focused.

grounded circuit (*Elec. Comm.*). A circuit which is deliberately connected to earth at one point or more, for safety or testing.

grounded work (*Join.*). Joinery attached to grounds.

group (*Chem*). (1) A vertical column of the periodic system, containing elements of similar properties.—(2) Metallic radicals which are precipitated together during the initial separation in qualitative analysis.—(3) A number of atoms which occur together in several compounds.

group automatic operation (*Elec. Eng.*). A method of automatic control sometimes employed with electric lifts; the pressing of a landing push-button calls the next available lift.

group delay (*Radio*). The time taken by an individual signal, such as a dot, to travel from the transmitter to the receiver. It is equal to the separation of the two stations, measured along the path of the waves, divided by the group velocity. Also called ENVELOPE DELAY, GROUP RETARDATION.

group drive (*Elec. Eng*). A method of electric motor drive, employed in factories, in which a motor drives a group of several machines.

group frequency (*Radio*). The frequency of repetition of the individual trains of waves emitted from a spark transmitter or other generator of damped waves.

group reaction (*Chem.*). The reaction by which members of a *group* (2, q.v.) are precipitated.

group retardation (*Radio*). See **group delay.**

group selector (*Auto. Teleph*). A selector which is first operated by a train of impulses, so that the wipers are lifted to a desired level of bank contacts, and then hunts by rotating the wipers over the contacts until a free outlet is found.

group velocity (*Radio*). The velocity of propagation of a pulse or group of waves. In an ionised medium it is lower than the phase velocity.

grouse disease (*Vet.*). A popular term for the specific infection of the intestines of grouse by the nematode worm *Trichostrongylus pergracilis.*

grout (*Civ. Eng.*). See **cement grout.**

groutnick (*Masonry*). A groove cut in a masonry joint to give access to grout.

grouting (*Build., Civ. Eng.*). The process of injecting cement grout into foundations, decayed walls, etc., for strengthening purposes. Also called CEMENTATION.

Grove cell (*Elec. Eng.*). A primary cell similar to a Bunsen cell but with a positive electrode of platinum instead of carbon.

Grove gas cell (*Elec. Eng.*). A primary cell with electrodes of platinum immersed in hydrogen and oxygen respectively and an electrolyte of acidulated water.

growing point (*Bot.*). The apical meristem of a growing axis, where active cell divisions occur and the differentiation of tissues begins.

growing zone (*Bot.*). That portion of an organ in which elongation proceeds.

growl (*Mining*). The noise heard when strata are being subjected to great pressure.

growth (*Biol.*). A change in the body of an organism, and in the cells composing it, accompanied by cell division, by the utilisation of material, and, nearly always, by increase in the size and weight of the organism or of the part under consideration. Once growth has occurred, its results cannot be reversed.

growth (*Met.*). (Applied to cast-iron) the tendency to increase in volume when repeatedly heated and cooled.

growth curvature (*Bot.*). A curvature in an elongated plant organ, brought about by one side growing faster than the other.

growth form (*Bot.*). See **life form.**

growth inhibiting substance (*Bot.*). A substance, formed inside plant cells, which slows or stops growth, often in some other part of the plant.

growth promoting substance (*Bot.*). A substance which promotes or accelerates growth. It may be formed inside the plant, or may be obtained from external sources.

growth ring (*Bot.*). The cylinder of secondary wood added during one season of growth, as seen in cross-section. A growth ring may not be the same as an *annual ring* (q.v.).

growth water (*Bot.*). See **available water.**

groynes (*Hyd. Eng.*). (1) Barrier walls, formed of piling, fascine work, or rubble, built out from river banks at right-angles to the flow, in order to reduce the channel and keep the scour of the water within definite bounds.—(2) Similar structures built on a sea-shore to check the erosive effects of currents and tides. Also called JETTIES.

grozing iron (*Plumb.*). A tool for smoothing joints made in lead piping.

grub axe (*Tools*). A tool for digging up roots; it has a broad chisel-shaped point on one side and a flat adze-like blade on the other.

grub saw (*Tools*). A hand-saw for cutting marble, having a steel blade stiffened along the back with wooden strips.

grubber (*Agric. Mach.*). A heavy type of cultivator in which the teeth are set rigidly in a frame.

Gru'ifor'mes (*Zool.*). An order of *Alectoromorphae* possessing a schizognathous palate. Rails, Coots, Water-hens, Trumpeters, Cranes, Sun-bitterns, and Fin-foots. Mainly marsh-living forms.

grummet (*Plumb.*). Hemp and red-lead putty mixed as a jointing material for water-tightness.

gru'mous (*Bot.*). Having flesh composed of little grains.

Gryphite Grits (*Geol*) A local name for part of the Inferior Oölite of the Cotteswolds in Gloucestershire. Actually, a limestone containing shells and shell-fragments (largely of *Gryphaea*) rendering the rock gritty; but not grit in the true petrological sense.

Gryptcrete (*Build.*). A proprietary fibrous plaster ceiling slab used in panel heating.

Guadaloupian (or **Guadeloupe**) **Group** (*Geol.*). Strata, referred to the Permian, occurring in Texas and New Mexico; they comprise the Delaware Mountain Series below and the Capitan Limestone above.

guag (*Mining*). The space left after the mineral has been extracted. Also called GUNIS.

guai'ac test (*Chem.*). A test for the presence of blood in gastric contents, based upon the oxidation of guaiac resin in ethereal solution to guaiaconic acid. The presence of blood is shown by a blue colour in the ether solution.

guai'acol (*Chem.*). $HO{\cdot}C_6H_4{\cdot}OCH_3$, the monomethyl ether of *catechol* (q.v.), found in beech-wood tar; a very unstable compound, with strong reducing properties.

guan'idine (*Chem.*). $HN{:}C(NH_2)_2$, imido-urea or the amidine of amidocarbonic acid; a crystalline compound, easily soluble in water, strongly basic.

guano (*Agric.*). The excrementitious deposit of certain sea-fowl, found on the coasts and islands of Central America, Africa, etc. It consists chiefly of calcium and tricalcium phosphate mixed with ammonium oxalate and ammonium hippurate.

guan'ophore (*Zool.*). See **xanthophore.**

guard or **guard wire** (*Auto. Teleph.*). The wire accompanying a speaking pair through an automatic telephone exchange; it is earthed while the speaking pair is being used by subscribers, thus indicating that the speaking pair cannot be engaged by any other circuit.

guard (*Build., etc.*). A protection on a scaffold to prevent persons from falling; on a machine, to prevent injury to the operator or others from gears, cutting tools, etc.

guard (*Civ. Eng.*). A *fender pile* (q.v.).

guards (*Bind.*). Narrow strips of paper or linen projecting between sections in a book, for the attachment of plates, maps, etc.

guard bead (*Join.*). A bead protecting the junction of sash and sill in a shop front against the entry of rain.

guard cell (*Bot.*). One of the two specialised epidermal cells which border on the pore of a stoma and together cause it to close or to open.

guard cradle (*Elec. Eng.*). A network of wires serving the same purpose as a *guard wire* (q.v.). Also called GUARD NET.

guard lock (*Hyd. Eng.*). A lock separating tidal waters from the water in a basin.

guard net (*Elec. Eng.*). See **guard cradle.**

guard pile (*Hyd. Eng.*). A *fender pile* (q.v.).

guard pin (*Horol.*). See **safety finger.**

guard plate (*Eng.*). A sheet steel plate fixed in front of moving parts of machinery to prevent injury to the operator.

guard polyp (*Zool.*). See **nematophore.**

guard post (*Civ. Eng.*). A *fender post* (q.v.).

guard rail (*Rail.*). See **check rail.**

guard ring (*Elec. Eng.*). A ring surrounding a charged body to ensure an even distribution of potential over the surface of the body by eliminating the effect of the edges.

guard wire (*Elec. Eng.*). An earth wire used on an overhead transmission line; it is arranged in such a position that, should a conductor break, it will immediately be earthed by contact with the wire. See **Price's guard wire.**

gubernac'ulum (*Zool.*). In Mammals, the cord supporting the testes, in the scrotal sac: in *Hydrozoa*, an ectodermal strand supporting the gonophore in the gonotheca: in *Mastigophora*, a posterior flagellum used in steering.—*adj.* **gubernac'ular.**

gudgeon (*Build.*). A metal pin used for joining adjacent stones.

gudgeon (*Join.*). The wrought-iron pin which is fastened to a gate-post or door frame, and about which the leaf of a strap-hinge turns.

gudgeon pin or **gudgeon wrist pin** (*Eng.*). The pin connecting the piston of an internal-combustion engine with the bearing of the little end of the connecting-rod. Also called PISTON PIN. See also **floating gudgeon pin.**

guest (*Zool.*). An animal living and/or breeding in the nest of another animal, as a myrmecophile in an ants' nest.

gug (*Mining*). A self-acting inclined roadway in a coal-mine.

guide (*Civ. Eng.*). A pile driven to indicate a site.

guide (*Rail.*). A *check rail* (q.v.).

guide bars (*Eng.*). Bars with flat or cylindrical surfaces provided to guide the crosshead of a steam-engine and so avoid lateral thrust on the piston rod. Also called SLIDE BARS.

guide bead (*Join.*). A bead fixed to the inside of a cased frame as a guide for the sliding sash. Also called INNER BEAD.

guide mill (*Met.*). A rolling-mill equipped with guides to ensure that the stock enters the mill at the correct point and angle.

guide piles (*Civ. Eng.*). Stout timber piles used at intervals along both sides of wide excavations where the sides are held firm by sheet piles and strong support is needed for the struts wedging the sides apart.

guide pulley (*Eng.*). A loose pulley used to guide a driving-belt past an obstruction or to divert its direction.

guide rail (*Rail.*). A *check rail* (q.v.).

guided waves (*Radio*). Electromagnetic waves which are guided along conductors or insulating surfaces, as distinct from those in free space.

guiding bed (*Mining*). A thin band of coal or shale which forms a connexion between two parts of a nipped-out seam.

Guignet's green, gē-nyā' (*Dec.*). A very permanent colour made from an oxide of chromium. Also called CHROME GREEN.

guilloche, gi-lōsh' (*Arch.*). An ornament in the form of interlaced bands, used to decorate borders or mouldings.

guillotine (*Join.*). A *trimming machine* (q.v.).

guillotine (*Paper*). A machine having a heavy steel blade, used for trimming books or cutting stacks of paper.

guillotine (*Surg.*). An instrument for cutting off tonsils.

guinea-pig paralysis (*Vet.*). See **paralysis (guinea-pig).**

gula (*Zool.*). In Vertebrates, the upper part of the throat: in Insects, an unpaired ventral cephalic sclerite lying behind the submentum.—*adj.* **gular.**

gulamen'tum (*Zool.*). In some Insects, the ventral sclerite formed by the fusion of the submentum and the gula.

gular (*Zool.*). In some lower Vertebrates, a bone developed between the rami of the lower jaw: in *Chelonia*, an anterior unpaired element of the plastron.

gulching (*Mining*). The noise which generally precedes a fall or settlement of overlying strata in a coal-mine.

Guldberg and Waage's law, goold'berg, vah'ge (*Chem.*). See **law of mass action.**

gullet (*Civ. Eng.*). A narrow trench dug the full depth of a proposed cutting (in the case of large cuttings). A track is laid along the bottom of this trench, and wagons carry away the earth as the trench is widened into the full cutting.

gullet (*Tools*). A depression cut in the face of a saw in front of each tooth, alternately on one side of the blade and then on the other.

gullet (*Zool.*). The oesophagus: in *Protozoa*, the cytopharynx.

gullet saw (*Tools*). A saw with gullets cut in front of each tooth. Also called BRIER-TOOTH SAW.

gullet tooth (*Tools*). A saw tooth with a gullet cut away in front of it.

gulleting (*Civ. Eng.*). The process of excavating road or railway cuttings in a series of steps worked simultaneously.

gulley (*San. Eng.*). A fitting installed at the upper end of a drain, to receive the discharge from rain water or waste pipes.

gulley grating (*San. Eng.*). A perforated cover for a gulley trap.

gulley trap (*San. Eng.*). A device installed at a gulley to imprison foul air within the drain pipe. Also called YARD TRAP.

gu'lose (*Chem.*). A monosaccharose belonging to the group of aldohexoses.

gum (*Mining*). Small coal, slack, or duff.

gums (*Chem.*). Non-volatile, colloidal plant products which either dissolve or swell up in contact with water. On hydrolysis they yield certain complex organic acids in addition to pentoses and hexoses.

gum arabic (*Chem.*). A fine, yellow or white powder, soluble in water; sp. gr. 1·355. It is obtained from certain varieties of acacia, the world's main supply coming from the Sudan and Senegal. Used in pharmacy for making emulsions and pills; also in glues and pastes. Also called ACACIA GUM, SENEGAL GUM.

gum bichromate process (*Photog.*). The use of gum as a vehicle for pigments and bichromate on printing papers, the exposed image being developed by water.

gum printing (*Photog.*). The use of gum and other colloids for adding pigments to bromide prints.

gums (*Zool.*). In higher Vertebrates, the thick tissue masses surrounding the bases of the teeth.

gum-boil (*Med.*). A small abscess on the palate, associated with a carious tooth, or the result of infection following upon local injury.

gumma (*Med.*). A mass of cellular granulation tissue, due to syphilitic infection in the late or tertiary stage.—*adj.* **gum'matous.**

gummed papers (*Paper*). Paper coated with adhesive (dextrine, gum arabic, etc.).

gummer (*Mining*). A man who clears the fine coal, gum, or dirt from the undercut made by a coal-cutting machine.

gumming (*Paint.*). The thickening which some oils undergo on exposure to the air, as a result of absorbing oxygen from it.

gumming-spade (*Mining*). A long-handled shovel used by a gummer.

gum'mosis (*Bot.*). A pathological condition shown by the conversion of cell walls into gum

gun. The generic term applied to all artillery weapons when assembled on their mountings or in their carriages.

gun (*Cathode Ray Tubes*). The assemblage of electrodes, comprising the cathode, anode, focusing and modulating electrodes, from which the electron beam is emitted before being subjected to deflecting fields.

gun (*Civ. Eng., Paint., etc.*). A *spray-gun* (q.v.).

gun (*Mining*). A bent bar of iron for connecting a horse's shaft to a tub or train.

gun carriage. The support provided for an artillery weapon, both for travelling and for firing See **mounting.**

guncotton (*Chem.*). A *nitrocellulose* (q.v.) with a high nitrogen content, probably the hexanitrate It burns readily and explodes when struck or strongly heated. Used for explosives.

gun current (*Cathode Ray Tubes*). The total electronic current flowing to the anode in a *cathode ray tube* (q.v.), part of which forms the *beam current* (q.v.).

gunmetal (*Met.*). A copper-tin alloy (i.e. bronze) containing copper 88, tin 10, and zinc 2% (Admiralty gunmetal), or copper 88, tin 8, and zinc 4%. Lead and nickel are frequently added, and the alloys are used as cast where resistance to corrosion or wear is required; e.g. in bearings, steam-pipe fittings, gears, etc.

gunstock stile (*Join.*). See **diminished stile.**

gunis (*Mining*). See **guag.**

gun'ite (*Civ. Eng.*). A mixture of sand and cement, mixed dry for use in a *cement gun* (q.v.).

Gunter's chain (*Surv.*). A chain having an overall length of 66 ft. It is preferred in Britain for land surveys because areas are more easily computed with it, since one acre equals 10 sq. chains; it is much used also in pegging out railway centre lines, because one chain is the tenth part of a furlong.

Gunzberg test, goonts'berg (*Chem.*). A test for the presence of free hydrochloric acid in gastric juice, based upon the appearance of a red colour on evaporation with an alcoholic solution of phloroglucinol and vanillin.

gurgoyle (*Build.*). See **gargoyle.**

gurlet (*Masonry*). A pickaxe having a sharply pointed peen and a bladed peen for cutting.

gurley (*Diel.*). The number of seconds required for the closed cylinder to fall under its own weight in the *Gurley densimeter* (q.v.).

Gurley densimeter (*Diel.*). An instrument consisting of an open cylinder having one end under water and the other end closed by the paper sample whose porosity is to be determined. The cylinder falls under its own weight and in so doing pushes air through the paper. If the paper is very dense the air is pushed through slowly and the cylinder takes longer to fall a given distance.

gusher (*Geol.*). See **geyser.**

guss (*Mining*). A rope used for drawing a basket of coal in a thin seam.

gusset or gusset plate (*Eng., Struct.*). A bracket or stay, cast or built up from plate and angle, used to strengthen a joint between two plates which meet at an angle, as the junction of a boiler shell with the front and back plates, or between connecting members of a structure.

gusset piece (*Build.*). A piece of timber covering the triangular end-gap between the roof slope and the horizontal gutter boarding behind a chimney stack.

gus'tatory (*Zool.*). Pertaining to the sense of taste.

gustatory calyculus (*Zool.*). See **taste-bud.**

gut (*Zool.*). The alimentary canal.

gut-tie (*Vet.*). Strangulation of a loop of intestine which has herniated through a rupture in the peritoneal covering of the right spermatic cord of castrated cattle.

gutta (*Bot.*). (1) An oil drop present in a spore or in a fungal hypha.—(2) A general term for a vacuole, when small.—(*Zool.*) A patch of colour or other marking, resembling a small drop, on the surface of an animal.—*pl.* **guttae.**—*adj.* **gut'tulate.**

gutta-percha. The coagulated latex of *Isonandra* (or *Palaquium*) *Gutta* and other trees such as *Bassia pallida*, *Mimusops balata*, and *Payena Leerii*, found chiefly in British Malaya and the East Indies.

Physical properties of deresinated gutta-percha: sp. gr. ·945, tensile strength about 6000 lb. per sq. in., dielectric strength about 280,000 volts per in., m.p. (Wendriner) about 95° C. Having a very high resistivity (50,000 megohms per cm. cub.) and dielectric constant of 3·0, and being waterproof, it is especially suitable, without lead sheath, for submarine cables. See also **balata.**

guttae (*Arch.*). An ornament in the form of a line of truncated cones used to decorate entablatures or hollow mouldings.

guttate (*Bot.*). Containing little drops of material.

guttation (*Bot.*). The exudation of drops of fluid from an uninjured part of a plant, commonly from the ends of the main veins of leaves.

gutter (*Bind.*). The margin of a sheet which, when folded, falls into the back of a book: the inner margins of two adjacent pages, lying along the back.

gutter (*Build., Civ. Eng.*). A channel along the side of a road, or around the eaves of a building, to collect and carry away surface waters.

gutter (*Hyd. Eng.*). A trench alongside a canal, for clay puddle.

gutter (*Mining*). A small airway made through a goaf or gob.

gutter bearer (*Carp.*). A timber about 2×1½ in. carrying gutter boarding.

gutter bed (*Plumb.*). A lead sheet fixed behind the eaves gutter and over the tilting fillet to prevent overflow from the gutter from soaking into the wall.

gutter boards (*Build.*). See **snow boards.**

gutter bolt (*Build.*). A securing bolt between the spigot and the socket ends at a joint in a cast-iron gutter.

gutter-pointed (*Bot.*). Acuminate, and with the point channelled above, forming a spout.

gut'tulate (*Bot.*). Containing a gutta or guttae.

guttural pouch (*Vet.*). A dilatation of the eustachian tube of the horse.

gut'turoliths (*Vet.*). See **chondroids.**

Gutzeit test, goot'zit (*Chem.*). A method for the determination of arsenic.

guy derrick (*Build., Civ. Eng*) A crane operating from a mast held in an upright position by guy-ropes.

guy-rope (*Civ. Eng.*). A rope holding a structure in a desired position.

guying (*Civ. Eng*). The operation of fixing a structure in position by means of guy-ropes.

Gwilt's rule (*Build.*). A rule for giving the thickness of walls of buildings. It states that

$$T=\frac{HL}{nD},$$

where T = thickness of wall in feet, H = height of wall in feet, L = length between party walls in feet, D = diagonal of face of wall $=\sqrt{H^2+L^2}$, $n=22$ for dwelling-houses of brick, 20 for warehouses of brick, 18 for public buildings of brick.

Gyffin Shales (*Geol.*). Shales, flags, and mudstones, 300 ft. thick, occurring in North Denbighshire, and of the same age as the Llandovery Series of the Welsh Borderland.

gymbals, gimbals (*Horol.*). Self-aligning bearings for supporting a chronometer in its box. Used to ensure that the chronometer is kept level, irrespective of the ship's motion.

gymnasium (*Build.*). A hall specially adapted to, and equipped for, the performance of physical exercises.

gymne'trous (*Zool.*). (Of Fish) lacking an anal fin

gymno- (Greek *gymnos*, naked). A prefix used in the construction of compound terms; e.g. *gymnorhinal* (q v.).

gymnoa'rian (*Zool.*). Said of gonads which are not enclosed within coelomic sacs. Cf. *cystoarian.*

Gym'noblaste'a (*Zool*). An order of *Hydrozoa* in which the polyps are colonial and the skeleton of the colony consists of a perisarc only; the medusae, when set free, are *Anthomedusae* (q.v.)

gym'noblas'tic (*Zool.*). Said of hydroid colonies in which the blastostyles are unprotected by gonangia. Cf. *calyptoblastic.*

gym'nocarp'ous (*Bot.*). Having the hymenium exposed from an early stage in its development.

gym'nocyte (*Biol.*). A cell without a cell-wall.

Gym'nolae'mata (*Zool.*). An order of *Ectoprocta*, in which the lophophore is circular and there is no epistome; found in estuaries and brackish water, but mainly in the sea.

Gym'nophio'na (*Zool.*). See **Apoda.**

gym'noplasm (*Biol.*). An amorphous mass of naked protoplasm.

gym'norhi'nal (*Zool.*). (Of Birds) having no feathers on the area surrounding the nostrils.

gym'noso'matous (*Zool.*). Having a naked body, as some *Mollusca* which lack both shell and mantle.

Gym'nosperm'ae (*Bot.*). One of the two main divisions of seed plants, with about 500 species, mostly conifers. They are distinguished by the production of their ovules and seeds on the surface of a fertile leaf, not enclosed in an ovary.

gymnosper'mous (*Bot.*). Having the seeds exposed, not contained in an ovary.

gym'nospore (*Zool.*). A protozoan spore which is not enclosed by a spore-case. Cf. *chlamydospore.*

gym'nosto'matous (*Zool.*). Lacking a *peristome* (q.v.).

gym'nosto'mous (*Bot.*). Lacking a peristome.

gyn-, gyno-, gynaec-, gynaeco- (Greek *gynē*, gen. *gynaikos*, woman). A prefix used in the construction of compound terms; e.g. *gynaecology* (q.v.).

gy'naecan'er (*Zool.*). A male ant which superficially resembles the female.

gynae'ceum (*Bot.*). (1) The group of archegonia in mosses.—(2) The carpel or carpels in a flower.

gynae'coid (*Zool.*). An egg-laying worker ant.

gynaecol'ogy or **gynecology** (*Med*). That branch of medical science which deals with the functions and diseases peculiar to women.

gynaecomast'ia or **gynecomastia** (*Med.*). Abnormal enlargement of the male breast.

gynae'cophore (*Zool.*). In some *Nematoda*, a canal on the lower side of the male, which accommodates the female.—*adjs.* **gynae'copho'ral, gynae'cophor'ic.**

gynan'drism (*Zool.*). See **hermaphroditism.**

gynan'dromorph (*Zool.*). An animal exhibiting male and female characters.

gynan'dromor'phism (*Zool.*). The occurrence of secondary sexual characters of both sexes in the same individual.

gynan'drous (*Bot.*). Having the stamens and styles united to form a column, as in the flowers of orchids.

gynase (*Zool.*). A hormone or enzyme which produces femaleness in an organism.

gyne (*Zool.*). A sexually perfect female ant; a queen ant.

gy'noba'sic (*Bot*). Having the style attached close to the base of the ovary.

gy'noba'sis or **gy'nophore** (*Bot*). An elongation of the receptacle of a flower, forming a short stalk to the ovary.

gy'nodioe'cious (*Bot.*). Said of a species in which some plants bear hermaphrodite flowers and others bear female flowers.

gy'nogen'esis (*Biol.*). A kind of pseudapogamy in which the male gamete enters the egg but nevertheless fails to bring about fertilisation, so that all further development takes place from the egg alone.

gy'nogonid'ia (*Zool.*). In some *Mastigophora*, female gametes formed after repeated division of parthenogonidia.

gy'nomonoe'cious (*Bot.*). Having hermaphrodite and female flowers on the same plant.

gy'nospore (*Bot.*). See **megaspore.**

gy'noste'mium (*Bot.*). The column (in flowers of orchids).

gypsum (*Min.*). Crystalline hydrated sulphate of calcium, $CaSO_4{\cdot}2H_2O$. Occurs massive as alabaster, fibrous as satin spar, and as clear, colourless, monoclinic crystals known as selenite. Used in the manufacture of plaster of Paris.

gypsum plant (*Bot.*). A plant which appears to flourish in a soil containing gypsum.

gyrate (*Bot.*). See **circinate.**

gyration, radius of (*Phys.*). See **radius of gyration.**

gy'ratory (*Mining*). A widely used form of rock-breaker in which an inner cone gyrates in a larger outer hollow cone.

gy'ro compass (*Ships, etc.*). A compass built up round a gyro wheel which is driven by an electric motor. It has a high degree of immunity to magnetic disturbances, and the orientation of the sensitive element is that of the gyro axle. The speed of the rotor is about 8600 r.p.m.

gyroplane (*Aero.*). A rotaplane.

gyroscope. A small heavy wheel or top rotated (usually electrically) at high speed in anti-friction bearings. Any alteration of the inclination of the axis of rotation is resisted by a turning movement (gyrostatic moment). It is therefore used as a compass, as a controlling device in aircraft and torpedoes, and, in large sizes, as a ship's stabiliser. Also called GYROSTAT.

gyrose (*Bot.*). Having a folded surface, marked with sinuous lines or ridges.

gyrostat. See **gyroscope.**

gyrus (*Zool.*). A ridge between two grooves: a convolution of the surface of the cerebrum.

H

h (*Phys.*). See **Planck's constant.**

H (*Chem.*). The symbol for hydrogen.

[H] (*Light*). One member of the strongest pair (H and K) of Fraunhofer lines in the solar spectrum, almost at the limit of visibility in the extreme violet. Their wavelengths are [H], 3968·625 A. ; [K], 3933·825 A. ; and the lines are due to ionised calcium.

H_α, H_β, H_γ, etc. (*Light*). The lines of the Balmer series in the hydrogen spectrum. Their wavelengths are: H_α, 6562·99 ; H_β, 4861·52 ; H_γ, 4340·67 ; H_δ, 4101·94 A.U. The series continues into the ultraviolet, where about 20 more lines are observable.

H-acid (*Chem.*). 1,8-Aminonaphthol-3,6-disulphonic acid, an intermediate for dyestuffs.

H and D number (*Photog.*). An expression for the speed of photographic emulsions. See **Hurter and Driffield curve.**

H-armature (*Elec. Eng.*). See **shuttle armature.**

H-beam (*Build.*, *Civ. Eng.*, *etc.*). A steel beam with a section shaped like the letter H, the cross-piece of which is relatively long. Also called H-GIRDER, I-BEAM, or simply a ROLLED STEEL JOIST.

H-hinge (*Join.*). A hinge which when opened has the shape of the letter H. Also called a PARLIAMENT HINGE.

H-paper (*Cables*). Höchstädter paper, a paper one side of which is coated with aluminium foil, the composite sheet being perforated to allow oil to flow freely.

H-piece (*Bot.*). A short lateral hypha connecting two longer hyphae, giving an H-like figure, and probably facilitating the flow of nutritive material about the mycelium.

H-section (*Elec. Comm.*). An electrical network derived from the T-section, in which half of each series arm is placed in the other leg of the circuit, making the section balanced.

H-type cable (*Cables*). A cable having a wrapping of H-paper round each core. There are single-core and three-core H-type cables. The benefit of H-paper in single-core cables is that no ionisation takes place between the core and sheath. In three-core cables no ionisation takes place in the fillings.

H-type pole (*Elec. Eng.*). A type of wooden support for overhead transmission lines, consisting of two poles placed vertically and braced together at the centre.

haar (*Meteor.*). A wet sea-fog advancing in summer from the North Sea upon the shores of England and Scotland.

haben'ula (*Zool.*). A strap-like structure: in particular, a nerve-centre of the diencephalon.—*adj.* **haben'ular.**

Haber process, hah'— (*Chem.*). A method of fixing nitrogen, in which nitrogen combines with hydrogen to form ammonia. The gases are circulated through a series of catalyst bombs at 400-500° C. and 200 atmospheres. The ammonia is washed out with water.

habit (*Crystal.*). A term used to cover the varying development of the crystal forms possessed by any one mineral. Thus calcite may occur as crystals showing the faces of the hexagonal prism, basal pinacoid, scalenohedron, and rhombohedron. According to the relative development or *dominance* of one or other of these forms, the habit may be prismatic, tabular, scalenohedral, or rhombohedral.

habit (*Zool.*). The established normal behaviour of an animal species.

habit-form (*Ecol.*). See **biological race.**

habit spasm (*Med.*). Tic. A repeated, rapidly performed, involuntary, and co-ordinated movement, occurring in a nervous person.

hab'itat (*Biol.*). The normal locality or place of abode of an organism; e.g. (*Bot.*) the place inhabited by a plant or by a plant community, together with all factors external to the plant or plants, and influencing their lives.

habitat form (*Bot.*). A plant showing features, such as luxuriant growth or dwarfing, which can be related to the place where it is growing.

habitat group (*Bot.*). A set of unrelated plants which inhabit the same kind of situation; e.g. water plants.

haboob' (*Meteor.*). A line-squall, with dust storms, blowing in the Sudan during the rainy season.

hack (*Bricks*). A long parallel bank, about 6 in. high, made of brick, rubbish, and ashes, on which bricks are laid in the course of manufacture, when it is intended to dry them in the open.

hack-barrow (*Bricks*). A barrow used to carry green bricks to the hack for drying.

hack-cap (*Bricks*). A small timber structure erected to provide cover for a hack.

hack-saw (*Eng.*). (1) A mechanic's hand-saw used for cutting metal. It consists of a steel frame, across which is stretched a narrow saw-blade of hardened steel.—(2) A larger saw, similar to the above, but power-driven through a crank and connecting-rod.

hacket (*Carp.*). A *hatchet* (q.v.).

hacking (*Bricks*). The operation of piling up green bricks on a hack to dry.

hacking (*Build.*). The process of making a surface rough, in order to provide a key for plasterwork.

hacking (*Masonry*). A course of stones in a rubble wall, the course being composed partly of single stones of the full height of the course and partly of shallower stones arranged two to the height of the course.

hacking hammer (*Plast.*). The hammer used in the operation of *hacking-off* (q.v.).

hacking-off (*Plast.*). The operation of removing old plaster from a surface which is to be replastered.

hacking-out knife (*Build.*). A knife used to remove old putty from sash rebates before reglazing.

hackling (*Linen*). The process of combing to which scutched flax is subjected in the hackling machine, in order to parallelise the long fibres and remove the short ones.

Hackworth valve gear (*Eng.*). A radial gear in which an eccentric opposite the crank operates a link whose other end slides along an inclined guide, the valve rod being pivoted to a point on the link.

hade (*Geol.*, *etc.*). The angle of inclination of a fault-plane, measured from the vertical. If the angle is small the fault is of *low hade* (as in overthrusts). Cf. *dip*.

Hadfield's manganese steel (*Met.*). See **manganese steel.**

had'rocen'tric vascular bundle (*Bot.*). A concentric vascular bundle in which the xylem is surrounded by phloem.

had'romal, had'romase (*Bot.*). An enzyme present in some fungi which enables them to decompose wood.

had'rome (*Bot.*). The conducting tissues of the xylem.

Haeckel's law, heck'l (*Biol*). See **biogenetic law.**

haem-, haema-, haemo-, haemat-, haemato- (Greek *haima*, gen. *haimatos*, blood). A prefix used in the construction of compound terms; e.g. *haemotoxin*, a poison which produces haemolysis.

hae'mad (*Zool.*). Situated on the same side of the vertebral column as the heart.

hae'mal, haematal, haemic (*Zool.*). Pertaining to the blood or to blood-vessels.

haemal arch (*Zool.*). A skeletal structure arising ventrally from a vertebral centrum, which encloses the caudal blood-vessels.

haemal canal (*Zool.*). The space enclosed by the centrum and the haemal arch of a vertebra, through which pass the caudal blood-vessels.

haemal spine (*Zool.*). The median ventral vertebral spine formed by the fusion of the haemapophyses, below the haemal canal.

haemal system (*Zool.*). The system of vessels and channels in which the blood circulates.

haemangio'ma (*Med.*). Angioma. A tumour composed of blood-vessels irregularly disposed and of varying size.

hae'mapoi'esis (*Zool.*) The formation of blood.

hae'mapoph'yses (*Zool.*). A pair of plates arising ventrally from the vertebral centrum, and meeting below the **haemal** canal to form the haemal arch and spine.

haemarthro'sis (*Med.*). A joint containing blood which has effused into it

haematem'esis (*Med.*). The vomiting of blood, or of blood-stained contents of the stomach.

hae'matin (*Chem.*). *Protohaematin, oxyhaematin.* A compound of *protoporphyrin* (q.v.) and ferric iron; it combines with globin to form methaemoglobin. It can be reduced to reduced haematin (*haemochrome, heme*) which contains divalent iron, and unites with globin to give haemoglobin.

haematin'ic (*Med.*). Pertaining to the blood.

hae'matite (*Min.*). Oxide of iron, Fe_2O_3, crystallising in the trigonal system. It occurs in a number of different forms: kidney iron-ore massive, as found in the iron mines in Lancashire and Cumberland; specular iron-ore in groups of beautiful, lustrous, rhombohedral crystals as, for example, from Elba; bedded ores of sedimentary origin, as in the Carboniferous Limestone of S. Wales; and as a cement and pigment in sandstones. The Clinton ore is the most important oölitic haematite in the U.S.A. (see **Clinton Limestones**). The Wabana ore in Newfoundland is also haematitic in part, but most of the iron produced in N. America comes from the 'iron ranges' of the Lake Superior district, especially the Mesabi Range, Minn.

haemato'bium (*Zool.*). An organism living in blood. —*adj.* **haemato'bic.**

haemat'oblast (*Zool.*). A primitive blood cell, which may develop into an erythrocyte or a leucocyte: a blood platelet.

hae'matocele, —sēl (*Med.*). An effusion of blood localised in the form of a cyst in a cavity of the body.

hae'matochrome (*Bot., Zool.*). A red colouring matter produced by a number of green algae, especially when exposed to drought, and by certain *Phytomastigina.*

hae'matocol'pomet'ra (*Med.*). Accumulation of menstrual blood in the vagina and uterine cavity.

hae'matocol'pos (*Med.*). Accumulation of menstrual blood in the vagina, due to an imperforate hymen.

haemat'ocry'al (*Zool.*). See **cold-blooded.**

hae'matodo'cha (*Zool.*). In male Spiders, a distensible blood-cavity which forms part of the palpal organ.

hae'matogen'esis (*Zool.*). See **haemopoiesis.**

haematog'enous. Having origin in the blood.

haematol'ogist (*Med.*). One who specialises in the study of the blood and its diseases.

haemato'ma (*Med.*). A swelling composed of blood effused into connective tissue.

haematome'tra (*Med.*). Accumulation of menstrual blood in the uterus, due to blocking of the outlet.

haematomye'lia (*Med.*). Haemorrhage into the substance of the spinal cord.

haematoph'agous (*Zool.*). Feeding on blood.

hae'matopor'phyrin (*Chem.*). An iron-free pigment obtained from haemoglobin by the action of conc. hydrochloric acid. It is 1·3·5 8-tetramethyl-2-4-di-(hydroxyethyl)-6·7-dipropionic acid-porphin.

hae'matorra'chis (*Med.*). Haemorrhage into the vertebral canal but outside the spinal cord.

hae'matosal'pinx (*Med.*). Collection of blood in a Fallopian tube.

haemato'sis (*Zool.*). See **haemapoiesis.**

haemat'other'mal (*Zool.*). See **warm-blooded.**

haematox'ylin (*Micros.*). A colouring matter extracted from logwood; much used to stain microscopic preparations.

haemat'ozo'on (*Zool.*). An animal living parasitically in the blood.

haematu'ria (*Med.*). Presence of blood in the urine.

haemendothelio'ma (*Med.*). A tumour composed of cells derived from the lining endothelium of blood-vessels.

haemic. See under **haemal.**

haemin (*Chem.*). The hydrochloride of *haematin* (q.v.), $C_{34}H_{32}N_4O_4FeCl$, brown crystals. Its molecule contains four pyrrole radicals.

haemochromato'sis (*Med.*). Bronzed diabetes. A disease in which the iron-containing pigment, haemosiderin, is deposited in excess in the organs of the body, giving rise to cirrhosis of liver, enlargement of spleen, diabetes, skin pigmentation.

haemochro'mogen (*Chem.*). (1) A compound of haematin and any nitrogenous (amino) substance.—(2) A compound of reduced haematin and denatured globin which polymerises at *p*H5 to form haemoglobin, and is formed from haemoglobin by the action of dilute alkali.

hae'mocoele. *Primary body cavity* (q.v.).

haemocy'anin (*Zool.*). A blue respiratory pigment, containing copper, in the blood of *Crustacea* and *Mollusca*. It has respiratory functions similar to haemoglobin.

hae'mocytes (*Zool.*). The corpuscles found floating in haemolymph.

hae'mocytol'ysis (*Zool.*). The solution of red blood corpuscles. Also called HAEMOLYSIS, ERYTHROCYTOLYSIS.

haemoge'nia (*Med.*). See **purpura haemorrhagica** and **thrombocytopenia.**

haemoglo'bin (*Zool.*). A respiratory pigment occurring in the erythrocytes of all *Craniata*, and in the blood plasma of certain *Invertebrata*. It belongs to the group of conjugated proteins and has the empirical formula $(C_{759}H_{1203}N_{210}S_2FeO_{204})_4$, and a molecular weight of about 68,000. It combines readily with oxygen to form oxyhaemoglobin, but has a still greater affinity for carbon monoxide.

haemoglobinae'mia (*Med.*). The abnormal presence of haemoglobin in the blood, as a result of destruction of red blood cells.

haemoglobinaemia, paralytic (*Vet.*). Azoturia. An acute degeneration of the muscles of horses, characterised by lumbar paralysis and haemoglobinuria.

haemoglobinom'eter (*Med.*). An instrument for measuring the percentage of haemoglobin in the blood.

haemoglobinu'ria (*Med.*). The presence of haemoglobin in the urine, as a result of excessive destruction of red blood cells.

haemoglobinuria, paroxysmal (*Vet.*). See **haemoglobinaemia (paralytic).**

hae'molymph (*Zool.*). The watery fluid, containing leucocytes, believed to represent blood, found in the haemocoelic body-cavity of certain Invertebrates.

haemol'ysins (*Chem.*). A group of immune bodies causing the dissolution of red blood cells.

haemol'ysis. See **haemocytolysis.**

haemolyt'ic anaemia (*Med.*). Anaemia due to excessive destruction of red blood cells.

hae'mopericar'dium (*Med.*). The presence of blood in the pericardial sac.

haemophil'ia (*Med.*). A hereditary disorder in which bleeding after injury persists, owing to delayed coagulation of the blood. The disorder is transmitted through females to males.

haemopneumotho'rax, hē'mō-nū'— (*Med*) The presence of blood and air in the pleural cavity.

haemopoie'sis (*Zool.*). See **haemapoiesis.**

haemop'tysis (*Med*). The spitting of blood, or of blood-stained sputum.

haem'orrhage (*Med.*). Bleeding; escape of blood from a ruptured blood-vessel.

haemorrha'gic septicaemia (*Vet.*). See **pasteurellosis.**

haem'orrhoid (*Med.*). Pile (usually in plural, *haemorrhoids*). Varicose dilatation of the haemorrhoidal veins at the lower end of the rectum and the anus

hae'mosidero'sis (*Med.*). Deposition, in the tissues of the body, of the iron-containing pigment *haemosiderin*, after excessive destruction of red blood cells. See also **haemochromatosis.**

haemosta'sis (*Med.*). The arrest of bleeding.

haemostat'ic (*Med.*). Arresting or checking bleeding: an agent which does this.

haemotro'pic (*Zool.*). Affecting blood.

Haffield Breccia (*Geol*) The equivalent of the *Trappoid Breccia* of Permian age in the Malvern Hills, formed as scree material under desert conditions.

Haffkine's vaccine (*Med.*). A prophylactic vaccine for immunisation against plague.

Haffotty Shales (*Geol.*). A local name for the Manganese Shale Group in the Harlech Series of the Cambrian System in N. Wales.

hafnium (*Chem*). Symbol, Hf. A metallic element in the fourth group of the periodic system At. no. 72, at. wt. 178·6, sp. gr 13·31, m p. about 2000°. It occurs in zirconium minerals.

haft (*Bot.*). (1) A leaf stalk with a thin strip of green tissue running along each side forming a wing.—(2) The stalk of a spatulate leaf.—(3) The claw of a petal.

haft (*Tools*). A tool handle.

hag principle (*Mining*). The system under which the skilled miner employs an unskilled helper. *Hagging* implies 'sweating.'

hagger (*Mining*). See **hewer.**

Hagley Ashes (*Geol.*). These are of volcanic origin and occur in the Bala Series in the Ordovician System of S. Shropshire, west of the Longmynd. A much attenuated representative of part of the great Snowdonian Volcanic Series of N. Wales.

ha-ha (*Build.*). A fence sunk below ground-level so as to give an uninterrupted view.

Haigh fatigue-testing machine (*Eng.*). A machine for testing the resistance of materials to fatigue under alternating direct stress; the specimen is loaded by means of a powerful electromagnet, excited by an alternating current.

hail, hailstones (*Meteor.*). Precipitation in the form of hard pellets of ice, called *hailstones*, which often fall from cumulo-nimbus clouds and accompany thunderstorms. Hailstones are formed when raindrops are swept up by strong air-currents into regions where the temperature is below freezing-point. In falling, the hailstone grows by condensation from the warm moist air which it encounters.

Hailes Sandstone (*Geol.*). See **Granton Sandstone.**

hair (*Anat.*, *Zool.*). A slender, elongate structure, mostly composed of *keratins* (q.v.), arising by proliferation of cells from the Malpighian layer of the epidermis in Mammals: more generally, any thread-like outgrowth of the epidermis.

hair (*Bot.*). See **trichome.**

hair (*Plast*). Hair obtained from the hides of cattle; used for reinforcing plaster undercoats and for reducing cracking due to shrinkage.

hair cloth (*Textiles*). A material generally composed of coarse hair and cotton yarn; used as a stiffening for coats.

hair compasses (*Instruments*). A drawing instrument consisting of a pair of dividers having needle points, one of which has a fine-screw adjustment for varying the distance between them.

haircords (*Textiles*). Cotton fabrics of light weight, in which fine cords are produced by running two fine threads together at frequent intervals. The warp, for example, often has alternate single and double ends.

hair hook (*Plast.*). A tool used for mixing hair with plaster; it consists of a long handle having at one end a few prongs projecting at right-angles.

hair hygrometer (*Meteor.*). A form of hygrometer which is controlled by the varying length of a human hair with humidity. It is not an absolute instrument, but it can be used at temperatures below freezing-point, and it can be made self-recording.

hairline (*Textiles*). The name given to fine lines of solid colour in a fabric; the direction is usually lengthwise of the cloth.

hairline letter (*Typog.*). A fine-faced type used for business stationery, titles, etc.

hair pencil (*Paint.*). A fine brush made from camel or sable hairs, or from the hairs of some other animals; used for lettering, graining, and other decorative work.

hair-pin winding (*Elec. Eng.*). A form of winding used for the armatures of electric machines; it is partly formed and pushed into the slots from one end, the other ends being subsequently welded or otherwise connected together.

hair pit (*Bot*) See **cryptostoma.**

hair side (*Leather*). The surface of a skin or hide from which the air has been removed.

hair space (*Typog.*). The thinnest of the spaces used between words. It is about 1-point wide.

hairspring (*Horol.*). The balance spring.

hake (*Bricks, etc.*). A *hack* (q.v.) built to dry tiles in the course of their manufacture.

halation (*Photog.*). Fogging of an emulsion due to light reflection and dispersion within the emulsion. Reduced by *backing* (q.v.) the glass or film with light-absorbing material having approximately the same refractive index as the support.

Haldane apparatus (*Chem.*). An apparatus for the analysis of air; used also for the analysis of mine gases.

half-anchor ear (*Elec. Eng.*). An anchor ear to which only one anchoring wire is attached.

half-bed, half-joint (*Masonry*). In pricing the labour charge for stonework, each horizontal surface on a stone is spoken of as a *half-bed*, as it contributes one-half to the cost of preparing each bed joint; similarly, *half-joint* refers to the vertical jointing surfaces.

half-blind dovetail (*Join.*). A *lap dovetail* (q.v.).

half-bound (*Bind.*). Said of a book having its back, a portion of the sides, and the corners bound in one material (originally leather) and the remainder of the sides in some other material (e.g. cloth or paper).

half-brick wall (*Build.*). A wall built entirely of stretchers and therefore 4½ in. thick.

half-case (*Typog.*). (1) A type case of the usual width, but half the length; used for holding display type or special letters.—(2) See **double case.**

half-cell (*Elec. Eng.*). See **single-electrode system.**

half-closed slot (*Elec. Eng.*). See **semi-closed slot.**

half-coiled winding (*Elec. Eng.*). A form of single-layer winding in which there is only one group of coils per pole per phase. Also called a HEMITROPIC WINDING

half-column (*Build.*). An *embedded column* (q.v.) of which half projects.

half coupling (*Eng.*). See **flange coupling.**

half-deflection method (*Elec. Eng.*). A method of finding the internal resistance of a cell when the value is known to be high. A second cell, a galvanometer, and a resistance are connected in series with the cell under test, and the value of the resistance required to give a galvanometer deflection of half the value obtained with the cell alone is found.

half-dressed warp (*Weaving*). A warp that has been wound on a beam without separation of the threads by the dents of the reed, etc. (as in a 'dressed' warp).

half-element (*Elec. Eng.*). See **single-electrode system.**

half-header (*Build.*). A half-brick used at the corner of a wall to close the course.

half-hour rating (*Elec. Eng.*). A form of rating for electric machinery supplying an intermittent load. It indicates that the machine delivers the specified rating for a period of half an hour without exceeding the specified temperature rises. Cf. *one-hour rating.*

half inferior (*Bot.*). Said of a flower in which the receptacle forms a cup which is adherent to the base of the ovary and partly up its side.

half landing (*Build.*). A *half-space landing* (q.v.)

half-lap coupling (*Eng.*). The connexion of two co-axial shafts by cutting away a short length of the ends of each to the diametrical plane, so as to form a *half-lap joint* (q.v.), and either riveting together or enclosing in a keyed-on sleeve or muff.

half-lap joint (*Carp., etc.*). The name of the joint formed by the process of *halving* (q.v.).

half-lattice girder (*Struct.*). A *Warren girder* (q.v.).

half-life (*Chem.*). The period of time in which the activity of a radioactive substance falls to half its original value. It may have a value ranging from 3×10^{10} years to 0·002 second.

half-normal bend (*Elec. Eng.*). A bend serving to connect two lengths of the conduit used in electrical installation work which are at an angle of 135°.

half-pace (*Build.*). (1) A landing at the end of a flight of steps.—(2) A raised floor in a window bay.

half-period zones (*Light*). A conception, due to Huyghens, whereby an optical wave front is considered to be divided into a number of concentric annular zones, so that, at a given point in front of the wave, the illumination from each zone is half a period out of phase with that from its neighbour. The use of half-period zones facilitates the study of diffraction problems.

half-principal (*Carp.*). A short rafter which does not reach the ridge of a roof.

half race (*Bot.*). A race of plants in which only a few of the seedlings show the characters of the race (the rest having the ordinary characters of the species), and in which selection does not lead to the fixing of a pure race.

half-rip saw (*Join.*). A hand-saw designed for cutting timber along the grain and having slightly smaller teeth than the rip saw.

half roll (*Aero.*). See **roll.**

half-round chisel (*Eng.*). A *cold chisel* (q.v.) having a small half-round cutting edge; used for chipping semi-circular grooves such as oilways.

half-round file (*Eng.*). A file whose cross-section has one flat and one convex face.

half-round screws (*Eng.*). See **button-headed screws.**

half-sawn (*Masonry*). Said of a granite face as left from the saw.

half secret dovetail (*Join.*). A *lap dovetail* (q.v.).

half-section (*Elec. Comm.*). A section of an electric wave filter divided in the centre so as to form an L-network. It has the same cut-off frequency but half the attenuation, if the image impedances are correctly matched.

half shroud (*Eng.*). A gear-wheel shroud extending only up to half the tooth height. See **full shroud, shroud.**

half-socket pipe (*San. Eng.*). A drain-pipe having a socket for the lower half only.

half-space landing (*Build.*). A landing extending across the full width of a staircase.

half-speed shaft (*I.C. Engs.*). The camshaft of an internal-combustion engine, which runs at half the speed of the crankshaft.

half stuff (*Paper*). Raw materials which have been converted into pulp by the breaker.

half-timber (*Timber*). One part of a baulk which has been divided in halves along its length

half timbering (*Build.*). An early mode of house-building in which the foundations and principal members were of stout timber, and walls were formed by filling the spaces between members with plaster.

half-title (*Typog.*). The title of a book printed on the leaf preceding the title-page.

half-tone process (*Photog., Print.*). A process of photographic reproduction in which the varying tones of the original are photographically translated into dots of uniform tone but varying size. This dot image is etched into relief for letterpress printing (*half-tone block*), or photolithographed on a grained zinc or aluminium plate for offset printing.

half-watt lamp (*Illum.*). A name sometimes given to gas-filled lamps from the fact that the consumption approaches half a watt per candle-power.

half-wave antenna (*Radio*). An antenna whose overall length is one half-wavelength. The voltage distribution is from a maximum at the top to a minimum in the middle and a maximum at the base.

half-wave plate (*Light*). A plate of doubly refracting, uniaxial crystal cut parallel to the optic axis, of such thickness that, if light is transmitted normally through it, a phase difference of half a period is introduced between the ordinary and extraordinary waves. A half-wave plate is used in Laurent's polarimeter.

half-wave rectification (*Radio, Elec. Eng.*). Rectification in which current flows only during the positive (or negative) half-cycles of the alternating voltage. The commonest form of rectification of radio signals. Also called SINGLE-WAVE RECTIFICATION.

half-wave suppressor coil (*Radio*). An inductance coil inserted at half-wavelength intervals along an antenna wire; used in some forms of directional antenna to suppress radiation in reverse phase from alternate half-wavelength sections of the wire.

half-wave transmission (*Elec. Eng.*). A method of transmission of electrical energy in which the natural period of oscillation of the transmission line is equal to four times the frequency of the transmitted currents.

hali-, halo- (Greek *hals*, salt). A prefix used in the construction of compound terms.

halides, hā'lidz *or* hal'— (*Chem.*). Fluorides, chlorides, bromides, and iodides.

haliplank'ton (*Ecol.*). The plankton of the seas.

halistere'sis (*Med.*). Softening of bone due to disappearance of lime salts from it.

halite (*Min.*). Common or rock salt. The naturally occurring form of sodium chloride, crystallising in the cubic system; represented in the Purbeck Series by clay pseudomorphs, and forming deposits of considerable thickness in close association with anhydrite and gypsum in the Permian and Triassic rocks of this and other countries. Deposits of commercial value occur in Cheshire, Lancashire, Co. Antrim, and Somerset, the salt being pumped out as brine from the Keuper Marl; the Stassfurt deposits in Germany and those of Wieliczka in Poland are famous. In the U.S.A valuable salt deposits occur in the Salina beds of Silurian age, worked in Michigan, New York, Ohio, etc.; also in the overlying Mississippian. Salt of Permian age is important in Kansas and Oklahoma. Salt domes occur in Louisiana and Texas.

halito'sis (*Med.*). Offensively smelling breath.

Hall effect (*Elec. Eng.*). A change in the distribution of current in a strip of metal, due to a magnetic field.

Hall process (*Met.*). A process for the extraction of aluminium by the electrolysis of a fused solution of alumina in cryolite at a temperature of approximately 1000° C. The aluminium is molten at this temperature and settles to the bottom of the bath, from which it is drawn off. Contains up to 99·8% aluminium.

Hallade recorder (*Eng.*). An instrument for recording vibration of rolling-stock due to track irregularities, etc., in planes parallel, transverse, and perpendicular relative to the track.

hälleflin'ta, hel'e— (*Geol.*). An old name for very fine-grained, compact, and tough volcanic ashes.

Haller's organ (*Zool.*). In some *Acarina* (*Ixodidae*), a cavity filled with comb-like teeth and communicating with the exterior by a slit-like opening, situated on the upper side of the tarsus of the first leg; believed to be olfactory.

halloy'site (*Min.*). One of the so-called clay minerals, apparently amorphous; consists of hydrated aluminium silicate.

hallucination (*Psychol.*). A perception of sensation for which there is no objective reality, such as hearing voices, seeing persons or things, etc., which do not exist outside fantasy.

hallux (*Zool.*). In land Vertebrates, the first digit of the hind-limb.

hallux flexus (*Med.*). A late stage of hallux rigidus, the big toe being rigidly flexed on the sole.

hallux rigidus (*Med.*). Rigid stiffness of the big toe, due to osteoarthritis of the joint between the toe and the foot.

hallux valgus (*Med.*). A deformity of the big toe, in which it turns towards and comes to lie above the toe next to it; usually associated with bunion.

hallux varus (*Med.*). A rare deformity of the big toe, in which it diverges from the toe next to it.

halo (*Meteor.*). A bright ring or system of rings often seen surrounding the sun or moon. The *large halo*, of radius 22°, is due to light refracted at minimum deviation by ice crystals in high cirrostratus clouds. The *small halo*, termed a corona, a few degrees in radius, is formed by diffraction by water droplets in the atmosphere.

halos, pleochroic (*Geol.*). See **pleochroic halos.**

ha'lobion'tic (*Ecol.*). Strictly confined to salt water.

halobiot'ic (*Zool.*). Living in salt water, especially in the sea.

halochro'mism (*Chem.*). The formation of coloured salts from colourless organic bases by the addition of acids.

halogena'tion (*Chem.*). The introduction of halogen atoms (Cl, Br, I) into an organic molecule by substitution or addition.

hal'ogens (*Chem.*). A group consisting of the non-metallic elements, fluorine, chlorine, bromine, and iodine.

haloid acids (*Chem.*). A group consisting of hydrogen fluoride, hydrogen chloride, hydrogen bromide, and hydrogen iodide.

halolim'nic (*Zool.*). Originally marine but secondarily adapted to fresh water

ha'lophile (*Ecol.*). A fresh-water species capable of surviving in salt water.

ha'lophobe (*Bot.*). A plant which will not grow in a soil containing any appreciable amount of salt.

ha'lophyte (*Bot.*). A plant which will live in a soil containing an appreciable amount of common salt or of other inorganic salts.

halophyt'ic vegetation (*Bot.*). A population consisting of halophytes.

hal'otri'chite (*Min.*). Hydrated sulphate of iron and aluminium, occurring rarely as yellowish fibrous silky colourless crystals in rocks that have been affected by the action of sulphuric acid around fumaroles. Also called IRON ALUM.

hal'teres, —tērz (*Zool.*). A pair of capitate threads which take the place of the hind wings in *Diptera*, and are believed to assist the insect to maintain its equilibrium while flying; balancers.

halvans (*Mining*). Inferior ore: the refuse made during ore mining.

halving (*Carp., etc.*). A method of jointing (e.g two timbers); it consists in cutting away half the thickness from the face of one, and the remaining half from the back of the other, so that when the two pieces are put together the outer surfaces are flush.

ham (*Radio*). The recognised description of an amateur operator of a radio transmitter.

Ham Hill Stone (*Geol.*). The representative of the lower part of the Upper Lias, between the Dorset coast and the Mendip Hills.

ham'ate, ham'ulose (*Bot.*). Said of (1) a narrow leaf hooked at the tip; (2) a trichome similarly bent.

Hamilton Group (*Geol.*). The highest division of the Middle Devonian rocks of N. America, consisting of marine sandy shales and sandstones succeeded by deltaic flagstones (Hudson River bluestone).

hamiros'trate (*Zool.*). Having a hooked beak, as Vultures.

hammer (*Eng.*).

See **ball-pane—**
boilermaker's—
coppersmith's—
power—
rawhide—
sledge—

hammer (*Horol.*). In striking or chiming clocks, the weighted mass which strikes the gong, rods, tubes, or bells.

hammer-axe (*Tools*). A tool with a double head—axe at one side and hammer at the other side of the handle.

hammer-beam (*Build.*). A short cantilever beam projecting into a room or hall from the springing level of the roof, strengthened by a curved strut underneath, and carrying a hammer-beam roof.

hammer-beam roof (*Carp.*). A type of timber roof existing in various forms, all affording good headroom beneath. It consists essentially of arched ribs, supported on hammer beams at their feet, and carrying the principal rafters, strengthened sometimes by a collar-beam and/or struts.

hammer blow (*Eng.*). The alternating force between a locomotive driving-wheels and the rails, caused by the centrifugal force of the balance weights used to balance the reciprocating masses.

hammer break (*Elec. Eng.*). A name given to the electromagnetic trembler device used on an electric bell or the primary of an induction coil.

hammer-dressed (*Masonry*). A term applied to stone surfaces left with a rough finish produced by the hammer.

hammer drill (*Mining*). A compressed-air rock drill in which the piston is not attached to the steel or borer but moves freely.

hammer-headed (*Tools*). A term applied to masons' chisels intended to be struck by a hammer rather than by a mallet.

hammerman (*Eng.*). (1) The operator of a power-driven hammer.—(2) A smith's mate or 'striker.'

hammer mill (*Agric. Mach.*). A mill in which the foodstuffs for animals are pulverised; they are beaten against the sides of a metal drum by steel hammers.

hammer rod (*Horol.*). The vertical rods connecting the lifting cams of a turret clock to the hammers.

hammer scale (*Eng.*). The scale of iron oxide which forms on work when heated for forging.

hammer stalk (*Horol.*). The rod to which a hammer is fastened in a striking or chiming clock.

hammer tail (*Horol.*). An extension of the hammer stalk which is in contact with the pins in the pin wheel or barrel, when the hammer is lifted.

hammer toe (*Med.*). A deformity of any toe, especially the second, in which the toe, flexed on itself, is, at its junction with the foot, bent towards the instep.

Hammond organ (*Acous.*). An electronic organ, operated by manuals and pedals, in which the sounds are synthesised from fundamentals generated by a series of electromagnetic generators and reproduced through loudspeakers.

Hamstead Beds (*Geol.*). The highest division of the Oligocene of the Hampshire Basin, lying above the Bembridge Beds, and consisting of black and green clays containing non-marine shells and plant remains, and a few feet of blue marine clays at the top.

ham'ula (*Zool.*). The *retinaculum* (q.v.) of *Collembola.*

ham'ulus (*Zool.*). Any small hook-like structure: the hooked end of a barbicel.—*adjs.* **ham'ular, ham'ate.**

hance (*Arch.*). That part of the intrados, close to the springing of an elliptical or many-centred arch, which forms the arc of smaller radius.

Hancock jig (*Mining*). A movable screen which is moved up and down in water by means of cams in order to separate heavy minerals from gangue or waste.

hand (*Join.*). A term used to indicate the mode of hanging a door. The door is *right-* or *left-handed,* according as the hinges are on the right or left when opening the door towards oneself.

hands (*Horol.*). The pointers used to indicate the rate of progress of a wheel in a train: the pointers used to indicate the time on a dial of a clock or watch.

hand-axe (*Tools*). A light axe for single-handed operation.

hand-brace (*Carp.*). See **brace.**

hand camera (*Photog.*). A portable camera, without rigid support on a stand or tripod; normally exposed while held in the hand.

hand feed (*Eng.*). The hand operation of the feed mechanism of a machine tool, as distinct from an automatic feed. See **feed.**

hand float (*Plast.*). A flat rectangular piece of wood with a handle on one side, used for floating.

hand hole (*Eng.*). A small hole, closed by a removable cover, in the side of a pressure vessel or tank; it provides means of access for the hand to the inside of the vessel.

hand ladle (*Foundry*). A small foundry ladle supported by a long handle of steel bar. See also **hand shank.**

hand-lamp (*Illum.*). A portable electric-light fitting suitable for carrying in the hand. Also called INSPECTION-LAMP, PORTABLE-LAMP.

hand-lead (*Surv.*). A small lead used for attachment to a lead-line measuring within 100 fathoms.

hand letters (*Bind.*). Letters formed of brass at the end of hand tools, with which the finisher impresses the title on the back or side of a bound volume.

hand level (*Surv.*). An instrument capable of being held and adjusted in the hand, so as to provide a horizontal line of sight whereby differences in level may be found.

handmade paper (*Paper*). Paper made by dipping a mould into rag pulp and, by skilful shaking, distributing it into a sheet. The wet sheets are piled up between felts. Handmade paper is used when durability and stylish appearance are required.

hand press (*Print.*). A press operated by hand; now used chiefly for proof-pulling.

hand-rail (*Join.*). A rail fixed at the side of a stair whose slope it follows.

hand-rail bolt (*Join.*). A rod which is threaded and fitted with a nut at both ends; used to draw together the mating surfaces of a butt joint, such as that between adjacent lengths of hand-rail. The rod passes through holes in the members, and at one end the nut, a square one, is housed in a square mortise which prevents it from turning. At the other end the nut is circular, with notches cut in its periphery, to afford a means of screwing it into its mortise.

hand-rail plane (*Join.*). A plane having a specially shaped sole and cutting-iron, adapting it to the finishing of the top surface of a hand-rail.

hand-rail punch (*Join.*). A small tool which is inserted in the notches in the periphery of the circular nut of a *hand-rail bolt* (q.v.) and is used to tighten it up.

hand-rail screw (*Join.*). A small rod, taper-threaded at each end, used to connect adjacent lengths of hand-rail as an alternative to the *hand-rail bolt* (q.v.). Also called a DOWEL SCREW.

hand-regulated arc lamp (*Illum.*). An arc lamp in which the striking of the arc and the adjustment of the carbons to give the correct arc length are carried out entirely by hand.

hand rest (*Eng.*). A support, shaped like a letter T, on which a turner rests a hand tool, during wood-turning or metal-spinning in a lathe.

hand roller (*Typog.*). A roller used for inking type-matter on the hand press, preparatory to pulling a proof.

hand-rope operation (*Elec. Eng.*). A method of control of electric lifts; a rope is passed through the car and attached to control equipment mounted at the top of the shaft.

hand-saw (*Tools*). A saw fitted with a handle at one end by which it may be operated.

hand screw (*Join.*). A *clamp* (q.v.).

hand-set (*Typog.*). Said of type-matter which has been composed by hand, as opposed to that set by a *composing machine* (q.v.),

hand shank (*Foundry*). A *foundry ladle* (q v) supported at the centre of a long iron bar, formed into a pair of handles at one end for control during pouring ; carried by two men.

hand tools (*Eng.*). All tools used by fitters when doing hand work at the bench, as hammers, files, scrapers, etc.

hand wheel (*Horol.*). A grooved pulley provided with a cranked handle and mounted on a universal form of vice, used for driving a lathe or other tool by hand.

hand winding (*Elec. Eng.*). The process of winding a machine by the insertion of the coils, turn by turn, into the slots ; used in cases where it is not convenient to use former-wound coils.

handle (*Tools*). The part of a tool by which it is grasped.

handle-type fuse (*Elec. Eng.*). A fuse in which the carrier containing the fuse-link is provided with a handle to facilitate withdrawal and replacement.

handlers (*Leather*). The name for a series of pits in which hides are laid flat after the first stage of tanning.

hang-over (*Elec. Comm*). The delay in restoration of speech-operated switches, as in the *Vodas*, to ensure the non-clipping of weak final consonants of words.

hangar (*Aero.*). A special construction for the accommodation of aircraft.

hanger (*Build.*). An overhanging bracket for the support of a gutter at the eaves.

hanger (*Elec. Eng.*) (1) Plates of glass or other material standing on edge in an accumulator cell, and supporting the accumulator-plates by means of their lugs.—(2) A fitting used for supporting the overhead contact wire of a traction system from a transverse wire or structure.

See **bridge—** **straight-line—**
car-shed—

hanger (*Eng.*). (1) A bracket, usually of cast-iron, bolted to a wall or to the underside of a girder, to hold a bearing for supporting overhead shafting.—(2) A bracket, usually of steel strip, used to support a pipe from a roof.

hanger-on (*Mining*). A man who attaches or detaches the tubs or trams on an endless-rope haulage in a coal-mine. A *hitcher* performs a similar task at the shaft bottom. See **clipper.**

hanging battens (*Illum.*). A suspended row of lamps used in stage lighting.

hanging buttress (*Masonry*). A buttress carried upon a corbel at its base.

hanging post (*Build.*). A *hingeing post* (q.v.).

hanging sash (*Join.*). A sash arranged to slide in vertical grooves, and counterweighted so as to be balanced in all positions.

hanging steps (*Build.*). Steps which are built into a wall at one end and are unsupported at the other end.

hanging stile (*Join.*). That stile of a door to which the hinges are secured.

hanging tie (*Struct.*). A tie which is supported by some kind of *anti-sag bar* (q.v.) to prevent sagging under its own weight.

hanging valley (*Geol.*). A tributary valley not graded to the main valley by reason of the over-deepening of the latter. The two are connected by rapids or waterfalls.

hanging wall (*Mining*). The wall of a lode vein or reef which overhangs as one walks along the strike in a drive or stope.

hangings (*Build.*). A term applied to materials, such as wall-papers, used as wall coverings.

Hangman Grits (*Geol.*). A thick series of sandstones and grits, of Old Red Sandstone facies and Devonian age, named from a headland in N. Devon.

hank (*Textiles*). A general term for a reeled length of yarn. In calculating the counts of yarn, a definite length is assigned to the hank for each type of yarn. See **counts of yarn.**

Hanot's cirrhosis, an-ō (*Med.*). A fine cirrhosis of the liver, which is greatly enlarged, associated with jaundice.

hapan'thous (*Bot.*). Flowering once and then dying.

haplite (*Geol.*). See **aplite.**

haplo- (Greek *haploos*, single, simple). A prefix used in the construction of compound terms; e g. *haplobiont* (q.v.)

haplobi'ont (*Bot.*) A plant which has only one kind of individual in its life-history.—*adj.* **haplobion'tic.**

hap'locaules'cent (*Bot.*). Having a single axis.

hap'lochlamyd'eous chimaera (*Bot.*). A periclinal chimaera in which one component is present as a single cell layer, forming the epidermis.

hap'lodip'lont (*Bot*). A sporophyte in which the cells contain the haploid chromosome number.

Haplodo'ci (*Zool.*). An order of *Neopterygii*, characterised by the possession of only three gill arches, a large flattened head and an elongate body ; scales are reduced or absent ; carnivorous tropical and temperate forms. Toad-fish.

hap'lodont (*Zool*). Having molars with simple crowns.

hap'loid (*Cyt.*) (Of the reduced number of chromosomes characteristic of the germ cells of a species) equal to half the number in the somatic cells. Cf. *diploid*.

haploid apogamety, haploid apogamy (*Bot.*). See **reduced apogamy.**

Hap'lomi (*Zool.*) An order of *Neopterygii*, characterised by the possession of abdominal pelvic fins, an air-bladder communicating with the gullet by a pneumatic duct, and soft fin-rays ; the mesocoracoid is absent ; mainly fresh-water forms. Pikes and Mud-fish.

haplont (*Bot.*). A plant which has sexuality, and in which the zygotic nucleus only is diploid ; all other nuclei are haploid.

hap'lophase (*Biol.*). The period in the life-cycle of any organism when the nuclei are haploid. Cf. *diplophase*.

haplo'sis (*Cyt.*). The halving in the number of the chromosomes at meiosis.

Hap'losporid'ia (*Zool.*). An order of *Neosporidia*, most of the members of which infest Fish and aquatic Invertebrates ; the spores possess cases but have no polar capsules.

haplostem'onous (*Bot.*). Having a single whorl of stamens.

haploxylic, —zil'ik (*Bot.*). Said of a leaf containing one vascular strand.

happiness (*Psychol.*). A feeling-tone experienced when all instinctive emotions are expressed in harmony with the conscious aims and ideals of the individual.

hap'teron (*Bot.*). A cell or a cellular organ which attaches a plant to a support. The term is used especially in speaking of the attachment organs of the lower plants.

hap'totro'pism (*Bot.*). One-sided growth leading to curvature (*haptotropic curvature*) ; being the response of an elongated plant organ which has been stimulated by touch or slight pressure.

harbour (*Civ. Eng.*). A sheltered area of water giving safe anchorage to ships, and generally provided with facilities for loading and unloading.

hard (*Hyd. Eng.*). A layer of gravel or similar materials put down on swampy or sodden ground to provide a way for passage on foot.

hards (*Cinema.*). A colloquialism for lights, such as arc lamps, which give a hard or harsh type of lighting.

hard bast (*Bot.*). Sclerenchyma present in phloem.

hard core (*Build.*, *Civ. Eng.*). Lumps of broken brick, hard natural stone, etc., used to form the basis of a foundation for road or paving.

hard-facing (*Met.*). The process of welding on to the surface of soft steel or other metals a layer of a hard material, such as alloy steel or Stellite, capable of resisting abrasion.

hard finish (*Plast.*). A coat of fine stuff applied with a trowel.

hard glass (*Chem.*). A trade term indicating a borosilicate glass—a hard glass whose hardness is principally due to the presence of boron compounds. Such glass is used in laboratories when a glass resistant to heat and to chemical action is required.

hard heading (*Mining*) Sandstone or other hard rock met with in making headings or tunnels in a coal-mine.

hard kiln (*Pot*). A muffle kiln fired at a temperature between that of the enamel and gloss kilns.

hard lead (*Met.*). Metal in which the high degree of malleability characteristic of pure lead is destroyed by the presence of impurities, of which antimony is the most common.

hard lighting (*Photog*) The lighting of objects to be photographed in such a way that there is strong contrast between light and shade, with strong demarcations. The opposite of *soft lighting*.

hard packing (*Typog*) Hard paper employed to cover the cylinder of a printing press when printing on hard, smooth papers from engravings, etc.; used in order to obtain a sharp impression.

hardpan (*Civ. Eng.*). A rock layer beneath soft soil; or a layer of hardened subsoil.

hard-paste (*Pot*). See **paste.**

hard plaster (*Plast.*). A hard-setting form of plaster of Paris.

hard plating (*Met*). Chromium plating deposited in appreciable thickness directly on to the base metal, that is, without a preliminary deposit of copper or nickel The coating is porous, but offers resistance to corrosion and to wear owing to the hardness of the coating.

hard soaps (*Chem.*). See **soaps.**

hard stocks (*Bricks*) Bricks which are sound but have been overburnt and are not of good shape and colour; used in the middle of thick walls and for footings and pavings.

hard tube (*Thermionics*) A high-vacuum discharge-tube.

hard twist (*Textiles*). A yarn with more than the usual amount of twist, which has been inserted in order to secure the desired effects in particular fabrics.

hard valve (*Thermionics*). The same as *hard tube* (q.v.).

hard waste (*Cotton Spinning*). Waste yarn from cop bottoms and waste made during winding, warping, reeling, and weaving.

hard water (*Chem.*). Water having magnesium and calcium salts in solution and offering difficulty in making a soap lather. See **permanent hardness, temporary hardness.**

hardwood (*Timber*). A dense, close-grained wood from deciduous trees such as oak, beech, ash, teak.

hardening (*Met.*). The process of making steel hard by cooling from above the critical range at a rate that prevents the formation of ferrite and pearlite and results in the formation of martensite. May involve cooling in water, oil, or air, according to composition and size of article.

hardening (*Photog.*). The use of formalin for hardening gelatine emulsion, making it insoluble and more permanent. See also **differential hardening.**

hardening media (*Met.*). Liquids into which steel is plunged in hardening. They include cold water, various oils, and water containing sodium chloride or hydroxide to increase the cooling power.

hardening of oils (*Chem.*). The hydrogenation of oils in the presence of a catalyst, usually finely divided nickel, in which the unsaturated acids are transformed into saturated acids, with the result that the glycerides of the unsaturated acids become hard. This process is of great importance for the foodstuffs industries, e.g. margarine is prepared in this way.

hardenite (*Met.*). An obsolete term for martensite, the hard constituent in hardened steel.

Harder's glands (*Zool.*). In most of the higher Vertebrates, an accumulation of small glands near the inner angle of the eye, closely resembling the lacrimal gland.

Hardgrave Sandstone (*Geol.*). A marine sandstone of Upper Liassic age, marking the commencement of the marine transgression in Jurassic times in the Cordilleran geosyncline. Succeeds the non-marine Trail Group.

hardness (*Met*). Signifies, in general, resistance to deformation. It is actually measured by determining the resistance to indentation, as in the Brinell, Rockwell, Vickers diamond pyramid, and scleroscope hardness tests. The values of hardness obtained by the different methods are to some extent related to each other, and to the ultimate tensile stress of non-brittle metals.—(*Min.*) The resistance which a mineral offers to abrasion. The absolute hardness is measured with the aid of a sclerometer. The comparative hardness is expressed in terms of Mohs' scale, and is determined by testing against ten standard minerals: (1) talc, (2) gypsum, (3) calcite, (4) fluorite, (5) apatite, (6) orthoclase, (7) quartz, (8) topaz, (9) corundum, (10) diamond. Thus a mineral with 'hardness 5' will scratch or abrade fluorite, but will be scratched by orthoclase. Hardness varies on different faces of a crystal, and in some cases (e.g. kyanite) in different directions on any one face.

hardness test (*Met.*, *Min.*).
See **Brinell— Rockwell— scleroscope—**

Hardraw Scar Limestone (*Geol.*). A limestone occurring near the base of the Yoredale Series in the higher part of the Lower Carboniferous of the Pennines, north of the Craven faults.

hare (*Furs*). The skin of the hare is generally dressed and dyed to imitate fox fur or that of some other animal whose fur is valued. The Belgian hare is a fancy breed of the domestic rabbit.

harelip (*Med.*). A congenital cleft in the upper lip, often associated with cleft palate.

Harford Sands (*Geol.*). White or pale-brown sand partially cemented by carbonate of lime, occurring immediately above the freestones of Cleeve Hill, Cheltenham, and in nearby localities. Named from Harford, near Bourton-on-the-Water.

harl, harling (*Build.*). Scottish terms for *rough-cast, rough-casting.*

Harlech Dome (*Geol.*). A major geological structure, involving the Cambrian and Ordovician strata of Merionethshire, which dip outwards in all directions from a point near Harlech, the type area of the Harlech Series.

Harlech Series (*Geol.*). A very thick series of alternating massive grits, feldspathic and conglomeratic in part, and shales, the complete succession being (1) Llanbedr Slates, (2) Rhinog Grits, (3) Manganese Shale Group, (4) Barmouth Grits, and (5) Gamlan Shales. The series is poorly fossiliferous, but the Gamlan Shales are known to be Middle Cambrian, and the rest may be Lower Cambrian in age.

harmattan′ (*Meteor.*). A dusty, dry north-easterly wind blowing over W. Africa during the dry season.

harmonic (*Acous.*). Any overtone in a single musical note of complex wave-form which has a frequency which is an exact multiple of the pitch frequency or fundamental, even when the latter is not present objectively. The overtones are counted in order of frequency above, but excluding, the lowest of the detectable frequencies in the note; the label of the harmonic is always its frequency divided by the fundamental. See **overtone.**

harmonic (*Elec. Eng.*). A component of an alternating wave with a frequency which is a multiple of the fundamental frequency. A harmonic having a frequency of *three* times the fundamental frequency, for instance, is called a *third harmonic*.

harmonic (*Radio*). Radiation from a transmitter at a frequency which is an integral multiple of the fundamental frequency.

harmonic analyser (*Elec. Eng*). An apparatus for determining the magnitude and phase angle of the constituent harmonics of an alternating wave form. See **electric harmonic analyser.**

harmonic antenna (*Radio*). An antenna whose overall length is an integral number (greater than one) of quarter-wavelengths.

harmonic distortion (*Elec. Comm.*). Amplitude distortion in which the production of harmonics is of greater importance than inter-modulation products.

harmonic excitation (*Radio*). (1) Excitation of an antenna on one of its harmonic modes.—(2) Excitation of a transmitter from a harmonic of the master oscillator.

harmonic filter (*Radio*). See **filter.**

harmonic generator (*Radio*). See **frequency multiplier.**

harmonic interference (*Radio*). Interference caused by harmonic radiation from a transmitter.

harmonic motion, simple (*Phys.*). See **simple harmonic motion.**

harmonic selective signalling (*Teleph.*). The ringing of subscribers on a party line by alternating currents of selected frequencies, each subscriber having apparatus which responds to his allocated frequency only.

harmonic suppressor (*Radio*). Any device (usually a filter) for suppressing the radiation of harmonics from a transmitter, or for preventing the interference caused thereby.

har′motome (*Min.*). A member of the zeolite group, hydrated silicate of aluminium and barium, crystallising in the monoclinic system, though the symmetry approaches that of the tetragonal system. Best known by reason of the distinctive cruciform twin groups that are not uncommon.

Harnage Shales (*Geol.*). A division of the Caradoc Series of the Ordovician of S. Shropshire.

harness (*Aero.*). The entire system of screened ignition leads enclosed within their screening tubes to prevent electromagnetic radiation from affecting the radio-receiving equipment.

harness (*Weaving*). The part of a jacquard machine by which the warp threads are operated in weaving; it consists of strong cords placed in position by a comber board. Also, the healds in a tappet or dobby loom.

harness cord (*Weaving*). Strong varnished linen twine, used to connect the figuring hooks with the mails that lift the warp threads in a jacquard loom.

harp pendant (*Gas Fittings*). A gas pendant carrying the burner at the centre of a suspended loop.

harpactoph′agous (*Zool.*). Predatory.

harriers (*Mining*). Trammers, putters, or drawers employed to convey trucks or tubs from the working face. They may help load the trucks.

Harris process (*Met.*). An alternative method of softening lead. Arsenic, antimony, and tin are oxidised by adding sodium nitrate and lead oxide, and the oxides formed are caused to react with sodium hydroxide and chloride to form arsenates, antimonates, and stannates.

harrow (*Agric. Mach.*). A type of light cultivator without wheels; it is dragged over the ground for the purpose of pulverising and levelling it, or for covering seed. See **chain harrow.**

Hartfell Shales (*Geol.*). The second division of the Moffat Shales in the Southern Uplands of Scotland, a condensed sequence of graptolitic shales equivalent to part of the Bala Series of the Ordovician System.

Hartley oscillator (*Radio*). A triode valve oscillator circuit consisting essentially of a parallel resonant circuit connected between the grid and anode, the cathode being connected to a tapping-point along the coil.

Hartman dispersion formula (*Light*). An empirical expression for the variation of the refractive index μ of a material with the wavelength of the light:

$$\mu = \mu_0 + \frac{c}{(\lambda - \lambda_0)^a},$$

μ_0, c, λ_0, and a being constant for a given material. For glass, a may be taken as unity. See also **Cornu-Hartman formula.**

Hartnell governor (*Eng*). An engine governor in which the vertical arms of two or more bell-crank levers support heavy balls, the horizontal arms carrying rollers which abut against the central spring-loaded sleeve operating the engine-governing mechanism.

Hartshill Quartzite (*Geol.*). The basal division of the Cambrian System, occupying the same stratigraphical position as the Wrekin and Malvern Quartzites; extensively quarried for road metal in the neighbourhood of Nuneaton, Warwickshire.

hartshorn, spirits of (*Chem.*). See **spirits of hartshorn.**

Hartwell Clay (*Geol.*). The local equivalent of the Portland Sand occurring in the Aylesbury district.

Harvard (*Textiles*). A heavy-weight cotton shirting material with a twill weave, and, generally, a fancy stripe.

Harvard twill (*Textiles*). The 2-and-2 twill.

Harvard classification (*Astron.*). A method of classifying stellar spectra, employed by the compilers of the Draper Catalogue of the Harvard Observatory and now in universal use. It consists of the sequence O B A F G K M N R (sometimes called the *main sequence*), with further subdivision of the classes by numbers.

harvest mite (*Vet.*). Larval forms, known as *Trombicula* (*Leptus*) *autumnalis*, of a species of mite known as *Trombidium holosericeum*. The larval forms sometimes penetrate the skin of man, animals, and birds.

harvest moon (*Astron.*). The name given in popular language to the full moon occurring nearest to the autumn equinox. Owing to certain relations holding at that time between its daily motions, it rises on several successive nights almost at the same hour, instead of progressively later, and was formerly therefore of use to harvesters working after sunset.

harvester-thresher (*Agric. Mach.*). A machine, mounted on a chassis, which performs the operations of a binder and a thresher.

Harvey meter (*Photog.*). A meter for calculating the photographic exposure to be given, taking into account prevailing conditions.

harz jig (*Mining*). A fixed screen through which water is made to pulsate by means of a plunger in order to separate heavy minerals from gangue or waste.

hasp (*Build.*). A fastening device in which a slotted plate fits over a staple and is secured to it by means of a padlock or peg.

Hassal's corpuscles (*Zool.*). Nests of flattened, concentrically arranged epithelial cells occurring in the medulla of the thymus gland of higher Vertebrates.

hastate (*Bot.*). Having two somewhat out-turned lobes at the base of a leaf; halbert-shaped.

Hastings Beds, Hastings Sands Group (*Geol.*). The lower of the two major divisions of the Wealden Series, comprising the Fairlight Clay, Ashdown Sands, Wadhurst Clay, and Tunbridge Wells Sand. By some regarded as the highest division of the Jurassic System; by others as the lowest Cretaceous series.

Hastings Series (*Geol.*). See **Timiskaming Group.**

hat-leather packing (*Eng.*). An L-section leather ring, gripped between discs to form a piston, or similarly attached to the ram of a hydraulic machine to prevent leakage.

hatch (*Build.*). A door closing only the lower half of a door opening.

hatchet (*Carp., etc.*). A small axe used for splitting or rough-dressing timber.

hatchet iron (*Plumb.*). A particular form of *copper bit* (q.v.) having an edged end instead of a point.

hatchet stake (*Eng.*). A smith's tool having a sharp horizontal edge when supported by the anvil; used for bending sheet metal. See **stake.**

Hatschek's nephridium (*Zool.*). In *Cephalochorda*, an anterior dorsal nephridium opening into the pharynx just behind the mouth.

Hatschek's pit (*Zool*). In *Cephalochorda*, a small depression arising from the left head cavity and opening into the cavity of the oral hood.

hauerite, how'er-it (*Min.*). A rare brownish-black sulphide of manganese, occurring as small cubic crystals in clay or schist.

haul (*Civ. Eng.*). In the construction of an embankment by depositing material from a cutting, the *haul* is the sum of the products of each load by its haul distance.

haul (*Mining*). To pull along the level by animals or mechanical means.

haul (*Teleph.*). The relative length of a trunk line.

haul distance (*Civ. Eng.*). The distance, at any particular time, that excavated material has to be carried before deposition in order to form an embankment.

hauling rope (*Civ. Eng.*). See **traction rope.**

haulm, hawm (*Bot.*). A stem of a grass. *

haunch (*Join.*). The part forming a stub tenon, left near the root of a haunched tenon. Also called a HAUNCHEON.

haunches (*Build., Civ. Eng.*). See **flanks.**

haunched tenon (*Join.*). A tenon from the width of which a part has been cut away, leaving a haunch near its root.

hauncheon (*Join.*). See **haunch.**

haunching (*Join.*). A mortise cut to receive the haunch of a haunched tenon.

hausmannite, hows'— (*Min.*). A blackish-brown crystalline form of manganese oxide, occurring (rarely) with other manganese ores, as in the Lake Superior district.

haustel'lum (*Zool.*). In *Diptera*, the distal expanded portion of the proboscis.—*adj.* **haustellate.**

haustor'ium (*Bot.*). (1) A lateral hypha produced by the mycelium of a parasitic fungus, which obtains nutriment from the host.—(2) A modified root or shoot of a higher plant living as a parasite, serving to attach the parasite to the host, and to obtain nourishment from it.—(3) The same as the foot of the embryo of a fern.

haut-pas, haute-pace, ō pa, ōt— (*Build.*). A *half-pace* (q.v.).

haüynite or **haüyne,** hoi'nit, hoin (*Min.*). A feldspathoid, crystallising in the cubic system, consisting essentially of silicate of aluminium and sodium, with sodium sulphate; occurs as small blue crystals, chiefly in soda-trachytes.

haven cap (*Paper*). A standard size of brown paper, 21 × 26 in.

Haver'sian canals (*Zool.*). Small channels pervading compact bone and containing blood-vessels.

Haversian fringes (*Zool.*). Long finger-shaped projections of the surface of synovial membranes.

Haversian lamellae (*Zool.*). In compact bone, the concentrically arranged lamellae which surround a Haversian canal.

Haversian spaces (*Zool.*). In the development of bone, irregular spaces formed by the internal absorption of the original cartilage bone.

Haversian system (*Zool.*). In compact bone, a Haversian canal with the Haversian lamellae which surround it.

hawk (*Plast.*). A small square board used to carry plaster or mortar; held by means of a central handle on its under surface.

hawk's eye (*Min.*). A dark-blue form of silicified crocidolite found in Griqualand West; when cut *en cabochon*, it is used as a semi-precious gemstone.

hawser (or **hawse-**) **pipe** (*Ship Constr.*). A tubular casting fitted to the bows of a steamer, through which the anchor chain or cable runs out.

hay-band (*Foundry*). See **straw-rope.**

hay-elevator (*Agric. Mach.*). A mechanically driven endless band, fitted with prongs, on to which hay is forked for transport to a rick.

hay-fever (*Med.*). Paroxysmal attacks of running at the nose, associated with congestion and irritation of the nasal mucous membrane and of the eyes, due to specific sensitivity to grass pollens.

hay-loader (*Agric. Mach.*). A machine towed behind a hay wagon and worked by its land wheels. It picks up the hay, and conveys it to the wagon by means of a trough and reciprocating rake-bars.

hay-stacker (*Agric. Mach.*). A machine which throws hay on to a rick with an action like a catapult.

hazard (*Build.*). A fire risk in connexion with a building.

See **external—** **internal—**

hazel rods (*Eng.*). Thin hazel rods used as handles for smiths' tools (e.g. chisels) to absorb the shock when struck by the sledge-hammer.

Hb (*Chem.*). A symbol for a molecule of haemoglobin minus the iron atom.

H.B.S. (*Carp.*). The common abbrev. for *herring-bone strutting* (q.v.).

He (*Chem.*). The symbol for *helium.*

H.E. shell (*Ammunition*). Shell designed to cause damage to personnel and material, both by fragmentation of the shell body and by the force of explosion.

head. A generic term for the essential part of an apparatus or machine, as distinguished from other parts which are subsidiary to the main function but assist its action. See specific senses below.

head (*Arch.*). The capital of a column.

head (*Bind., Typog.*). The top edge of a volume: the top margin of a sheet. See **fore-edge, tail.**

head (*Bot.*). (1) A group of sterigmata and conidia crowded into a dense mass, of rounded outline.—(2) A dense inflorescence of small, crowded, usually sessile flowers, surrounded by an involucre.

head (*Build.*). See **lintel.**

head (*Carp., Join.*). The upper end of a vertical timber.

head (*Eng.*). (1) Any part having the shape or position of a head, e.g. the *head* of a bolt.—(2) Any part or principal part analogous to a head, e.g. the head of a hammer or a lathe.

head (*Hyd. Eng.*). The energy possessed per unit weight of a fluid, due to (1) its elevation above some datum, (2) its velocity, (3) its pressure.

head (*Mining*). (1) An advance main roadway driven in solid coal.—(2) The top portion of a seam in the coal face.—(3) The difference in air pressure producing ventilation.—(4) The whole falling unit in a stamp battery, or merely the weight at the end of the stem.

heads (*Build.*). A term applied to the tiles forming a course around the eaves.

headband (*Bind.*). A decorative band of silk or other material at the head of a book, between the back and the cover.

head-bay (*Hyd. Eng.*). The part of a canal lock immediately above the head-gates.

headframe (*Mining*). The steel or timber frame at the top of a shaft, which carries the sheave or pulley for the hoisting rope, and serves various other purposes.

head-gates (*Hyd. Eng.*) The gates at the high-level end of a lock.

headgear (*Mining*). See **headframe.**

head hitcher (*Mining*). The man in charge of signals, loading, and unloading at shaft bottom in a mine.

head kidney (*Zool.*). In some Invertebrates, an anterior larval nephridium: in Vertebrates, the pronephric kidney, usually present in the embryo only.

head-lamp (*Illum.*). (1) A lamp and reflector for projecting a beam of light ahead of an automobile, locomotive, etc.—(2) A lamp for strapping to the forehead (e.g. that used by surgeons).

headline (*Typog.*) The line of type placed at the top of a page, giving either the title of the book or the chapter heading.

head metal (*Foundry*). The metal contained in the runner bush, or in the riser of a mould.

head moulding (*Build.*). A moulding situated above an aperture.

head nailing (*Build.*). The method of nailing slates on a roof in which nails are driven in the slates near their heads or higher edges. Cf. *centre nailing.*

head of drain (*San. Eng.*). The highest point in a system of drain pipes.

headphones (*Radio*). Telephone receivers attached to a band or strap and worn about the head.

head race (*Hyd. Eng.*). A channel conveying water to a hydraulically operated machine.

head-rail (*Join.*). The horizontal member of a door-case.

head resistance (*Aero.*). See **drag.**

headroom (*Build.*). The uninterrupted height within a building on any floor, or within a staircase, tunnel, doorway, etc.

headstock (*Eng.*). In general, a device for supporting the end or head of a member or part; e.g. (1) the part of a lathe that carries the spindle, (2) the part of a planing machine that supports the cutter or cutters, (3) the supports for the gudgeons of a wheel, (4) the movable head of some measuring machines.—(*Textiles*) The part of a machine which contains the main gearing and the drive for a beam.

head tree (*Carp.*). A timber block placed on the top of a post, so as to provide increased bearing surface.

head valve (*Eng.*). The delivery valve of a pump, as distinct from the suction or *foot valve* (q.v.).

head wall (*Build.*). A wall built in the same plane as the face of a bridge arch.

headway (*Build.*). *Headroom* (q.v.).

heads-and-feet printing (*Cinema.*). The practice of printing positives with the negative film going backwards as well as forwards, to reduce wear of the negative.

header (*Build.*). A whole brick which has been laid so that its length is at right-angles to the face of the wall.

header (*Eng.*). A box or manifold supplying fluid to a number of tubes or passages, or connecting them in parallel.

header or **heading man** (*Mining*). The man in charge of driving a heading.

header joist (*Carp.*). A *trimmer* (q.v.).

heading (*Build.*). A *heading course* (q.v.).

heading (*Civ. Eng.*). A relatively small passage driven in the line of an intended tunnel, the latter being afterwards formed by enlarging the former.—(*Mining*) Passage-way through solid coal.

heading bond (*Build.*). The form of bond in which every brick is laid as a header, each 4½ in. face breaking joint above and below; used for footings and corbellings but not for walling.

heading chisel (*Carp., Join.*). A *mortise chisel* (q.v.).

heading course (*Build.*). An external or visible course of bricks which is made up entirely of headers.

heading joint (*Join.*). A joint between the ends of boards abutting against each other.—(*Build., Masonry*) A joint between adjacent stones in the same course.

heading man (*Mining*). See **header.**

heading tool (*Eng.*). A tool for swaging bolt heads, or for forming bolt heads, etc., in hand forging.

Headon Beds (*Geol.*). A Tertiary formation occurring in the Hampshire Basin, usually referred to the Oligocene, though the Lower Headon Beds are regarded as the highest part of the Bartonian cycle of the Eocene. The formation comprises fresh-water limestones, marls, lignitic sands, and (in the Middle Headon) marine glauconitic sandy clays.

heald (*Textiles*). (1) The part of the loom mechanism used to raise and lower the warp in a tappet or dobby loom. It consists of an eye (formed of twine or wire) through which a thread is drawn.—(2) The shaft upon which a large number of healds are mounted.

healding (*Weaving*). See **looming.**

healing (*Build.*). The operation of covering a roof with tiles, lead, etc.

heapstead (*Mining*). The buildings and surface works around a colliery shaft.

hearing (*Acous.*). The subjective appreciation of externally applied sounds.

hearing loss (*Acous.*). The diminution of hearing acuity as compared with the acuity of the average ear. Measured by the area of the normal audition diagram which is not appreciated. See also **relative hearing loss.**

heart (*Zool.*). A hollow organ, with muscular walls, which by its rhythmic contractions pumps the blood through the vessels and cavities of the circulatory system.

heart-block (*Med.*). The condition in which a lesion of the special tissue that conducts the contraction impulse from the auricle to the ventricle results in a different rate of contraction of these two parts of the heart.

heart bond (*Masonry*). A form of bond having no through-stones, headers consisting of a pair of stones meeting in the middle of the wall, the joint between them being covered by another header stone.

heart-burn (*Med.*). A burning sensation felt at any point in the mid-line between the Adam's-apple and the lower end of the sternum; a symptom of functional dyspepsia.

heart cam (*Horol.*). A cam in the form of a heart, used in stop watches and chronographs to bring the recording hand instantly back to zero, on pressing the button. Also called HEART PIECE.

heart shake (*Timber*). A shake starting at the heart of a log.

heartwater (*Vet.*). A filterable-virus infection of cattle, sheep, and goats of South Africa which is transmitted by the tick *Amblyomma hebraeum.*

heart wood (*Bot.*). The dense, and often dark-coloured wood which lies in the inner part of a trunk or branch, making up the bulk of such a member; *heart wood* furnishes good timber, both for colour and durability.

hearth (*Build.*). The floor of the fireplace.

hearth (*Glass*). That part of the furnace in which heat is developed for the purpose of melting glass.

hearth (*Met.*) In reverberating furnaces, the bottom on which the charge is placed, either for smelting, or heating solid metals. In blast-furnaces, the part below tuyeres where molten metal (or matte) and slag collect.

hearting (*Build.*) The operation of building the inner part of a wall, between its facings.

heat (*Phys.*). That which when given to a body raises its temperature, and when taken from a body lowers its temperature. Heat is a form of energy into which mechanical energy may be converted. For some of the chief branches in the study of heat see **temperature, thermometry, heat units, specific heat, latent heat, calorimetry, mechanical equivalent of heat, radiant heat, radiation, conductivity (thermal).**

heat (*Eng.*). The term sometimes used for *temperature*; e.g. forging or welding *heat.*

heat (*Zool.*). The period of sexual desire.

heat balance (*Eng.*). A heat-energy account drawn up for a boiler or engine trial, showing how the heat energy supplied is expended by the plant.

heat coil (*Elec. Comm.*). A small protective resistance coil, which heats on prolonged excess current in telephone and telegraph lines, melts a small quantity of solder, and disconnects the line, so preventing possible damage to apparatus.

heat-cramps (*Med.*). See **cramps.**

heat drop (*Eng.*). See **adiabatic heat drop.**

heat index (*Astron.*). The difference between the radiometric magnitude of a star (as determined by some heat-measuring instrument, such as the thermo-couple) and its visual magnitude; hence an indication of the proportion of heat to light received from a star.

heat insulation (*Build.*). The property, possessed in varying degrees by different materials, of impeding the transmission of heat.

heat of formation (*Chem.*). The net quantity of heat evolved during the formation of one gram-molecule of a substance from its component elements.

heat of solution (*Chem.*). The quantity of heat evolved or absorbed when a substance is dissolved in a large volume of a solvent.

heat regenerators (*Chem.*). Stoves which are alternately heated by the waste gases from an industrial process and used to heat up the incoming gases.

heat-resisting steel (*Met.*). A steel with high resistance to oxidation, and moderate strength at high temperatures, i.e. above 500° C. Alloy steels, of a wide variety of compositions, which usually contain large amounts of one or more of the elements chromium, nickel, or tungsten, are used.

heat run (*Elec. Eng.*). A test in which an electric machine or other apparatus is operated at a specified load for a long period in order to ascertain the temperature which it reaches.

heat spot (*Zool.*). An area of the skin sensitive to heat owing to the presence of certain nerve-endings beneath the skin.

heat-stroke (*Med.*). Heat hyperpyrexia. The combination of coma, convulsions, a high temperature (even as high as 110° F.), and other symptoms, as a result of exposure to excessive heat.

heat treatment (*Met.*). Generally, any heating operation performed on a solid metal; e.g. heating for hot-working, or annealing after cold-working. Particularly, the thermal treatment of steel by normalising, hardening, tempering, etc.; used also in connexion with aluminium and other precipitation-hardening alloys.

· **heat transfer.** See **conduction of heat, convection of heat, radiation.**

heat units. See **calorie, British Thermal Unit.**—**heat value.** See **calorific value.**

heater (*Build.*). Appliance for heating a building.

heater (*Thermionics*). The conductor carrying the current for heating an equipotential cathode, generally enclosed by the cathode.

heating coefficient (*Elec. Eng.*). A term sometimes used to denote the temperature rise of a piece of electrical apparatus; expressed in degrees per watt of heat dissipated from a surface.

heating curves (*Met.*). Curves obtained by plotting time against temperature for a metal heating under constant conditions. The curves show the absorption of heat which accompany melting, polymorphic changes in pure metals, and various transformations in alloys.

heating-element (*Elec. Eng.*). The heating-resistor, together with its former, of an electric heater, electric oven, or other device in which heat is produced by the passage of an electric current through a resistance.

heating limit (*Elec. Eng.*). See **thermal limit.**

heating-resistor (*Elec. Eng.*). The wire or other suitable material used as the source of heat in an electric heater.

heaves (*Geol., Mining*). (1) The slip along a fault (horizontal components).—(2) Risings of the floor of a mine.

heaves (*Vet.*). See **emphysema (cutaneous).**

heavier-than-air craft (*Aero.*). See **aerodyne.**

heaviness (*Aero.*). See **nose— tail—**

Heaviside (or **Kennelly-Heaviside**) **layer** (*Radio*). An ionised region of the upper atmosphere which reflects the waves from a transmitter on the earth. It is now known that there are at least two such layers, existing at different heights. See also **Appleton layer, E-layer.**

Heaviside unit function (*Elec. Comm.*). A *step* (q.v.) in which the change in amplitude is unity.

heavy crop (*Geol.*). In the systematic examination of a sediment the small quantity of accessory minerals it contains is separated from the predominant quartz by passing the whole through bromoform. Quartz and feldspar are lighter than the latter and therefore float on its surface; but the accessory minerals, such as zircon, rutile, anatase, brookite, kyanite, and iron ores, sink to the bottom of the container and may be separated for detailed examination. The grains heavier than bromoform constitute the *heavy crop,* which provides valuable evidence of the provenance of the sediment.

heavy hydrogen (*Chem.*). See **deuterium.**

heavy joist (*Carp.*). A term sometimes applied to a timber beam between 4 in. and 6 in. wide and 8 in. or more deep.

heavy minerals (*Geol.*). Small crystals or grains of minerals, with a specific gravity greater than that of bromoform, occurring, usually in small quantities, in sediments and their indurated equivalents.

heavy spar (*Min.*). See **barytes.**

heavy water (*Chem.*). Deuterium oxide, ${}^2_1H_2O$. Its chemical properties are the same as those of normal (light) water, but it differs in physical properties, e.g. it is about 10% denser; m.p. 3·80° C., b.p. 101·42° C. Its concentration in ordinary fresh water is about 1:6000, which value may be increased by electrolysis.

he'bephre'nia (*Psychiatry*). A type of schizophrenia, characterised mainly by marked emotional disturbances, by wild outbursts of excitement alternating with periods of weeping and depression. Eventually it entails a poverty of emotional life, accompanied by delusions and hallucinations. Tends to occur at an earlier age than the catatonic or paranoid types.

Heb'erden's nodes (*Med.*). Small bony knobs occurring on the bones of the fingers of old people.

heb'etate (*Bot.*). Bearing a blunt or soft point.

heb'etude (*Med.*). Lethargy and mental dullness, with impairment of the special senses.

Hebridean Gneiss, Lewisian Gneiss (*Geol.*). The crystalline gneissose Pre-Cambrian rocks of the N.W. Highlands of Scotland, consisting chiefly of orthogneisses covering a wide range of composition and including also paragneisses and schists of sedimentary origin, such as the Loch Maree Series. The Lewisian rocks are the oldest in Britain. In addition to forming the island of Lewis and the greater part of the Hebrides, they outcrop in the coastal belt of the mainland, southwards from Cape Wrath.

hebronemi'asis, cutaneous (*Vet.*). See **bursattee.**

heck (*Join.*). A door latch.

heck (*Cotton*). The traverse guide of a warping machine.

hecto-ampere balance (*Elec. Eng.*). A Kelvin current balance having a range from 6 to 600 amperes.

hectocot'ylus (*Zool.*). In some male *Cephalopoda*, one of the tentacles modified for the purpose of transferring sperm to the female.

heddle (*Weaving*). The name formerly applied to a heald shaft. See **heald.**

hed'enbergite (*Min.*). An important lime-iron pyroxene, $CaFeSi_2O_6$, occurring as black crystals, and also as a component in many of the rock-forming clinopyroxenes.

hedgehog transformer (*Radio*). A form of audio transformer, used in the early types of receiver, in which the core consists of a bundle of iron wires which are bent back over the windings to form a closed magnetic circuit. Also used with early power transformers.

Hedley's dial (*Surv.*). A form of compass adapted for taking inclined sights; it consists of a pair of sighting vanes (or a telescope capable of rotation about a horizontal axis), carrying with them a vertical graduated arc moving over a fixed reference mark.

hedon'ic glands (*Zool.*). In some Reptiles, glands of the skin which secrete a pleasant-smelling substance during the breeding season.

hed'rioblast (*Zool.*). See **medusoid.**

heel (*Build.*). The lower end of a timber, as opposed to the head, or upper end.

heel (*Carp., Join., etc.*). The back end of a plane.

heel (*Elec. Eng.*). See **leaving edge.**

heel-post (*Hyd. Eng.*). The vertical post at one side of a lock-gate, about which the lock-gate swings. Also called a QUOIN-POST.

heel strap (*Build.*). A wrought-iron strap fastening the foot of a principal rafter to the tie-beam in a timber truss. The strap is U-shaped, and is threaded at the ends to take a cover plate so that the joint is completely encircled.

heel (*Hyd. Eng.*). The angle of inclination of a floating vessel from the vertical.

heeling error (*Ships*). The error in a ship's compass due to variation of the effect of the vertical component of the earth's field caused by the heeling over of the ship; it can be corrected by a group of vertical permanent magnets.

Hefner candle (*Illum.*). The standard of luminous intensity used in Germany, being the light produced by a Hefner lamp burning under specified conditions. It is equal to 0·9 international candle.

Hefner lamp (*Illum.*). A flame lamp of specified dimensions burning amyl acetate. See **Hefner candle.**

Hegar's dilators (*Med.*). A series of bougies of varying sizes for dilating the opening of the uterus into the vagina.

Hehner's test, hā'ner (*Chem.*). A test for the presence of formaldehyde in milk. It is based upon the appearance of a blue or violet ring when the milk is mixed with a dilute ferric chloride solution, and concentrated sulphuric acid is added to form a layer beneath the milk.

height (*Build., Civ. Eng.*). The rise of an arch.

height above base (*Surv.*). A term used in reference to vertical heights above an arbitrary datum, employed when this is more convenient than Ordnance Datum.

height board (*Carp.*). A gauge for the treads and risers of a timber staircase.

height of instrument (*Surv.*). (1) In levelling or trigonometrical survey work, the vertical distance of the plane of collimation of the level, or the horizontal axis of the theodolite above datum.—(2) In tacheometry, the vertical distance of the horizontal axis of the instrument above ground-level.

Heine-Medin disease, hī'ne mā-dĕn (*Med.*). Acute anterior *poliomyelitis* (q.v.).

Hel'berger furnace (*Elec. Eng.*). A form of electric crucible furnace.

Helderberg (or **Helderbergian**) **formation** (*Geol.*). The lowest formation of the Devonian System of N. America, typically exposed in the Helderberg Mts. of New York, where the strata rest conformably on the uppermost Silurian.

heleoplank'ton (*Ecol.*). The mixture of true plankton and benthon found in small ponds and pools.

heli'acal rising, heliacal setting (*Astron.*). The rising or setting of a star or planet simultaneously with the setting of the sun; much observed in antiquity as a basis for a solar calendar for agricultural purposes, it is now quite obsolete as a special study.

helian'thine (*Chem.*). $(CH_3)_2N\cdot C_6H_4\cdot N{:}N\cdot C_6H_4\cdot SO_3H$, *p*-dimethylamino-azobenzene-*p*-sulphonic acid, a chrysoidine dye. The sodium salt of this acid is methyl orange, used as an indicator.

helic-. See **helix.**

helical gears (*Eng.*). Gear-wheels in which the teeth are not parallel with the wheel axis, but *helical* (i.e. parts of a helix described on the wheel face), being therefore set at an angle with the axis. See **double-helical gears.**

helical hinges (*Join.*). A type of hinge used for hanging swing-doors which have to open both ways.

helical spring (*Eng.*). A spring formed by winding wire into a helix along the surface of a cylinder; sometimes erroneously termed a *spiral spring* (q.v.).

hel'icoid (*Biol.*). Coiled like a flat spring.

helicoid cyme (*Bot.*). A sympodium in which the branches all develop on the same side of the relatively main axis, but not in the same plane.

helicoid dichotomy (*Bot.*). A branch system with repeated dichotomies, giving each time a weak and a strong branch, the latter always on the same side.

helicop'ter (*Aero.*). A heavier-than-air flying-machine, whose chief support in flight is derived from the reaction of the air upon a system of power-driven revolving planes or rotors.

helicot'rema (*Zool.*). An opening at the apex of the cochlea, by which the scala vestibuli communicates with the scala tympani.

helio- (Greek *hēlios*, sun). A prefix used in the construction of compound terms pertaining to the sun; e.g. *heliometer* (q.v.).

heliocentric parallax (*Astron.*). See **annual parallax.**

he'liodor (*Min.*). A beautiful variety of clear yellow beryl occurring near Rössing in S.W. Africa; much prized as a gemstone.

he'liograph (*Surv.*). An instrument similar to the heliostat but fitted with a spring device by which it can be made to flash long or short flashes.

heliom'eter (*Astron., etc.*). An instrument for determining the sun's diameter and for measuring the angular distance between two celestial objects in close proximity. It consists of a telescope with its object glass divided along a diameter, the two halves being movable, so that a superposition of the images enables a value of the angular separation to be deduced from a reading of the micrometer.

helion filament (*Elec. Eng.*). An electric-lamp filament consisting of carbon with an outer coating of silicon.

he'liophyte (*Bot.*). A plant able to live with full exposure to the sun.

helio-sci'ophyte (*Bot.*). A plant which can live in shade, but does better in the sun.

he'liostat (*Astron.*). An instrument designed on the same principle as the coelostat, but with certain modifications that make it more suitable for reflecting the image of the sun than for use on a larger region of the sky; hence used, in conjunction with a fixed instrument, especially for photographic and spectroscopic study of the sun.—(*Surv.*) An instrument used to reflect the sun's rays in a continuous beam, so as to serve as a signal enabling a station to be sighted over long distances.

heliotax'is, heliotro'pism (*Biol.*). Response or reaction of an organism to the stimulus of the sun's rays.—*adj.* **heliotac'tic.**

heliothe'rapy (*Med.*). The treatment of disease by the exposure of the body to the rays of the sun.

he'liotrope (*Min.*). See **bloodstone.**

heliotrope (*Surv.*). A form of *heliograph* (q.v.).

heliotro'pin (*Chem.*). A synonym for *piperonal* (q.v.).

heliotro'pism (*Biol.*). See **heliotaxis.**

Heliozo'a (*Zool.*). An order of *Sarcodina*, the members of which generally occur in fresh water and have numerous fine radial axopodia, which do not anastomose; the ectoplasm is usually vacuolated; there is no shell or central capsule.

helium (*Chem.*). Symbol, He. An inert element in Group O of the periodic system, the lightest of the rare gases. At. no. 2, at. wt. 4·002, valency 0. It is colourless, odourless, and monatomic. M.p. below −272·2° C., b.p. −268·9° C., density 0·17847 gm. per litre at N.T.P. Helium constitutes about 1 part in 200,000 by volume of the atmosphere and occurs in various natural gases, especially in the U.S.A. It is extracted by liquefaction processes, for use in filling airships.

helium diving bell. A *diving bell* (q.v.) in which the nitrogen in the compressed-air is replaced by helium, thus reducing tendency to the *bends* (q.v.), and permitting effective operation at greater depths than normal. Used as a technique in rescuing men from submarines.

helium stars (*Astron.*). Those stars, of spectral type B in the Harvard classification, whose spectrum shows only dark lines, in which those due to the element helium predominate.

he'lix (Latin *helix*, gen. *helicis*, a spiral). A line, thread, or wire curved into a shape such as it would assume if wound in a single layer round a cylinder; a form like a screw-thread.

helix (*Radio*). An obsolescent term for an inductance coil of helical form, especially the air-spaced coil used for tuning a transmitting antenna.

helix (*Zool.*). A spirally coiled structure.

Heller's test (*Chem.*). A test for the identification of albumins, based upon the fact that many proteins are precipitated when their aqueous solution is floated over concentrated mineral acids.

Hellesen cell (*Elec. Eng.*). A dry cell with zinc and carbon electrodes and a depolariser of manganese dioxide.

helm (*Meteor.*). The *helm wind, cloud,* and *bar* constitute a phenomenon on the western slope of Crossfell Range, Cumberland. The cold wind blows down under the cloud and ends under the bar, which is a further parallel and whirling cloud.

Helmert's formula (*Phys.*). An expression giving the value of g, the acceleration due to gravity, for a given latitude and altitude:

$$g = 980{\cdot}616 - 2{\cdot}5928 \cos 2\lambda + 0{\cdot}0069 \cos^2 2\lambda - 0\,0003086H,$$

where λ is the latitude and H is the height in metres above sea-level, g being in cm. per sec. per sec.

helmet (*Elec. Eng.*). The iron cap or pole piece sometimes fitted to a lodestone to form an armed lodestone.

helmet (*Civ. Eng.*) A cast-iron *dolly* (q.v.) used at the head of a reinforced concrete pile, the two being separated by a sand cushion.

helmet (*Zool.*) In some species of *Bucerotidae* (Hornbills), a casque-like structure at the base of the upper bill: in *Insecta*, the galea.

helmet-shaped (*Bot.*). Arched and hollow like a helmet.

Helmholtz galvanometer (*Elec. Eng.*). A type of tangent galvanometer in which an approximately uniform field is produced by having two coils parallel to each other, a few inches apart.

Helmholtz resonance (*Acous.*). The type of acoustic resonance arising in a flask-shaped cavity (Helmholtz resonator) and, by extension, in flat cavities, such as a recessed window or the cavity in front of a microphone diaphragm.

Helmholtz resonator (*Acous.*). An acoustic resonator in which the mass reactance of a short column of air neutralises at a fairly definite frequency the reactance of the stiffness of the volume contained in an enclosure, which communicates with the open air only through the said column. Used at one time for analysing complex sounds.

Helmin'thes (*Zool.*). A name formerly used in classification to denote a large group of worm-like Invertebrates now split up into *Platyhelminthes*, *Nematoda*, and several smaller groups.

helminthi'asis (*Med.*). Infestation of the body with parasitic worms.

hel'minthoid (*Bot.*). Shaped like a worm.

hel'ophyte (*Bot.*). A bog plant.

hel'otism (*Zool.*). See **dulosis.**

helve (*Tools*). The handle of an axe, hatchet, or similar chopping tool.

helve hammer (*Eng.*). An obsolete form of trip hammer, used in forging.

Helvetia leather (*Leather*). See **crown leather.**

hem-, hema-, hemo-. Prefix. Variant of *haem-, haema-, haemo-* (q.v.). See **haemorrhage, haemorrhoid,** etc.

hemely'tra (*Zool.*). The fore wings of *Heteroptera*, which are thickened at their bases like elytra while the distal portion remains membranous.

hemeralo'pia (*Med.*). Day-blindness, objects sometimes being better seen in a dull light. The term is wrongly used also to mean night-blindness (see **nyctalopia**).

hemi- (Greek *hemi*, half). A prefix used in the construction of compound terms; e.g. *hemianopia* (q.v.).

hemianaesthe′sia, hemianesthe′sia (*Med.*). Loss of sensibility to touch on one side of the body; usually connotes also loss of sensibility to pain and temperature.

hemianalge′sia (*Med.*). Loss of sensibility to pain on one side of the body.

hemiangiocar′pic, hemiangiocar′pous (*Bot.*) Descriptive of the fruit body of a fungus when the hymenium begins its development inside a closed chamber, but is exposed at maturity.

hemiano′pia, hemianop′sia (*Med.*). Loss of half of the field of vision.

hemiatax′y, hemiatax′ia (*Med.*). Loss of co-ordination of the muscles of one side of the body.

hemiat′rophy (*Med.*). Wasting of muscles of one side of the body, or of one half of a part of the body.

hemiaut′ophyte (*Bot.*). A parasite which contains chlorophyll and can make some carbohydrate material.

hemiblas′tula (*Zool.*). An abnormal blastula produced by the destruction of one of the two primary blastomeres and the cultivation of the other.

hem′ibranch, —brank (*Zool.*). The single row of gill lamellae or filaments, borne by each face of a gill-arch in Fish: a gill-arch with respiratory lamellae or filaments on one face only.

hemicarp (*Bot.*). See **mericarp.**

hemiceph′alous (*Zool.*). Said of dipterous larvae which possess a reduced head or jaw capsule which is incomplete posteriorly and can be retracted into the thorax.

Hemichor′da (*Zool.*). A subphylum of *Chordata*, lacking any bony or cartilaginous skeletal structures; without tail or atrium; having a reduced notochord in the pre-oral region, and a superficial central nervous system; the three primary coelomic cavities persist in the adult.

hemichore′a (*Med.*). Chorea affecting one side of the body.

hemicolloid (*Chem.*). A particle up to 250 A ($2{\cdot}5\times10^{-6}$ cm.) in length, and consisting of 20-100 molecules.

hemicra′nia (*Med.*). Headache affecting one side of the head.

hemicryp′tophyte (*Bot.*). A plant which develops its resting buds just above or below the surface of the soil, where they are protected by litter or by a thin layer of soil.

hemicrys′talline rocks (*Geol.*). Those rocks of igneous origin which contain some interstitial glass, in addition to crystalline minerals. Cf. *holocrystalline rocks.*

hemicy′clic (*Bot.*). Said of a flower which has some of its parts inserted in spirals and some in whorls.

hemiem′bryo (*Zool.*). An abnormal embryo, of which one half in the sagittal plane is complete and normal while the other half is composed of dead tissue; obtained by the destruction of either of the first two blastomeres and the cultivation of the other.

hemigas′trula (*Zool.*). An abnormal embryo representing half of a complete gastrula, together with dead tissue obtained by the destruction of one of the first two blastomeres and the cultivation of the other.

hemignathous, —gnā′thus (*Zool.*). Having jaws of unequal length.

hemihe′dral forms (*Crystal.*). Crystal forms the faces of which are parallel to, and have the same indices as, certain *holohedral forms* (q.v.); but in consequence of a lower degree of symmetry, half the faces are suppressed. Thus the tetrahedron (four faces) in the cubic system may be regarded as the hemihedral form of the octahedron (eight faces).

hemikaryot′ic (*Cyt.*). Having the haploid number of chromosomes.—*n.* **hemikar′yon.**

hemimetabol′ic (*Zool.*). Showing incomplete metamorphosis, but possessing provisional organs in the larval condition which are wanting in the imago, and which adapt the larva to an aquatic life; as *Odonata*. Cf. *paurometabolic.*

hemimor′phism (*Min.*). The development of polar symmetry in minerals, in consequence of which different forms are exhibited at the ends of bi-terminated crystals. Hemimorphite shows this character in a marked degree.

hemimor′phite (*Min.*). An orthorhombic hydrous silicate of zinc; one of the best minerals for demonstrating polar symmetry, the two ends being distinctly dissimilar. In U.S.A. called CALAMINE or ELECTRIC CALAMINE.

hemimor′ula (*Zool.*). An abnormal embryo with animal and vegetative cells and a segmentation cavity obtained by the destruction of one of the first two blastomeres and the cultivation of the remaining one.

Hemimyaria, —mi-ā′ri-a (*Zool.*). See **Salpida.**

hemiparasite (*Bot.*). See **facultative saprophyte.**

hemipe′nes (*Zool.*). In *Squamata*, the paired eversible copulatory organs.

hemiple′gia (*Med.*). Paralysis of one side of the body.

hemipneustic, —pnū′stik (*Zool.*). (Of *Inserta*) having one or more pairs of spiracles closed. Cf. *holopneustic.*

Hemip′tera (*Zool.*). An order of *Exopterygota*, having two pairs of wings of variable character; the mouth-parts are symmetrical and adapted for piercing and sucking, being formed into a beak with fused palpless stylets; in some forms the females are wingless; many are ectoparasitic, others feed on plant juices. Bugs, Cicadas, Aphids, Plant Lice, Scale Insects, Leaf Hoppers, White Flies, Black Flies, Green Flies, Cochineal Insects.

hemipterygoid, hem-i-pter′— (*Zool.*). In some Birds, a separated portion of the pterygoid which fuses with the palatine.

hemisap′rophyte (*Bot.*). See **facultative parasite.**

hemisection (*Surg.*). The cutting through of half of a part; e.g. of the spinal cord.

hem′isome (*Zool.*). The lateral symmetrical half of an animal.

hemisphere. The half of a sphere, obtained by cutting it by a plane passing through the centre. As applied to the Earth, the term usually refers to the *Northern* or the *Southern hemisphere*, the division being by the equatorial plane.

hemisphere (*Zool.*). One of the cerebral hemispheres (see **cerebrum**).

hemithyroidec′tomy (*Surg.*). Surgical removal of one half of the thyroid gland.

hemitropic winding (*Elec. Eng.*). See **half-coiled winding.**

hemorrhage (*Med.*). See **haemorrhage.**

hemorrhoid (*Med.*). See **haemorrhoid.**

hemp (*Textiles*). The name applied to a number of different types of fibres (common hemp, sunn, manila, sisal), useful chiefly for the making of ropes. The seeds of common hemp (*Cannabis sativa*) yield an oil used in paints, varnishes, and soaps.

Hempel pipette (*Chem.*). A glass pipette used for the measurement of the volume of a gas.

hench (*Build.*). The narrow side of a chimney shaft.

Hendre Shales (*Geol.*). Dark-coloured graptolitic shales lying below the Mydrim Limestone in the Ordovician System of the more westerly parts of S. Wales.

Hengistbury Head Beds (*Geol.*). A series of glauconitic sands and clays occurring in the Bournemouth district; of Eocene age.

Henle's layer, hen'le (*Zool.*). The outermost layer of the inner root sheath of a hair, composed of oblong horny cells with obscure nuclei.

Henle's loop (*Zool.*). The loop formed by a uriniferous tubule when it enters the medulla of the Mammalian kidney and turns round to pass upwards again to the cortex.

Henle's membrane (*Zool.*). A fenestrated membrane which lies immediately outside the endothelium lining a vein or an artery.

Henle's sheath (*Zool.*) In Vertebrates, a prolongation of the perineurium which invests the branches of nerves.

Hennebique pile, en'bĕk (*Civ. Eng.*). A type of reinforced concrete pile having the main bars grouped symmetrically about the centre of the pile and bound together at intervals by means of straps or wire lacing.

He'noch's purpura (*Med.*). A disease characterised by purpura, urticaria, swollen joints, and abdominal pain.

Henrici's notation, hen-rē'chō (*Eng.*). See **Bow's notation.**

Henrietta (*Textiles*). A dress material made from a silk warp and fine Botany weft; woven with the weft Prunelle twill, the picks per inch greatly exceeding the ends per inch.

henry (*Elec. Eng.*). The practical unit of inductance; it is equal to 10^9 electromagnetic units of inductance, or to 10^8 interlinkages per ampere.

henrymeter (*Elec. Eng.*). An obsolete apparatus for measuring inductance; in it an alternating current was passed through the inductance under test and a standard inductance in series, the voltage drop across the two being compared.

Henry's law (*Chem.*). The amount of a gas absorbed by a given volume of a liquid at a given temperature is directly proportional to the pressure of the gas.

Hensen's cells (*Zool.*). In Mammals, large pointed cells, forming a single or double row between Deiter's cells and Claudius' cells, in the cochlea.

Hensen's line (*Histol.*). In striated muscle, an indefinite clear line running transversely across the dark area of each fibre.

he'par sul'phuris (liver of sulphur) (*Chem.*). A reddish-brown product obtained when potassium carbonate and sulphur are heated together.

hepat-, hepato- (Greek *hēpar*, gen. *hēpatos*, the liver). A prefix used in the construction of compound terms; e.g. *hepatitis*.

hepatec'tomy (*Surg.*). Surgical removal of part of the liver.

hepat'ic (*Bot.*). (1) A liverwort.—(2) Dull purplish-red.

hepatic (*Med.*). Pertaining to the liver.

Hepat'icae (*Bot.*). A group of the *Bryophyta* in which the plant which bears the sexual organs is either a dichotomosing thallus or a shoot with a dorsiventral arrangement of the leaves. The capsule usually contains elaters mixed with the spores, and seldom contains a columella. Many of the thalloid forms are known as *liverworts*.

hepatisation (*Med.*). Pathological change of tissue so that it becomes liver-like in consistency; as of the lung in pneumonia.

hepati'tis (*Med.*). Inflammation of the liver.

hepatogenous, —toj'en-us (*Med.*). Having origin in the liver.

hepatolentic'ular degeneration (*Med.*). Wilson's disease. Progressive lenticular degeneration. A progressive disease of the nervous system characterised by involuntary movements, muscular rigidity, difficulty in speech and swallowing, and wasting, associated with cirrhosis of the liver.

hep'atolith (*Med.*). A gall-stone present in the liver.

hepato'ma (*Med.*). A tumour composed of liver tissue.

hepatomeg'aly, hepatomega'lia (*Med.*). Enlargement of the liver.

hepatonephri'tis (*Med.*). Coincident inflammation of the liver and the kidney.

hepatopan'creas (*Zool.*). In many Invertebrates (as *Mollusca, Arthropoda, Brachiopoda*), a glandular diverticulum of the mesenteron, frequently paired, consisting of a mass of branching tubules, and believed to carry out the functions proper to the liver and pancreas of higher Vertebrates.

hepatopex'y (*Surg.*). Fixation of the liver by suturing it to the abdominal wall.

hepatopor'tal system (*Zool.*). The portal circulation of the liver in Vertebrates. Also HEPATIC PORTAL SYSTEM (see **portal system**).

hepatopto'sis (*Med.*). Displacement of the liver downwards into the abdominal cavity.

hepatorrhex'is (*Med.*). Rupture of the liver.

hepatot'omy (*Surg.*). Incision of the liver.

hept- (Greek *hepta*, seven). A prefix used in the construction of compound terms.

hepta- (*Chem.*). Containing seven atoms, groups, etc.

heptam'erous (*Bot.*). Having parts in sevens.

heptane (*Chem.*). C_7H_{16}, a paraffin hydrocarbon, a colourless liquid, b.p. 98° C., sp. gr. 0·68. There are nine paraffins with this formula. The foregoing properties relate to *normal* heptane, which is a constituent of petrol and resembles hexane in its chemical behaviour.

heptava'lent or **septava'lent** (*Chem.*) Capable of combining with seven hydrogen atoms or their equivalent.

heptode (*Thermionics*). A seven-electrode valve containing a cathode, anode, and five grids; used as a frequency changer. The cathode and first two grids form an oscillating triode system which generates the local oscillation, the remaining four electrodes forming a screened-grid system of variable emission, the signal being applied to the fourth grid. Also called PENTAGRID.

heptoses (*Chem.*). A sub-group of the monosaccharoses containing seven oxygen atoms, of the general formula $HO{\cdot}CH_2{\cdot}(CHOH)_5{\cdot}CHO$.

Heraeus lamp (*Med.*). A special form of mercury-vapour lamp, used for medical purposes on account of its high proportion of ultra-violet rays.

herb (*Bot.*). A flowering plant of small or rather small stature, of which the aerial shoots last only as long as is necessary to develop the flowers and the fruits.—*adj.* **herba'ceous.**

herba'ceous (*Bot.*). Soft and green, containing little woody tissue.

herbaceous perennial (*Bot.*). A herb possessing some more or less modified underground stem system, which lasts for a number of years, and sends up each season one or more flowering shoots which die down after flowering and fruiting is completed.

herba'rium (*Bot.*). A collection of dried plants: by extension, the place where such a collection is kept.

Herbst's corpuscle (*Zool.*). A simple form of *Pacinian corpuscle* (q.v.), with fewer tunics and a core of cubical cells surrounding the nerve expansion.

her'cogamy, her'kogamy (*Bot.*). The condition of a flower when the stamens and stigmas are so placed that self-pollination is not possible.

her'cynite (*Min.*). See under **spinel.**

hereditary (*Biol.*). Inherited: capable of being inherited: passed on or capable of being passed on from one generation to another.

heredity (*Biol.*). That factor in evolution which causes the persistence of characters in successive generations.

Hering furnace (*Elec. Eng.*). A special form of electric furnace for melting metals; in it circulation of the molten charge is effected by making use of the pinch effect.

hermaph'rodite (*Bot.*). See **monoclinous.**

hermaphrodite (*Zool.*). Having both male and female reproductive organs in one individual. —*n.* **hermaphroditism.**

hermaphrodite duct (*Zool.*). In *Gastropoda*, the duct by which the ova and spermatozoa pass from the ovotestis to the albumen gland.

Hermel'lifor'mia (*Zool.*). An order of *Cryptocephala*, of tubicolous habit, in which the palps are large and subdivided but have become fused with the peristomium, which forms a huge bilobed hood on the edges of which the palps appear as a series of ridges.

Hermetex (*Build.*). A plastic asbestos preparation used for repairing roofs.

hernia (*Med*). Protrusion of a viscus, or part of a viscus, through an opening or weak spot or defective area in the cavity containing it; especially of an abdominal viscus.

herniot'omy (*Surg.*). Cutting operation for hernia.

heroin, her'ō-in (*Chem.*). A morphine alkaloid occurring in hashish. It is diacetylmorphine. Heroin is a dangerous drug of addiction, its distribution being limited by law. Its physiological action is narcotic, resembling that of morphine.

Héroult furnace, ā-roolt (*Met.*). An electric-arc furnace used in melting steel and other metals The metal in the hearth acts as conductor for current flowing between electrodes, which enter through the roof. Three electrodes of graphite or amorphous carbon are used, and arcs are formed between each electrode and the bath of metal.

Héroult process (*Met.*). An electrolytic process for the manufacture of aluminium from a solution of bauxite in fused cryolite.

her'pes simplex (*Med*). An eruption of vesicles round the mouth occurring in febrile diseases, due to infection with a filter-passing virus.

herpes zoster (*Med.*). Shingles. A painful eruption of crops of firm vesicles along the course of a nerve, the posterior root ganglia of which are inflamed.

herring-bone ashlar (*Masonry*). A block of stone tooled in grooves of herring-bone design.

herring-bone bond (*Build.*). A form of *raking bond* (q.v.) in which the bricks are laid with rake in opposite directions from the centre of the wall, so as to form a herring-bone pattern. This bond is also used for brick pavings, and has the advantage of making effective bond in the middle.

herring-bone gear (*Eng.*). A *double helical gear* (q.v.).

herring-bone structure (*Geol.*). This results from the twinning on the front (ortho-) pinacoid of pyroxenes possessing a schiller structure parallel to the basal pinacoid. The schiller structure appears as a fine striation; the basal pinacoids slope in opposite directions; therefore in appropriate sections the schiller structure simulates a herring's bones, the twin plane being the ' back-bone.'

herring-bone strutting (*Carp.*). Small struts fixed diagonally in pairs, crossing one another, between adjacent floor-joists. See **bridging.**

herring-bone (or **feather**) **twills** (*Weaving*). A fancy twill effect made by stripes in which the diagonal line is run alternately to the right and left. Usually based upon the 2-and-2 twill.

Hertfordshire Puddingstone (*Geol.*). See **puddingstone.**

Hertwig's rule, hert'vihh (*Zool.*). The nucleus always seeks to place itself in the centre of its sphere of activity.

hertz (*Elec. Comm.*). The unit of frequency, one cycle per second.

Hertzian oscillator (*Radio*). An idealised system envisaged by H. Hertz, comprising two point charges of opposite sign and separated by an infinitesimal distance, whose electric moment varies harmonically with time.

Hertzian radiator (*Radio*). The original form of radiator used by H. Hertz, comprising two flat metal plates, arranged in line and connected by straight conductors to a spark gap placed midway between them.

Hertzian waves (*Radio*). Electromagnetic waves having frequencies between zero and approximately ten thousand million cycles per second; especially those towards the upper limit of this range.

herzenber'gite, herts'— (*Min.*). A rare decomposition product of tin ores, having the composition, tin sulphide, SnS; described originally from a locality in Bolivia.

hesper'idene (*Chem*). See ***d*-limonene.**

hesperid'ium (*Bot*) A fruit like an orange; a fleshy fruit covered by a firm rind, derived from a syncarpous superior gynaeceum, and owing its fleshy material to large numbers of hairs projecting into the loculi and becoming filled with juice as the fruit ripens.

Hess's law (*Chem.*). The net heat evolved or absorbed in any chemical change depends only on the initial and final states, being independent of the stages by which the final state is reached.

Hessbit (*Build.*). A proprietary form of *sarking felt* (q.v.).

hessian (*Textiles*) A strong plain-weave jute fabric, used for packing material, sacks, etc., and for serving electric cables.

hessite (*Min.*). Telluride of silver, a metallic grey cubic mineral occurring in silver ores in various parts of the world, notably at Savodinski in the Altai Mts in Siberia.

Hessle Boulder Clay (*Geol.*). A boulder clay occurring in northern England east of the Pennines, deposited by ice moving southwards from the Southern Uplands of Scotland and Northumberland; later in date than the main glaciation.

hessonite or **cinnamon stone** (*Min.*). A variety of garnet containing a preponderance of the grossularite molecule, and characterised by a pleasing reddish-brown colour.

het'acrolite or **het'erolite** (*Min.*). A very rare double oxide of zinc and manganese, occurring in ore deposits as black tetragonal and fibrous crystals.

heter-, hetero- (Greek *heteros*, other, different). A prefix used in the construction of compound terms; e.g. *heteromastigote*, having two or more different types of flagella.

het'eracanth (*Zool.*). Having dorsal fin spines, which, in the depressed position, turn slightly to one side or the other, alternately. Cf. *homacanth.*

heteran'drous (*Bot.*). Having stamens which are not all of the same size.

hetero-agglutination (*Physiol.*, *Zool.*). (1) The adhesion of spermatozoa to one another by the action of a substance produced by the ova of another species.—(2) The adhesion of erythrocytes to one another when blood of different groups is mixed. Cf. *iso-agglutination.*

heteroauxin, —awk'sin (*Bot.*). A substance, found in urine, which stimulates growth in plants; it appears to be identical with β-indolylacetic acid.

het'erobares (*Chem.*). Atoms having different atomic weights.

heteroblas'tic (*Zool.*). Showing indirect development.

heterobrach'ial (*Cyt.*). Said of a chromosome bent into two parts of unequal length.

heterocar'pous (*Bot.*). Having more than one kind of fruit.

heterocer'cal (*Zool.*). Said of a type of tail-fin, found in adult Sharks, Rays, Sturgeons, and many other primitive Fish, in which the vertebral column bends abruptly upward and enters the epichordal lobe, which is larger than the hypochordal lobe.

heterochlamyd'eous (*Bot.*). Having a distinct calyx and corolla.

heterochromat'ic photometry (*Photog*). The measurement of colours of different hue.

heterochro'mia i'ridis (*Med.*). Difference of colour in the same iris or in the two irides of the same person.

heterochro'mosome (*Cyt.*). An ordinary typical chromosome, as opposed to a sex chromosome

heteroch'ronism (*Zool.*). Departure from the normal time-schedule in development.

heterochro'sis (*Zool.*). Abnormal coloration.

heterocoelous, —sē'lus (*Zool.*). Said of vertebral centra in which the anterior end is convex in vertical section, concave in horizontal section, while the posterior end has these outlines reversed.

Het'erocotyle'a (*Zool.*). An order of *Trematoda* in which the ventral sucker is always posterior, and the genital openings, whether separate or united, are always ventral, and usually anterior; generally ectoparasitic, or in the oral, nasal, or branchial cavities or the urinary bladder of Fish, Amphibia, Reptiles, and Crustacea.

heterocot'ylised arm (*Zool.*). See **hectocotylus.**

heterocy'clic compounds (*Chem.*). Cyclic or ring compounds containing carbon atoms and other atoms, e.g. O, N, S, as part of the ring.

het'erocyst (*Bot.*). An enlarged thick-walled cell occurring in a filament of a member of the *Myxophyceae*; of obscure function.

heterodac'tylous (*Zool.*). (Of Birds) having the first and second toes directed backwards, the third and fourth forwards, as the Trogons.

het'erodont (*Zool.*). (Of teeth) having different forms adapted to different functions.

heterodynam'ic (*Biol.*). Of unequal potentiality, as *heterodynamic centrosomes.*

heterodynamic hybrid (*Gen.*). A hybrid which resembles in many of its characters either the male or the female parent.

heterodyne detector (*Radio*). A detector employing the *heterodyne principle* (q.v.).

heterodyne interference (*Radio*). Interference arising from the simultaneous reception of two stations the difference between whose carrier frequencies is an audible frequency.

heterodyne oscillator (*Radio*). An oscillator in which the output is obtained by heterodyning two oscillators of different frequency. The output frequency can be varied over a large percentage range by a small percentage change in frequency of one of the two oscillators.

heterodyne principle (*Radio*). The principle of the production of beats having a frequency equal to the difference between two higher frequencies. See also **heterodyne reception.**

heterodyne reception (*Radio*). A system of reception of continuous waves in which the incoming signal is combined with a locally generated oscillation having a slightly different frequency from that of the signal. The combined wave is applied to a rectifying device, the output from which contains a component having a frequency equal to the difference between the two original frequencies, which may be made audible. Also called BEAT RECEPTION.

heterodyne wavemeter (*Radio*). A calibrated oscillator which is adjusted to the same frequency as that of the signal to be measured, so that the heterodyne note or difference frequency falls to zero.

heterodyne whistle (*Radio*). The continuous beat-frequency note produced by the heterodyning of two oscillations which are of slightly different frequency.

heteroecious, het-er-ē'si-us *or* —shus (*Bot.*). Said of a parasitic fungus which forms one or more kind of spores upon one host, and one or more distinct kinds of spores upon a second host which is not of the same species as the first.—(*Zool.*) Said of parasitic forms which have different hosts at different stages in the life-history.

heteroecism, —ē'sizm (*Bot.*). A condition found in some parasitic fungi, almost all belonging to the *Uredinales*. The parasite lives for a portion of its life-cycle in one host, and a portion in a second host belonging to a distinct species.

heterogametan'gic (*Bot.*). Having gametangia of more than one kind.

heterogam'ete (*Zool.*). See **anisogamete.**

heterogamous (*Bot.*). Having pistillate, staminate, hermaphrodite, and neuter flowers (or any two or three of these types) present in one inflorescence.

heterog'amy (*Biol.*). Metagenesis; the condition of producing gametes of more than one type.—*adj.* **heterogamous.**

heteroge'neous (*Chem.*). Said of a system consisting of more than one phase.

heterogen'esis (*Zool*). Metagenesis: abiogenesis. —*adj.* **heterogenet'ic.**

heterogeny (*Zool.*). Cyclic reproduction in which several broods of parthenogenetic individuals alternate with one or more broods of sexual forms.

heterogony (*Zool.*). Reproduction by both parthenogenesis and amphigony.

heterogy'nous (*Zool.*). With two different types of female.

heteroi'cous (*Bot.*). Said of *Bryophyta* which have more than one kind of arrangement of the antheridia and archegonia on the same plant.

het'eroion, —ō-i-on (*Chem*). A charged particle produced by the adsorption of a simple ion on a large, complex molecule.

heterokar'yote (*Zool.*). Having two different kinds of nuclei.

heterokine'sis (*Cyt.*). Differential division of chromosomes.

heterokon'tan (*Bot.*). Said of a motile plant or spore-bearing flagella not all of the same length.

heterolecithal, —les'-i-thal (*Zool.*). With unequally distributed yolk.

heterolite (*Min.*). See **hetaerolite.**

heteromas'tigote (*Zool.*). Having one or more anterior flagella directed forwards and a posterior flagellum directed backwards.

heterom'erism (*Zool.*). In metameric animals, the condition of having unlike somites; cf. *homoeomerism.*—*adj.* **heteromeric.**

heteromer'ous (*Bot.*). Said of a lichen thallus in which a layer of algal cells lies between two layers composed of fungal hyphae.

Heterometab'ola (*Zool.*). See **Exopterygota.**

heterometabol'ic (*Zool.*). Showing incomplete metamorphosis, i.e. a direct or simple metamorphosis, as in most members of the *Exopterygota.*

Hetero'mi (*Zool.*). An order of *Neopterygii* in which the air-bladder, if present, is without a pneumatic duct; the pelvic fins, if present, are abdominal; deep-sea forms about which little is known. Spiny Eels, Thornbacks.

heteromor'phic (*Zool., etc.*). Said of chromosome pairs which differ in size or form, or both; cf. *homomorphic.*—*n.* **heteromorphism.**

heteromorphic alternation (*Bot.*). See **antithetic alternation of generations.**

heteromorpho'sis (*Zool.*). The regeneration of a part in a different form from the original part: the production of an abnormal structure; cf. *homomorphosis.*—*adj.* **heteromorphous.**

heteromor'phous (*Bot.*). (1) Existing in more than one form.—(2) Having more than one kind of flower on the same plant.

heteromorphous rocks (*Geol.*). Rocks of closely similar chemical composition, but containing different mineral assemblages.

Heteronemertin'i (*Zool.*). An order of *Dimyaria* in which the mouth is behind the brain, the proboscis lacks stylets, and the cerebral ganglia and lateral nerves lie between the outer longitudinal and the circular muscles of the body-wall; marine forms.

heterone'reis (*Zool.*). In free-swimming *Polychaeta*, a special sexual form with enlarged parapodia.

heteron'omous (*Zool.*). Subject to different laws, especially of growth and specialisation. Cf. *autonomous.*

heteropel'mous (*Zool.*). Having bifid flexor tendons of the digits of the hind foot.

heteroph'agous (*Zool.*). (Of Birds) having young in a very immature condition.

heteropho'ria (*Med.*). Latent squint revealed by passing a screen before each eye. See also **esophoria** and **exophoria.**

het'erophyl'ly (*Bot.*). The occurrence of more than one kind of foliage leaf on the same shoot; also ANISOPHYLLY.—*adjs.* **heterophyllous, anisophyllous.**

hetero'pic (*Geol.*). Said of two formations deposited contemporaneously, but of different facies. Cf. *isopic.*

heteroplas'ma (*Zool.*). In tissue culture, a medium prepared with plasma from an animal of a different species from that from which the tissue was taken. Cf. *autoplasma, homoplasma.*

heteroplas'tic (*Zool.*). In experimental zoology, said of transplantation in which transplant and host belong to different genera or species. Cf. *autoplastic transplantation, homoioplastic, xenoplastic.*

het'eroplasty (*Med*). The operation of grafting on one person body-tissue removed from another.

het'eroploid (*Cyt.*). Possessing an additional chromosome, i.e, above the characteristic number.

heteropo'lar (*Chem.*). Having an unequal distribution of charge, as in a semipolar bond.

heteropolar generator (*Elec. Eng.*). An electromagnetic generator of the usual type, i.e. one in which the conductors pass alternate north and south poles, or in which alternate poles pass the conductors.

heteropycnosis, —pik-nō'zis (*Cyt.*). The tendency of sex-chromosomes to undergo precocious condensation in the growth stages, shown by the fact that some portions are densely staining.

hetero'sis (*Zool.*). Cross-fertilisation: in metameric animals, the modification of a merome in form or position, or both, from the type. Cf. *homoeosis.*

Heteroso'mata (*Zool.*). An order of *Neopterygii* in which the body is flattened from side to side, both eyes being on the same side of the head; the fin-rays are spiny and an air-bladder is lacking; bottom-living marine forms. Plaice, Sole, Topknot, Halibut, Flounder, Dab, Megrim, Witch, Scald-fish, Turbot, Brill.

het'erosporan'gy (*Bot.*). The formation of more than one kind of sporangium containing more than one kind of spore.

het'erospo'ry (*Bot.*). The formation of more than one kind of spore.—*adj.* **heterosporous.**

heterostatic method (*Elec. Eng.*). A method employed in using the quadrant electrometer, the needle being maintained at a high potential independently of the quadrants.

heterosty'lous (*Bot.*). Having styles of one length in some flowers, and of a different length in others.

heterosynap'sis (*Cyt.*). Pairing of two dissimilar chromosomes. Cf. *homosynapsis.*

heterothal'lism (*Bot.*). The existence of physiological differences between the mycelia of many species of fungi, most commonly shown by the inability of the mycelium to manifest sexual activities unless it is brought into contact with another mycelium of distinct character.

het'erotopes (*Chem.*). Atoms having different atomic numbers and, therefore, occupying different positions in the periodic system; they are separable by chemical means.

heteroto'pia (*Med.*). Displacement of a group of cells of an organ from their normal position during the course of development.

Het'erotrich'a (*Zool.*). An order of *Ciliata* the members of which are generally of swimming habit, although some are sedentary; they always possess a permanent gullet with an undulating membrane.

het'erotrich'ous (*Zool.*). Having cilia or flagella of two or more different kinds.

heterotrichous thallus (*Bot.*). An algal thallus consisting of a prostrate portion, lying on a substratum, and a series of filamentous branches standing out into the water.

heterotro'phic (*Bot.*). Unable to make food from simple beginnings, and therefore dependent for food upon dead or living organisms of another species, and ultimately on the green plant.

heterotro'pic chromosome (*Cyt.*). See **sex chromosome.**

het'erotype division (*Bot.*). The nuclear division in meiosis in which the number of chromosomes is halved.

heterotyp'ic (*Zool.*). Differing from the normal condition. Cf. *homotypic.*

heterotypic division (*Zool*). See **meiosis.**

het'eroxeny, —zē-ni (*Bot.*). See **heteroecism.**

heterozygo'sis (*Biol.*). See **heterosis.**

heterozy'gous (*Gen.*). Possessing both the dominant and recessive characters of an allelomorphic pair; cf. *homozygous.*—*n.* **heterozygote.**

heulandite, hū'— (*Min.*). One of the best-known zeolites, beautifully crystalline, occurring as coffin-shaped monoclinic crystals in cavities in decomposed basic igneous rocks. In composition similar to plagioclase, but with a high content of water.

Heurtley hot-wire magnifier, hėrt'lē (*Teleg.*). A device for magnifying weak telegraph currents The incoming currents deflect hot-wires across a cooling air-blast, the consequent unbalance currents of the Wheatstone bridge, of which the hot-wires form arms, becoming the magnified signals.

hewer (*Mining*). A man engaged in getting or mining hand-wrought coal.

hewettite, hū'— (*Min.*). A very rare hydroxide of vanadium and calcium, occurring as slender orthorhombic crystals in the vanadium deposits of Peru.

hewing. The operation of dressing timber by the use of an axe or hatchet.

Hewlett disc insulator (*Diel.*). A disc-form of suspension-type insulator.

hewn stone (*Masonry*). Blocks of stone whose faces have been hammer-dressed.

hex- (Greek *hex*, six). A prefix used in the construction of compound terms; e.g. *hexactinal*, having six rays.

hexa- (*Chem.*). Containing six atoms, groups, etc.

hex'acanth (*Zool.*). Having six hooks; as a stage in the life-history of some Tapeworms.

Hexac'tinel'lida (*Zool.*). A class of *Porifera*, usually distinguished by the possession of a siliceous skeleton composed of triaxial spicules, and large thimble-shaped flagellated chambers.

hexaflu'orophospho'ric acid (*Chem.*). HPF_6. Produced by the action of strong hydrofluoric acid on difluorophosphoric acid. Also referred to as PHOSPHOROFLUORIC ACID.

hexagon voltage (*Elec. Eng.*). The voltage between two lines, adjacent as regards phase-sequence, of a six-phase system.

hexagonal system (*Crystal.*). A crystal system in which three equal coplanar axes intersect at an angle of 60°, and a fourth, perpendicular to the others, is of a different length.

hexahy′droben′zene (*Chem.*). *Cyclohexane* (q.v.).

hexahy′drophe′nol (*Chem.*). *Cyclohexanol* (q.v.).

hexahy′dropyr′idine (*Chem.*). *Piperidine* (q.v.).

hexam′erous (*Bot.*). Having parts in sixes.

hexameth′ylene (*Chem.*). *Cyclohexane* (q.v.).

hexamethylene-tetramine (*Chem.*). $(CH_2)_6N_4$, a condensation product of formaldehyde with ammonia, a crystalline substance with strong antiseptic properties. It forms addition products with iodine, hydrogen peroxide, and numerous other substances.

Hexam′ine (*Chem.*). A trade-name for *hexamethylene-tetramine* (q.v.).

hexane (*Chem.*). C_6H_{14}. There are five compounds with this formula: normal hexane, a colourless liquid, of ethereal odour, b.p. 69° C., sp. gr. 0·66, is an important constituent of petrol and of solvent petroleum ether or ligroin.

hexaphase (*Elec. Eng.*). A term sometimes used instead of *six-phase.*

hex′apod (*Zool.*). Having six legs.

hexap′terous (*Zool.*). Having six wing-like processes.

hex′arch (*Bot.*). Having six strands of protoxylem

hex′astyle (*Arch.*). A portico formed of six columns in front.

hex′ava′lent (*Chem.*). Capable of combining with six hydrogen atoms or their equivalent.

hexone bases (*Chem.*). Protein derivatives comprising the amino acids arginine, lysine, and histidine. The name is now obsolescent.

hexoses (*Chem.*). A sub-group of the monosaccharoses containing six oxygen atoms, of the general formula $HO{\cdot}CH_2(CHOH)_4{\cdot}CHO$ and $HO{\cdot}CH_2{\cdot}(CHOH)_3{\cdot}CO{\cdot}CH_2OH$. The first formula signifies an *aldohexose* (q.v.), the second one a *ketohexose* (q.v.).

Heyde meter, hid′e (*Photog.*). A meter for estimating photographic exposures, taking into account prevailing conditions.

Heyland a.c. generator (*Elec. Eng.*). A self-excited a.c. generator in which the excitation is obtained by a special arrangement of transformers and commutator connected to the armature.

Heyland diagram (*Elec. Eng.*). A particular application of the circle diagram of an a.c. circuit to represent the behaviour of an induction motor.

Hf (*Chem.*). The symbol for *hafnium.*

Hg (*Chem.*). The symbol for *mercury.*

hia′tus (*Zool.*). A large gap or opening.

H.I.B. (*Build.*). A common abbrev. for *hoop-iron bond* (q.v.).

Hibbert cell (*Elec. Eng.*). A standard cell similar to a Clark cell but having an electrolyte of zinc chloride instead of zinc sulphate.

hi′bernac′ula (*Zool.*). In certain fresh-water *Polyzoa,* external buds which are arrested in development and which enable the colony, which has died down at the onset of winter, to regenerate in spring.

hibernating glands (*Zool.*). Vascular reserves of fatty tissue occurring in some hibernating Mammals.

hibernation (*Zool.*). The condition of partial or complete torpor into which some animals relapse during the winter season.—*v.* **hibernate.**

hiccup (*Med.*). Sudden spasm of the diaphragm followed immediately by closure of the glottis.

hick joint (*Build.*). A *flat joint* (q.v.) formed in fine mortar when pointing, after the old mortar has been raked out of the joints.

Hicks hydrometer (*Elec. Eng.*). A form of hydrometer used for finding the specific gravity of the electrolyte in an accumulator, in order to determine the state of its charge; the hydrometer consists of a glass tube containing a number of coloured beads, which float at different specific gravities.

hid′denite (*Min.*). See **spodumene.**

hidro′sis (*Zool.*). Formation and excretion of sweat.

Hiduminium R.R. alloys (*Met.*). See **R.R. alloys.**

hiemal aspect, hi-ē′mal (*Bot.*). Appearance and condition of the plants of a community in winter.

high (*Typog.*). Type or blocks which are higher than the rest of the forme are said to be *high.*

highs (*Acous.*). The same as *top.*

high brass (*Met.*). Copper-zinc alloy containing 34% zinc. Possesses high tensile strength. Used for springs, screws, rivets, etc.

high conductivity copper (*Met.*). Metal of high purity, having an electrical conductivity not much below that of the international standard, which is a resistance of 0·15328 ohms for a wire one metre long and weighing one gramme.

high-definition (*Television*). A term arbitrarily applied to those systems of television which employ one hundred or more scanning lines per frame.

high-duty cast-iron (*Met.*). Cast-iron with a tensile strength greater than 17 tons per sq. in. Produced by using large proportions of steel scrap, casting in hot moulds, inoculation, superheating, alloying additions, and heat-treatment.

high explosive (H.E.). A material which can produce detonation, as opposed to one producing explosion only; i.e. it must exert violent disruptive effect. See **detonator, H.E. shell.**

high-fidelity (*Acous.*). An inexact term generally meaning sound reproduction of a superior, but undefined, quality.

high frequency (*Radio*). A term loosely used to denote any frequency above the audible range, i.e. above ten kcps., but more especially those frequencies which are used for radio communication. See also **audio frequency, carrier frequency, intermediate frequency, radio frequency, video frequency.**

high-frequency alternator (*Radio*). Any alternator giving an output whose frequency is above 10 kcps. See **Alexanderson alternator, Bethenod-Latour alternator, Goldschmidt alternator.**

high-frequency amplification (*Radio*). Amplification at frequencies used for radio transmission. In a receiver, any amplification which takes place before detection or frequency conversion.

high-frequency choke (*Radio*). An inductance coil designed to have a high impedance at high frequencies.

high-frequency condenser microphone (*Acous.*). See **condenser microphone.**

high-frequency induction furnace (*Met.*). Essentially an air transformer, in which the primary is a water-cooled spiral of copper tubing, and the secondary the metal being melted. Currents at a frequency above about 500 cps. are used to induce eddy currents in the charge, thereby setting up enough heat in it to cause melting. Used in melting steel and other metals. See also **coreless induction furnace.**

high-frequency resistance (*Radio*). The resistance of a conductor or circuit as measured at high frequency. It is in general greater than the low frequency or d.c. resistance, owing to eddy current and dielectric losses. Also called RADIO-FREQUENCY RESISTANCE.

high-frequency transformer (*Radio*). A transformer designed to operate at high frequencies.

high-frequency treatment (*Med.*). The treatment of diseases by high-frequency currents, usually trains of heavily damped oscillations.

high-gloss (*Paint*). A term applied to paint drying with a brilliant finish like that of enamel paint.

high-intensity carbon arc (*Cinema.*). Projection arc carbons taking current up to 200 amperes and having cerium fluoride cores.

high-light (*Photog.*). That part of a photographic object or image which indicates a light source or reflection of illumination which is relatively high compared with the surrounding average.

high machine (or **mill**) **finish** (*Paper*). See **calendered paper.**

high-pass filter (*Elec. Comm.*). An electric wave filter in which currents with frequencies higher than a nominal cut-off frequency are passed with minimum attenuation, while frequencies below this frequency are highly attenuated.

high-power modulation (*Radio*). A system of modulation which takes place in the final stage of a transmitter, immediately before the high-frequency current enters the antenna. Cf. *low-power modulation.*

high-pressure cylinder (*Eng.*). The cylinder of a compound or multiple expansion steam-engine in which the steam is first expanded.

high-pressure gas systems. These utilise coal-gas under high pressure, in conjunction with air at atmospheric pressure, for industrial heating purposes; used where accurate control of furnace temperature is required.

high-speed circuit-breaker (*Elec. Eng.*). A circuit-breaker in which special devices are used to ensure very rapid operation; used particularly in connexion with d.c. traction systems.

high-speed emulsion (*Photog.*). An emulsion which is specially designed for short exposures and low illumination; e.g. for cinematography and scientific applications.

high-speed engines (*I.C. Engs.*). Said of engines having a piston speed in excess of about 1500 ft. per minute.

high-speed steam-engine (*Eng.*). A vertical steam-engine, generally compound, using a piston valve, or valves, whose moving parts are totally enclosed and pressure-lubricated. See **quick-revolution engine.**

high-speed steel (*Met.*). A hard steel used for metal-cutting tools. It retains its hardness at a low red heat, and hence the tools can be used in lathes, etc. operated at high speeds. It usually contains 12 to 18% tungsten, up to 5% chromium, 0·4 to 0·7% carbon, and small amounts of other elements (vanadium, molybdenum, etc.).

high-stop filter (*Elec. Comm.*). An electric wave filter in which currents of frequencies higher than a nominal cut-off frequency are highly attenuated, while those with frequencies below this are passed with minimum attenuation.

high-strength brass (*Met.*). A type of brass based on the 60 copper-40 zinc composition, to which manganese, iron, and aluminium are added to increase the strength. The names *delta metal* and *manganese bronze* denote varieties in which iron and manganese are the principal additions, but most varieties now contain all three elements.

high-tension (*Elec. Eng.*). See **high-voltage.**

high-tension battery (*Elec. Comm.*). See **B-battery.**

high-tension detonator (*Elec. Eng.*). An old form of detonator in which the charge was fired by means of an electric spark. Cf. *low-tension detonator.*

high-tension ignition (*Elec. Eng.*). An ignition system for internal-combustion engines which employs a spark from a high-tension magneto or an induction coil.

high-tension magneto (*Elec. Eng.*). The usual form of magneto used for producing the high-voltage spark required for the ignition of an internal-combustion engine.

high-test cast-iron (*Met.*). See **high-duty cast-iron.**

high-vacuum tube (or **valve**). See **hard tube.**

high-voltage (*Elec. Eng.*) A term used to denote any voltage above 650 volts; sometimes called HIGH-TENSION.

high-voltage test (*Elec. Eng.*). The application of a voltage greater than working voltage to a machine, transformer, or other piece of electrical apparatus, in order to test the adequacy of the insulation.

high warp (*Textiles*). A large number of threads per inch in the warp of a fabric.

higher critical velocity (*Hyd.*). The critical velocity of change from viscous to eddy flow.

Highfield booster (*Elec. Eng.*). An automatic battery booster consisting of a generator, a motor, and an exciter. Automatic regulation is carried out by balancing the exciter voltage against that of the battery.

Highgate resin (*Min.*). A popular name for fossil gum-resin occurring in the Tertiary London Clay at Highgate in North London.

Highland Boundary Fault (*Geol.*). One of the most important dislocations in the British Isles, extending from the Clyde to Stonehaven and separating the Highlands of Scotland from the Midland Valley. It was initiated in Middle Old Red Sandstone times but movement has taken place along it subsequently.

Hildebrand electrode (*Chem.*). See **hydrogen electrode.**

hile (*Bot.*). See **hilum.**

hill-and-dale recording (*Acous.*). The same as *contour recording* (q.v.).

hill diarrhoea (*Med.*). A peculiar form of diarrhoea occurring, during the hot season, in Europeans living in high altitudes in India, Ceylon, and elsewhere.

hills, origin of (*Geol.*). In the general lowering of ground-level by denudation, rivers work quickly downward in grading themselves to the existing base level. Between the river valleys, higher ground is left upstanding as hills. Again, some areas may be afforded protection by a capping of rock which is resistant to denudation; such areas will form hills as the surrounding ground is more rapidly lowered. Some hills are directly of volcanic origin, formed by the eruption of lava and ash. Even when the volcanic rocks of an area have been completely covered up by the sediments of a later geological period, in the process of re-excavation the igneous rocks tend to form hills on account of their durability, as in the Lake District and North Wales. See also **escarpment.**

Hilton Shales or **Hilton Plant Beds** (*Geol.*). Grey shales occurring above the Penrith Sandstone, in the Permian rocks west of the Pennines, and containing plant remains.

hi'lum or **hile** (*Bot.*). (1) The lateral depression in which the flagella are inserted in reniform zoospores.—(2) The scar left on the testa when the seed separates from its stalk.—(3) A small granule in the centre of a starch grain.

hilum or **hilus** (*Zool.*). A small depression in the surface of an organ, which usually marks the point of entry or exit of blood-vessels, lymphatics, or an efferent duct.

Hinchman Tuff (*Geol.*). A tuff laid down under marine conditions during Corallian times in the Cordilleran geosyncline. It is succeeded by the non-marine Foreman Series.

hind-brain (*Zool.*). In Vertebrates, that part of the brain which is derived from the third or posterior brain-vesicle of the embryo, comprising the cerebellum and the medulla oblongata: the posterior brain-vesicle itself.

hind-gut (*Zool.*). That part of the alimentary canal of an animal which is derived from the posterior ectodermal invagination or proctodaeum of the embryo.

hindered settling (*Mining*) The settling of crushed ore in a suspension of such ore (or of sand) and water.

hinge (*Bot.*). A thin strip in the wall of a guard cell, about which movement can occur.

hinge (*Carp., Join.*). A means of connecting two members, such as a door and its frame, so that the one may swing in relation to the other.

hinge (*Zool.*). The flexible joint between the two valves of the shell in a bivalve Invertebrate, such as a pelecypod Mollusc or a Brachiopod: any similar structure: a joint permitting of movement in one plane only.

hinge-bound door (*Join.*) A door which will not close easily or fully owing to the hinges being too deeply sunk.

hinge ligament (*Zool.*) The tough uncalcified elastic membrane which connects the two valves of a bivalve shell.

hinge line (*Zool.*). The line of junction of the two valves in a bivalve shell.

hinge tooth (*Zool.*). A small sharp projection of the shell near the hinge in bivalves

hingeing post (*Build.*). The post from which a gate is hung. Also called SWINGING POST.

Hinkes-Bird bead (*Join.*). A *deep bead* (q.v.).

hip (*Build.*). The outer angle (more than 180°) formed by the inclined ridge between two intersecting roof slopes. Cf. *valley*.

hip hook (*Build.*). A strap of wrought-iron fixed at the foot of a hip rafter and bent into the form of a scroll, as a support for the hip tiles.

hip iron (*Build.*). A *hip hook* (q.v.).

hip-knob (*Build.*). A finial surmounting the peak of a gable or a hipped roof.

hip rafter (*Carp.*). See **angle rafter.**

hip roll (*Carp.*). A timber of circular section with a vee cut out along its length, so as to adapt it for sitting astride the hip of a roof.

hip roof (*Build.*). A *hipped roof* (q.v.).

hip tile (*Build.*). A form of arris-tile laid across the hip of a roof.

hipped end (*Build.*). The triangular portion of roof covering the sloping end of a hipped roof.

hipped roof (*Build.*). A pitched roof having sloping ends in place of gable ends.

hippocam'pus (*Zool.*). In the Vertebrate brain, a tract of nervous matter running back from the olfactory lobe to the posterior end of the cerebrum.—*adj.* **hippocampal.**

hippocrep'iform (*Bot.*). Shaped like a horseshoe.

hippo-lasso (*Vet.*). An apparatus applied to the legs and over the back of a horse to prevent kicking during an operation.

hippu'ric acid (*Chem.*). Benzoyl-aminoacetic acid, $C_6H_5CO{\cdot}NH{\cdot}CH_2{\cdot}COOH$, rhombic crystals, m.p. 187° C., occurring in the urine of many animals.

Hippurite Limestone (*Geol.*). A massive limestone of Cretaceous age, stretching from S. France into Italy and Greece, and linking up with the Nubian Sandstone of N. Africa; characterised by the presence of *Hippurites*, an aberrant lamellibranch.

hippus (*Med.*). Rhythmical alternate contraction and dilatation of the pupil of the eye.

Hirsch'sprung's disease (*Med.*). A condition occurring in children in which there is great hypertrophy and dilatation of the colon.

hirsute (*Bot.*). Well covered with long but not very stiff hairs.—(*Zool.*) Hairy: having a covering of stiff hair or hair-like feathers.

hirsuties, hėr-sū'shi-ēz (*Med.*). Excessive hairiness.

hirudin, hi-rū'din (*Zool.*). An anticoagulin present in the salivary secretion of the leech.

Hi'rudin'ea (*Zool.*). A class of *Annelida* the members of which are ectoparasitic on a great variety of aquatic and terrestrial animals; they possess anterior and posterior suckers, and most of them lack setae; hermaphrodite animals with median genital openings; the development is direct. Leeches.

His's bundle (*Zool.*) In the Mammalian heart, a bundle of small parallel muscle fibres extending from the wall of the right auricle to the septum between the ventricles: the auriculo-ventricular bundle.

hispid (*Bot.*). Well covered with stiff hairs or bristles.

hiss (*Thermionics*). See **valve hiss.**

hissing arc (*Elec. Eng.*). An arc, between incorrectly adjusted carbon electrodes, which produces a hissing sound, the current being too great for the size of the arc crater. Sometimes called FRYING ARC in U.S.A.

his'tidine (*Chem.*). α-Amino-β-imidazole-propionic acid, a protein derivative belonging to the group of hexone bases.

histio'ma, histo'ma (*Med.*). Any tumour derived from fully developed tissue, such as fibrous tissue, cartilage, muscle, blood-vessels.

his'toblast (*Zool.*). One of the formative cells composing an *imaginal bud* (q.v.).

his'tocyte (*Zool.*). A tissue-cell as opposed to a germ-cell.

his'togen (*Bot.*). A more or less well-defined region within a plant where tissues undergo differentiation.

histogen'esis (*Zool.*). Formation of new tissues.

histohae'matin (*Zool.*). A respiratory pigment.

histol'ogy (*Zool.*). The study of the minute structure of tissues and organs.

histol'ysis, *or* —li'zis (*Bot.*). The breakdown, and sometimes liquefaction, of a cell or tissue.—(*Zool.*) Dissolution and destruction of tissues, as in the metamorphosis of *Endopterygota.*

histo'ma (*Med.*). See **histioma.**

his'tones (*Chem.*). A group of simple proteins ranking in complexity between protamines and albumins. They are strongly basic, and often occur combined with nucleic acid, or with haematin. They are soluble in water but insoluble in dilute ammonia.

historical geology. See under **geology.**

histozo'ic (*Zool.*). Living in the tissues of the body, amongst the cells.

hit-and-miss ventilator (*Build.*). A ventilating device consisting of a slotted plate over which may be moved another slotted plate, so that the openings for access of air may be more or less restricted as required.

hitch (*Mining*). A fault of minor importance, usually not exceeding the thickness of a seam.

hitcher (*Mining*). See **hanger-on.**

H.M.D. (*Hyd.*). An abbrev. for *hydraulic mean depth* (q.v.).

H.N.W. (*Build.*). An abbrev. for *head, nut, and washer.*

Ho (*Chem.*). The symbol for *holmium.*

Hoar Edge Grits (*Geol.*). The basal member of the Caradocian Series in the Caradoc district of S. Shropshire.

hoar-frost (*Meteor.*). A deposit of ice crystals formed on objects, especially during cold clear nights when the dew-point is below freezing-point. The conditions favouring the formation of hoar-frost are similar to those which produce *dew* (q.v.).

hoarding or **hoard** (*Build.*). A close-boarded fence of temporary character erected around a building site on which erection, demolition, or repair work is in hand.

hoary (*Bot.*). Covered with short greyish-white down.

hob or **hobbing cutter** (*Eng.*). A gear-cutting tool resembling a milling cutter or a worm gear, whose thread is interrupted by grooves so as to form cutting faces.

hobbing machine (*Eng*). A machine for cutting teeth on gear blanks, for the production of spur, helical, and worm gears by means of a hobbing cutter or *hob* (q.v.).

hobbles (*Vet.*). An apparatus applied to the legs of a horse for casting.

Höchstädter cable, hersh'stet-er (*Elec. Eng.*). A high-voltage multi-core cable in which a thin metallised sheath is placed over the insulation of each core, in order to control the distribution of electric stress in the dielectric and ensure that it is purely radial.

Höchstädter paper (*Cables*). See **H-paper.**

hock (*Zool.*). The tarsal joint or ankle of a Mammal.

hod (*Build.*). A three-sided container, supported on a long handle, used for carrying bricks and mortar on the site.

hod-boy or **hodder** (*Mining*). See **carting boy.**

Hodge's pessary (*Surg.*). A ring-shaped pessary for correcting backward displacement of the uterus.

Hodgkin's disease (*Med.*). See **lymphadenoma.**

hod'ograph (*Mech.*). A curve used to determine the acceleration of a particle moving with known velocity along a curved path. The hodograph is drawn through the ends of vectors drawn from a point to represent the velocity of the particle at successive instants.

hoe coulter (*Agric. Mach*). A coulter in the form of a small hoe; used on a drill to make a shallow trench for the seed.

Hofmann's reaction (*Chem*). A method of preparing primary amines from the amides of acids by the action of bromine and then of caustic soda. The number of carbon atoms in the chain should not be more than six, and the resulting amine has one carbon atom less than the amide from which it has been prepared.

Hofmeister series, hōf'mīs-ter (*Chem.*). The simple anions and cations arranged in the order of their ability to coagulate solutions of lyophilic colloids.

hog or **hogget** (*Textiles*). The name applied to wool from a year-old sheep which forms the first clipping.

hog-back girder (*Struct.*). A *hogging girder* (q.v.).

hog's back ridge (*Build.*). A purpose-made ridge tile having a rounded top.

hog-frame (*Struct.*). A term applied to some forms of truss which are shaped so as to bulge on the upper side.

hogget (*Textiles*). See **hog.**

hoggin or **hogging** (*Build.*). A mixture of gravel and clay, used for paving garden paths, etc.

hogging girders (*Civ. Eng.*). Girders which bulge along their top edges so as to be convex upwards.

hoist (*Mining*). An engine with a drum, used for winding up a load from a shaft. See **winding engine.**

hoisting. The process of lifting materials by mechanical means.

hoisting machine (*Eng.*). See **crab, differential pulley block, hydraulic lift, jack, jigger, lift, winch.**

hoisting-motor (*Elec. Eng.*). See **lift motor.**

hol-. Prefix. See **holo-.**

Holarc'tic region (*Zool.*). One of the primary faunal regions into which the surface of the globe is divided. It includes North America to the edge of the Mexican plateau, Europe, Asia (except Persia, Afghanistan, India south of the Himalayas, and the Malay peninsula), Africa north of the Sahara, and the Arctic islands.

hol'ard (*Bot.*). The whole of the water contained in the soil.

holaspid'ean (*Zool.*). Said of Birds which possess a single row of large scales covering the posterior surface of the tarsometatarsus.

Holbric (*Build.*). A patent *hollow block* (q.v.).

hol'codont (*Zool.*). Having the teeth inserted in a continuous groove.

hold (*Cinema.*). The retention of an image on the screen longer than is natural; generally obtained by repeated printing of a frame in the negative on the positive.

hold (*Ship Constr.*). A compartment within a ship's hull for the carriage of cargo. Below the lowermost deck it is termed *hold*; above this, *'tween decks*. For identification the holds are numbered from the fore end of the ship.

holdfast (*Bot.*). Any organ other than a root which attaches a plant (especially one of the lower plants) to a substratum.

holdfast (*Join*). A wrought-iron spike with a holed flange parallel to its length, used for fixing joinery.

hold-on coil (*Elec. Eng*). An electromagnet which holds the moving arm of a motor starter, or other similar device, in the 'on' position; if the current in the coil is reduced or interrupted the arm returns to the 'off' position under the action of a spring.

Holden permeability bridge (*Elec. Eng.*). A permeability bridge in which the standard bar and the bar under test carry magnetising coils, and are connected by yokes to form a closed magnetic circuit. The magnetising currents are varied until there is no magnetic leakage between the yokes.

holderbat (*Build.*). A metal collar formed in two half-round parts, capable of being clamped together around a rain-water, soil, or waste pipe, and having a projecting leg on one part for fixing to a wall.

holding time (*Teleph.*). The total time that a trunk line is in use for a call, including operator's time for connecting and subscriber's conversation.

holding-up (*Eng.*). The action of pressing a heavy hammer against the head of a rivet while closing or forming the head on the shank.

hole (*Civ. Eng.*). (1) A bore-hole.—(2) A depression for accommodating a blasting charge.

holing (*Build.*). The operation of piercing slates to receive nails.

hollander or **beating engine** (*Paper*). A trough containing a beating roll with bars set parallel to the axis; used for reducing materials prepared in the breaker to the condition requisite for producing a particular class of paper.

hollands (*Textiles*). A linen fabric of rather coarse texture; used (glazed) principally for window-blinds and linings.

hollow (*Join.*). (In mouldings, grooves, etc.) a concave profile or sinking.

hollows (*Join.*). The general name for planes having a convex sole and cutting iron for forming hollow surfaces. Cf. *rounds*.

hollows (*Pattern-making*). Fillets, or curves of small radius, uniting two surfaces intersecting at an angle; added to a pattern to give strength to the casting and facilitate withdrawal of the pattern from the mould.

hollow bed (*Masonry*). A bed joint in which, owing to the surfaces of the stones not being plane, there is contact only at the outer edges.

hollow blocks (or tiles) (*Build.*). Hollow burnt-clay or terra-cotta blocks (or tiles) much used as a building material for forming floors, or for external or partition walls.

hollow fusee (*Horol.*). A fusee with its top pivot sunk into the body in order to reduce the height of the movement.

hollow mandrel lathes (*Eng.*). The term formerly applied to lathes capable of having bar stock fed through the mandrel for repetition work.

hollow newel (*Build.*). The well-hole of a winding stair.

hollow pinion (*Horol.*). A pinion drilled throughout its length.

hollow plane (*Join.*). See **hollows.**

hollow quoin (*Hyd. Eng.*). A quoin accommodating the heel-post of a lock-gate in a vertical recess.

hollow roll (*Plumb.*). A joint between the edges of two lead sheets on the flat, made by turning up each edge at right-angles to the flat surface, bringing the two turned-up parts together, and shaping them over to form a hollow roll.

hollow tile (*Build.*). See **hollow blocks.**

hollow walls (*Build.*). *Cavity walls* (q.v.).

hollow-ware presser (*Pot.*). A machine for shaping bowls, cups, and other hollow ware.

hollowing plane (*Join.*). See **hollows.**

Hollybush Limestone (*Geol.*). A limestone of marine origin, occurring in the Lower Carboniferous of the Glasgow district.

Hollybush Sandstone (*Geol*.) A glauconitic sandstone of Cambrian age, lying on the basal quartzite of this System in the Malvern Hills. Occupies a comparable stratigraphical position to the Comley Sandstone.

Holmgren's canaliculi (*Zool.*). A system of fine canals which permeate the cytoplasm of the cell-body in some nerve cells.

holmium (*Chem.*). Symbol, Ho. A metallic element, a member of the rare earth group. At. no. 67, at. wt. 163·5. It occurs in euxenite, samarskite, gadolinite, and xenotine, and has not been obtained in the free state.

holo-, hol- (Greek *holos*, whole). A prefix used in the construction of compound terms; e.g. *holochlamydate*, having the mantle edge whole and unnotched.

holoaxial, hō-lō-ax'— (*Crystal.*). A term applied to those classes of crystals characterised by axes of symmetry only; such crystals are not symmetrical about planes of symmetry.

holobasid'ium (*Bot.*). A basidium which is not septate.

holoben'thic (*Zool*.). Passing the whole of the life-cycle in the depths of the sea.

holoblas'tic (*Zool.*). Said of ova which exhibit total cleavage.

ho'lobranch, —brank (*Zool.*). In Fish, a branchial arch carrying two rows of respiratory lamellae or filaments, one on the posterior and one on the anterior face.

holocar'pic (*Bot.*). Having the whole thallus transformed at maturity into a sporangium or a sorus of sporangia.

Holocep'hali (*Zool.*). A subclass of *Selachii*, characterised by the absence of a spiracle and by the possession of only four gill clefts, which are covered by an opercular fold. Chimaeras.

holoceph'alous (*Zool.*). Said of ribs which have a single head.

holocrystalline rocks (*Geol.*). Those igneous rocks in which all the components are crystalline; glass is absent. Cf. *hemicrystalline rocks.*

holoentoblas'tia, hō-lō-ent—(*Zool.*). An abnormal echinoderm larva, produced by cultivation in strong salt solution, in which the ectoderm is reduced to a small button at the animal pole.

hologam'etes (*Zool.*). Gametes as large as the ordinary energids of the species, and not formed by a special act of fission. Cf. *merogametes.*

ho'logam'y (*Bot.*). A fusion between two mature cells, each of which has been completely changed into a gametangium.—(*Zool.*) The condition of having gametes which resemble in size and form the ordinary cells of the species: union of such gametes. Cf. *merogamy.*

hologen'ic (*Zool.*). Said of induction in which the whole soma is primarily affected. Cf. *merogenic.*

holog'nathous (*Zool.*). Having the jaw composed of a single piece.

holohe'dral forms (*Crystal.*). Crystal forms exhibiting the highest possible symmetry in their respective systems.

Holomastigi'na (*Zool.*). An order of *Zoomastigina* the members of which have many flagella; they are capable of ingesting food by amoeboid action at any point of the body.

holomas'tigote (*Zool.*). Having numerous flagella scattered evenly over the body.

Holometab'ola (*Zool.*). See **Endopterygota.**

holometabol'ic (*Zool.*). Showing a complete metamorphosis, as most members of the *Endopterygota*; cf. *heterometabolic*.—*n.* **holometab'olism.**

holoneph'ros (*Zool.*). A continuous excretory organ of Vertebrates, extending the length of the body cavity; from it, according to some authorities, the parts of the Vertebrate kidney have been derived.

holophyt'ic (*Bot., Zool*.). Able to manufacture food from the simplest beginnings by photosynthesis, and neither parasitic nor saprophytic.

holopneu'stic, hō-lop—(*Zool.*). (Of *Insecta*) having all the spiracles open. Cf. *hemipneustic.*

holop'tic (*Zool.*). Having the eyes of the two sides meeting in front.

holorhi'nal (*Zool.*). Having the posterior margin of the nares rounded.

holoschisis, —ski'sis (*Zool*.). See **amitosis.**

ho'losty'ly (*Zool.*) In Vertebrates, a type of jaw suspension in which the PPQ bar fuses with the cranium, the hyoid arch playing no part in the suspension.

Ho'lothuroi'dea (*Zool.*). A class of *Echinodermata* having a sausage-shaped body without arms; the tube feet possess ampullae and may occur on all surfaces; the anus is aboral, the madreporite internal; the skeleton is reduced to small ossicles embedded in the soft integument; free-living mud-feeders. Sea Cucumbers.

Ho'lotricha, —trik'a (*Zool.*). An order of *Ciliata* the members of which have cilia approximately of equal length all over the body; in some forms the cilia are restricted to special regions.

holotrich'ous (*Zool.*) Bearing cilia of uniform length over the whole surface of the body.

ho'lotype (*Zool.*). The original type specimen, from which the description of a new species is established.

holozo'ic (*Zool.*). Devouring other organisms, as most animals.—*n.* **holozoon.**

Holtz machine (*Elec. Eng.*). An early form of influence machine having one fixed and one moving plate; for starting, an initial charge must be given.

ho'macanth (*Zool.*). Having dorsal fin spines which, in the depressed position, cover one another completely. Cf. *heteracanth.*

Home Office fuse (*Elec. Eng.*). A fuse constructed in accordance with the Home Office regulation as regards prevention of accidental contact with live parts and possible dangers should the fuse blow when it is being replaced.

Home Office switch (*Elec. Eng.*). See **earthed switch, shock-proof switch.**

home recorder (*Acous.*). A simplified type of gramophone disc-recorder, in which a record can be cut on a metal, celluloid, or composition surface, and reproduced with simple processing (e.g. rubbing with acetic acid) to harden the surface.

homeopathy. See **homoeopathy.**

ho'meothrausmat'ic (*Geol.*). Said of orbicular rocks in which the composition of the cores of the orbs resembles that of the groundmass in which they are embedded. *Allothrausmatic* is the term applied to those rocks in which the two compositions are different. See also **isothrausmatic.**

ho'meotyp'ic division (*Biol*). See **mitosis.**

homo- (Greek *homos*, same). A prefix used in the construction of compound terms; e g. *homolecithal*, having the yolk evenly distributed.

homoblas'tic (*Zool.*). Showing direct development: originating from similar cells.

homocer'cal (*Zool.*). Said of a type of tail-fin, found in all the adults of the higher Fish, in which the vertebral column bends abruptly upwards and enters the epichordal lobe, which is equal in size to the hypochordal lobe.

homochlamyd'eous (*Bot.*). Having a perianth consisting of members all of the same kind, not distinguishable into sepals and petals.

homoch'romy (*Zool.*). The resemblance of the colour of an animal to the colour of its surroundings.

homocy'clic (*Chem.*). Containing a ring composed entirely of atoms of the same kind.

ho'modont (*Zool.*). Said of teeth which all have the same characteristics.

homodro'mous (*Bot.*). Having the leaves inserted on spirals all running in a uniform direction.

homodynam'ic hybrid (*Gen*). A hybrid having an equal grouping of characters derived from both its parents, and so differing from both in appearance.

ho'modyne reception (*Radio*). A system of reception employing an oscillating valve adjusted to exactly the same frequency as the carrier of the incoming signal.

homoeom'erism (*Zool.*). In metameric animals, the condition of having all the somites alike; cf. *heteromerism.—adj.* **homoeomeric.**

homoeop'athy or **homeopathy.** A system of medicine, founded by Dr Samuel Hahnemann (1755-1843), the basic principle of which is *Similia similibus curentur* (=let likes be cured by likes). By experiment Hahnemann found that (1) a disease is characterised by a definite symptom complex, (2) it can be effectively treated by the drug which produces in a healthy individual the most similar symptom complex, and (3) for a given disease the proven drug is best administered in extreme dilution (expressed by the term *potency*, e.g. thirtieth potency).

homoeo'sis (*Bot.*). A type of variation in which a plant member takes on the characteristics of a member of different nature, as when a petal is changed into a stamen.

homoeosis (*Zool.*). In metameric animals, the assumption by a merome of the characters of the corresponding merome of another somite. Cf. *heterosis.*

homogame'tic (*Zool*). Having all the gametes alike.

ho'mogam'ous (*Bot.*). (1) Having all the flowers in an inflorescence alike, all being either hermaphrodite, staminate, pistillate, or neuter.—(2) Having the anthers and stigmas ripe at the same time.

homog'amy (*Zool.*). Inbreeding, usually due to isolation.

homoge'neous (*Chem.*). Said of a system consisting of only one phase, i.e. a system in which the chemical composition and physical state of any physically small portion are the same as those of any other portion.

homogeneous (*Zool.*). Homogenous.

homogeneous light. The same as *monochromatic light.*

homogen'esis (*Zool.*). The reproductive cycle in which the offspring resemble the parents.

homogeny, —moj'en-i (*Zool.*). Similarity of individuals or of parts, due to common descent.—*adj.* **homogenous.**

ho'moimer'ous (*Bot.*). Said of a lichen thallus in which the algal and fungal components are mixed and not arranged in layers.

homoi'oplas'tic (*Zool*). In experimental zoology, said of transplantation in which transplant and host belong to the same species. Cf. *autoplastic, heteroplastic, xenoplastic.*

homoi'other'mal (*Zool.*). See **warm-blooded.**

homol'ogous (*Bot., Zool.*). Of the same essential nature, and of common descent.

homologous alternation of generations (*Bot*). The doctrine that the sporophyte originated as a modification of the gametophyte, and not as a new phase introduced into the life-cycle.

homologous chromosomes (*Cyt.*). Each pair of chromosomes which associate at synapsis, these being the corresponding members of the two sets derived from the gametes.

homologous series (*Chem*). A series of organic compounds each member of which differs from the next by the insertion of a $-CH_2-$ group in the molecule. Such a series may be represented by a general formula and shows a gradual and regular change of properties with increasing molecular weight.

homologous variation (*Bot*). The occurrence of similar variations in related species.

homol'ogy (*Bot , Zool.*). The state of being homologous.—*n.* **ho'mologue.**

homomor'phic (*Cyt.*). Said of chromosome pairs which have the same form and size.

ho'momorpho'sis (*Zool*). The regeneration of a part in the same form as the original part. Cf. *heteromorphosis.*

homomor'phous (*Bot , Zool.*). Alike in form.

ho'monym (*Zool*) A name which is given to an animal and which is unsuitable because it is already in use to designate some other animal.

homophyl'lous (*Bot.*). Having foliage leaves all of the same kind.

homoplas'ma (*Zool*). In tissue culture, a medium prepared with plasma from another animal of the same species as that from which the tissue was taken. Cf. *autoplasma, heteroplasma.*

homoplas'tic (*Bot*). Of the same structure and manner of development but not descended from a common source.

ho'moplas'ty (*Zool.*). Similarity between two different organs or organisms, due to convergent evolution.

homopo'lar (*Chem.*). Having an equal distribution of charge, as in a covalent bond.

homopolar generator (*Elec. Eng.*). A d.c. generator in which the poles presented to the armature are of the same polarity, so that the e.m.f. generated in the conductors is always in the same direction.

homop'terous (*Zool.*). Having both pairs of wings similar: pertaining to the *Homoptera.*

homosexual'ity (*Psycho-path.*). A general term denoting sexual attraction for the same sex; it may be active and conscious, or repressed and unconscious. Homosexuality is a phase through which everyone passes before maturing to heterosexuality.

homosporan'gic (*Bot.*). Having only one kind of sporangium.

homospo'rous (*Bot.*). Having spores all of the same kind.

ho'mostyled (*Bot.*). Having styles all of the same length.

homosynap'sis (*Cyt.*). Pairing of two similar chromosomes. Cf. *heterosynapsis.*

homotax'is (*Geol.*). A term introduced by Huxley to indicate that two strata occurring in different areas shared the same faunal characters and were therefore of the same age in the geological sense. A faunal element may originate in, and be dispersed from, a certain locality A. In the course of time it reaches locality B, and, eventually, the more distant C. The sediments accumulating in these three localities which contain the remains of this same organism are *homotaxial* but not strictly contemporaneous, as time has been spent in migrating from A to B and from B to C.

homothal'lism (*Bot.*). The condition when a fungal mycelium is able to develop functional sexual organs on its own branches, and does not co-operate with another mycelium of the same species but of different physiological nature.

homother'mous (*Zool.*). See **warm-blooded.**

homotyp'ic (*Zool.*). Conforming to the normal condition. Cf. *heterotypic.*

homotypic division (*Cyt.*). See **mitosis.** Cf. *heterotypic division.*

homozygo'sis (*Gen.*). The condition of having inherited a given genetical factor from both parents, and therefore of producing gametes of only one kind as regards that factor: genetical stability as regards a given factor.—*n.* **homozy'gote.**—*adj* **homozy'gous.**

hone (*Tools*). A smooth stone used, either dry or moistened with oil or water, to give a fine keen edge to a cutting tool.

honestone or **whetstone** (*Geol.*). The term is applied (more frequently in the past than in the present) to fine-textured even-grained indurated sedimentary rocks which may be used as oil-stones for imparting a keen edge to cutting tools. Honestone has been largelv replaced now by emery and Carborundum.

honey. The concentrated secretion deposited as a food store by *Apis mellifera*; results from enzyme action upon nectar; rich in invert sugar.

honeycomb (*Textiles*). Fabric with a cell-like appearance resembling honeycomb, used for towels and quilts. Generally woven from coarse soft yarns in compact structures, known respectively as *ordinary honeycomb, Brighton honeycomb,* and *Grecian honeycomb.*

honeycomb coil (*Radio*). An inductance coil in which the wire is wound in a zig-zag formation around a circular former. The adjacent layers are staggered, so that the wires cross each other obliquely in order to reduce the capacity effects between turns.

honeycomb slating (*Build.*). This is similar to drop-point slating; the tiles, however, have their bottom corners removed.

honeycomb wall (*Build.*). A wall built so as to leave regular spaces, each course consisting usually of bricks laid stretcherwise but not touching at the ends, the course above it being arranged so that bricks cover the gaps in the course below. See **sleeper wall.**

honey dew (*Zool.*). A sweet substance secreted by certain *Aphididae*; believed to be emitted through the anus.

honey guide (*Bot.*). A patch or streak of colour on a petal, different from the general colour, possibly serving to direct insects to the nectaries, or as a guide for their landing on the flower.

honey-leaf (*Bot.*). A nectary with a strong development of the lamina of the petal.

Hong-Kong foot (*Med.*). Ringworm of the foot.

honing (*Eng.*). The process of finishing cylinder bores, etc. to a very high degree of accuracy by the abrasive action of stone slips held in a revolving head.

honing machine (*Eng.*). A machine for honing the bores of engine cylinders, etc. by the action of revolving abrasive stones. See **honing.**

hood (*Build.*). (1) A cowl for a chimney.—(2) A cap for a pile.

hood (*Zool.*). In *Tetrabranchiata*, a thickened anterior region of the body, in contact with the edge of the shell and forming an operculum when the animal withdraws: in the Cobra, an expansible region just behind the head: the head in any animal if it differs markedly in coloration from the rest of the body: a crest-like eminence on the head.—*adj.* **hooded.**

hood, lens (*Photog.*). See **lens hood.**

hood mould (*Build.*). A projecting moulding above a door or window opening.

hoof (*Zool.*). In certain Mammals, a horny proliferation of the epidermis, enclosing the toes.

hook bolt (*Build.*). A galvanised-iron bolt formed out of rod which is bent at one end into a hook serving as the head, and threaded at the other to take a nut; used for fixing corrugated sheeting.

hook-down (*Typog.*). See **hook-up.**

hook joint (*Join.*). A *hooked joint* (q.v).

hook-out blind (*Build*). An outside roller blind fitted with metal side arms and bottom rail so that the blind may be supported away from the window.

hook rebate (*Join.*). The S-shaped rebate formed on the meeting edges of a *hooked joint* (q v).

hook, switch (*Teleph.*). See **switch hook.**

hook-up (*Elec. Comm.*). The same as *lash-up.*

hook-up, hook-down (*Typog.*). The end of a line turned over and bracketed in the line above or below. Often used in setting up hymns or poetry.

hooked disseminule (*Bot*). A fruit, seed, or spore bearing outgrowths in the form of hooks; these become attached to the bodies of animals and assist in dissemination.

hooked joint (*Join.*). A form of joint used between the meeting edges of a door and its case when an airtight or dustproof joint is necessary; the meeting edges on the door have a projection on them fitting into a corresponding recess in the case.

Hooke's joint (*Eng.*). A piece of universal joint consisting of two horseshoe-shaped forks, each pivoted to a separate central member carrying two pins at right-angles. See **universal joint.**

Hooke's law (*Mechs.*). 'In an elastic material, strain is proportional to stress.' The value of the stress at which a material ceases to obey Hooke's law is known as the *elastic limit.* See **elasticity.**

hoop iron. Thin strip-iron used for securing barrels, and also for various purposes in the building trades; e g. as reinforcement in brick walls (see **hoop-iron bond).**

hoop-iron bond (*Build.*). A bond sometimes formed at the junctions of walls not built at the same time; made by using long strips of hoop iron, usually $2 \times \frac{1}{16}$ in., half built into the old wall and half into the new one.

hoop stretchers (*Furs*). Hoops of flexible wood on which large skins are stretched to dry.

Hoopes process (*Met.*). A process for the refining of aluminium electrolytically to a purity of 99·99%. Metal made by the Hall process is alloyed with 33% of copper and made the anode in a non-aqueous electrolytic bath composed of alumina and fluorides of barium, sodium, and aluminium. When current is passed between the hearth and carbon electrodes on top of the bath, aluminium dissolves from the anode alloy and pure metal accumulates at the cathodes.

hooping (*Civ. Eng.*). Reinforcing bars for ferro-concrete, bent either to a circular or helical shape.

hoose (*Vet.*). See **husk.**

Hope sapphire (*Min.*). Synthetic stone having the composition of spinel and a blue colour which turns purple in artificial light. First produced in the attempts to synthesise sapphire.

Hope Shales (*Geol.*). A local name for the Lower Llanvirn Shales containing the zone fossil *Didymograptus bifidus*, in S. Shropshire.

Hope's Nose Limestone (*Geol.*). A massive, well-bedded, and richly fossiliferous limestone, of Middle Devonian age, occurring at Hope's Nose (Point), Torquay.

hopeite, hō′pit (*Min.*). Hydrous phosphate of zinc, occurring very rarely in zinc mines as orthorhombic grey crystals.

Hopkins-Cole reaction (*Chem.*). A reaction given by proteins, consisting in the appearance of a reddish-violet ring when a mixture of a protein solution and a solution of glyoxylic acid is brought into contact with concentrated sulphuric acid.

Hopkinson test (*Elec. Eng.*). A method of testing two similar d.c. machines on full load without requiring a large consumption of power from the supply; one machine fed from the supply drives the other as a generator, which returns power to the supply.

Hoplocar′ida (*Zool.*). A division of *Crustacea* in which there are six abdominal somites, and the anterior thoracic limbs have a two-jointed protopodite, while in the posterior ones it is three-jointed; the carapace leaves at least four thoracic somites distinct; the ocular and antennular somites of the head are free and movable; the protopodite of the antenna is two-jointed.

hopped wort (*Brew.*). See **wort.**

hopper (*Build.*). A draught-preventer at the side of a hopper light.

hopper (*Mining*). A container or bin for broken ore.

hopper barge (*Civ. Eng.*). A vessel divided into compartments fitted with flap doors at the bottom, so that after being loaded by a stationary dredger it can convey the dredged material to a place of deposit.

hopper dredger (*Civ. Eng.*). The type of bucket-ladder or suction dredger which not only dredges material from below but has hopper compartments fitted with flap-doors at the bottom; into these compartments the material is discharged as it is dredged, and from them it is deposited after the vessel has moved to the place of deposit.

hopper light (*Build.*). A window-sash arranged to open inwards about hinges on its lower edge.

hopper window (*Build.*). A hopper light fitted at the sides with hoppers. Also called a HOSPITAL WINDOW.

hops (*Brew.*). The amentaceous fruit *strobiles* of the hop (***Humulus lupulus***), a perennial climbing moraceous herb, which is boiled with wort, in order to impart the bitter flavour characteristic of beer; hops also act as a preservative. See **wort.**

hopsack (or **mat**) **weave** (*Textiles*). A development of the plain weave in which two or more threads of warp and weft interlace alike. Twilled varieties are sometimes produced. Also termed BASKET WEAVE, CELTIC WEAVE.

hor′dein (*Chem.*). A prolamin obtained from barley. It is a typical gliadin.

horde′olum (*Med.*). See **sty.**

horizon (*Astron.*). That great circle, of which the zenith and the nadir are the poles, in which the plane tangent to the earth's surface, considered spherical, at the point where the observer stands, cuts the celestial sphere.

horizon (*Optics*). The more or less coloured visual impression experienced subjectively by blind persons.

horizon (*Surv.*). A plane perpendicular to the direction of gravity at the point of observation.

horizon, artificial (*Astron.*). A device for measuring altitudes with a sextant on occasions when a sea horizon is not available. It consists of a reflecting surface, generally a bath of mercury, in which the image of the sun or a star is substituted for the line of the horizon.

horizon, geological (*Geol.*). The term is synonymous with *stratigraphical level*, and has reference to the systematic position of a stratum on the geological time-scale. Thus if a certain shale is referred to the horizon of ***Didymograptus murchisoni***, it implies that it occurs at a particular level in the Llanvirn Series of the Ordovician System: it will contain the fossil remains of this particular graptolite or, in rocks of different lithology, traces of other creatures living at the same time.

horizon glass (*Surv.*). See **sextant.**

horizontal (*Bot.*). Spreading at a right-angle to a support.

horizontal antenna (*Radio*). An antenna comprising a system of one or more horizontal conductors, radiating or responsive to horizontally polarised waves.

horizontal axis (*Surv.*). See **trunnion axis.**

horizontal circle (*Surv.*). The graduated circular plate used for the measurement of horizontal angles by theodolite.

horizontal component (*Elec. Eng.*). The component of the earth's magnetic field which acts (i.e. exerts a force on a unit pole placed in it) in a horizontal direction.

horizontal draw-out metal-clad switchgear (*Elec. Eng.*). Metal-clad switchgear in which the switch itself can be isolated by removing it along suitable guides in a horizontal direction from the fixed portion of the panel.

horizontal engine (*Eng.*). Any engine in which the cylinder is horizontal; most commonly large low-speed steam- and gas-engines.

horizontal escapement (*Horol.*). See **cylinder escapement.**

horizontal parallax (*Surv.*). The value of the geocentric parallax for a heavenly body in the solar system when the body is on the observer's horizon.

horizontal polarisation (*Radio*). The state of polarisation of an electromagnetic wave when the electric field is directed horizontally.

horizontal sheeting (*Civ. Eng.*). Long horizontal poling boards placed on each side of a trench excavated in bad ground and strutted apart. Short vertical walings are introduced when the trench has been sunk about 3 ft.

hor′mocyst (*Bot.*). A short hormogonium enclosed in a thick stratified sheath.

hor′mogone (*Bot.*). A short length of filament in the ***Myxophyceae***, which breaks free and can grow into a new filament.

hormone (*Physiol.*). An internal secretion produced by the endocrine or ductless glands of the body and exercising a specific stimulatory (Greek *hormōn*, 'urging on,' 'stirring up') physiological action on other organs to which it is carried by the blood. Important hormones are thyroxine, adrenaline corticosterone, insulin, oestradiol.

horn (*Acous.*). An acoustic device for coupling high mechanical impedances, such as sound-reproducing diaphragms, with the low radiation impedance of the outer air.

See **conical—**
corner—
folded—
re-entrant—
tractrix—

horn, horn loudspeaker (*Cinema.*). The term *horn* is colloquially applied to any radiating receiver, whether possessing a horn or not, but strictly a *horn loudspeaker* is one possessing a horn as the radiating element.

horn (*Elec. Eng.*). See **arcing horn, pole horn.**

horn (*Eng.*). Any projecting part, such as the two jaws of a horn-plate carrying a locomotive axle-box.

horn (*Zool.*). Keratin: one of the pointed or branched hard projections borne by the head in many Mammals; any conical or cylindrical projection of the head resembling a horn: in some Birds, a tuft of feathers on the head: in some Gastropods, a tentacle; in some Fish, a spine.—*adjs.* **horned, horny.**

horns (*Join.*). The ends of the head in a door or window frame when these project beyond the outer surfaces of the posts.

horn arrester (*Elec. Eng.*). A lightning arrester consisting of a horn gap which arcs over on the occurrence of a lightning surge, but which rapidly extinguishes the arc on account of the special shape of the electrodes.

horn balance (*Aero.*). An extension on a control surface, at the outermost end. Arranged to act in opposition to the main surface, partially to balance it and reduce the effort necessary to manipulate it.

horn-break fuse (*Elec. Eng.*). A fuse fitted with arcing horns to assist in the rapid extinction of any arc which may be formed.

horn centre (*Drawing*). A small transparent disc of celluloid or horn, used by draughtsmen to provide a substance into which the point of the compasses may be placed, in lieu of the paper beneath, at points which are to be much used as centres for describing arcs.

horn gap (*Elec. Eng.*). A spark gap of gradually increasing length, such that an arc struck across it gets longer and finally extinguishes itself.

horn gate (*Foundry*). Horn-shaped in-gates or sprues, radiating from the bottom of a runner, which supply several small moulds made in the same moulding box. See **in-gate.**

horn lead (*Min.*). The translation of the French term *plomb corné*, sometimes applied to the mineral *phosgenite* (q.v.).

hornsilver (*Min.*). See **cerargyrite.**

hornstone (*Geol.*). An old name for rocks differing widely in composition and origin, characterised by their flinty, compact appearance. The term *hornfels* is still used for fine-textured contact-altered argillaceous rocks.

hornblende (*Min.*). An important rock-forming mineral of complex composition, essentially silicate of calcium, magnesium, and iron, with smaller amounts of potash, soda, and hydroxyl; crystallises in the monoclinic system; occurs as black crystals or grains in many different types of igneous and metamorphic rocks, including hornblende-granite, syenite, diorite, andesite, etc., and hornblende-schist and amphibolite.

hornblende-gneiss (*Geol.*). A coarse-grained metamorphic rock, containing hornblende as the dominant coloured constituent, together with feldspar and quartz, the texture being that typical of the gneisses. Differs from hornblende-schist in grain size and texture only.

hornblende-granite (*Geol.*). A type of granite, usually adamellite or granodiorite, containing hornblende as an essential constituent; with decreasing quartz, grades through tonalite into normal diorite.

hornblende-schist (*Geol.*). A type of green schist, formed from basic igneous rocks by regional metamorphism, and consisting essentially of sodic plagioclase, hornblende, and sphene, frequently with magnetite and epidote. See also **glaucophane.**

Horner's syndrome (*Med.*). The combination of small pupil, sunken eye, and drooping of upper eyelid, due to paralysis of the sympathetic nerve in the region of the neck.

horological (*Bot.*). Said of a flower which opens and shuts at a definite time of day.

horology. The science of time-measurement, or of the construction of timepieces.

horrip'ila'tion (*Med.*). Erection of the hairs on the skin, giving rise to the sensation known as *goose flesh.*

horse (*Carp.*). (1) One of the *strings* (q.v.) supporting the treads and risers of a stair.—(2) A trestle for supporting a board or timber while it is being sawn.

horse (*Mining*). A mass of barren or country rock occurring in a lode or reef.

horse (*Plast.*). The wooden backing to a zinc mould used in forming cornices.

horse (*Plumb.*). A wooden finial which is to be covered with lead.

horse-flesh ore (*Min.*). A name applied by Cornish miners to the mineral *bornite* (q.v.) on account of its reddish-brown colour.

horse gear (*Agric. Mach., etc.*). See **bullock gear.**

horse latitudes (*Meteor.*). See under **trade winds.**

horse mower (*Agric. Mach.*). This consists of a cutter bar, four or five feet long, hinged at one end to a two-wheeled frame, and projecting from the side of the machine. The cutting is done by a scissors-like action, the power being transmitted from the landwheels of the machine.

horse path (*Hyd. Eng.*). A canal towing-path.

horse-power (*Eng.*). The engineering unit of power, equal to a rate of working 33,000 foot pounds per minute, 23·56 C.H.U. per minute, or 42·42 B.Th.U. per minute.

See **brake— indicated— cheval.**

horse pox (*Vet.*). A contagious filterable-virus infection of equines characterised by a papulo-vesicular eruption of the skin and mucous membranes.

horseshoe curve (*Surv.*). A curve whose arc subtends an angle of more than 180° at the centre, so that the intersection point lies on the same side of the curve as the centre.

horseshoe drain. A drain pipe, having a U-shaped section, used for agricultural drainage purposes.

horseshoe filament (*Illum.*). An electric lamp filament in the shape of a single half-turn.

horseshoe magnet (*Elec. Eng.*). A permanent or electromagnet bent into a shape approximately similar to that of a horseshoe.

horse-sickness, African (*Vet.*). A filterable-virus infection of equines of South Africa.

horsing-up (*Plast.*). A term applied to the building-up of the mould used in running cornices, etc.

horst faults (*Geol.*). Two parallel normal faults hading outwards and throwing in opposite directions, the resulting structure being termed a *horst.*

hose (*Tubing*). Flexible tubing made from canvas, leather, rubber, or other material suitable for the conveyance of a liquid; for steam, flexible hose is made of metal.

hose coupling (*Tubing*). Metal joints for connecting lengths of hose; the coupling generally used is a special form of thread, such as a V-thread, or a clip type in which the halves are secured by spring catches.

hose-proof (*Elec. Eng.*). Said of a type of enclosure for electrical apparatus so constructed as to exclude water when the apparatus is washed down with a hose.

hosiery. A term applied formerly to knitted articles intended for footwear, but now applied to all sorts of knitted fabrics.

hospital bus-bars (*Elec. Eng.*). A set of bus-bars provided in a power- or sub-station for temporary or emergency purposes.

hospital door (*Join.*). A door faced all over on both sides with plywood so as to present flush surfaces. Also called a FLUSH-FACED DOOR.

hospital switch (*Elec. Eng.*). (1) A switch used on tramway or railway controllers to cut a faulty motor out of circuit.—(2) Any switch for changing a circuit over to an emergency supply in case of failure of the main supply.

hospital window (*Build.*). See **hopper window.**

host (*Biol.*). An organism which, temporarily or permanently, supports another organism (parasite) at its own expense.

hot (*Elec.*). Said of a conductor which is charged to a dangerously high potential. Colloquial.

hot-air engine (*Eng.*) An internal-combustion engine in which the working fluid, air, is alternately heated and cooled by a furnace and regenerator; impracticable except for small powers.

hot-air heaters (*Build.*). Heaters employed in the pipeless system of heating buildings; they supply warm air through gratings in the floor or openings in the walls, thereby encouraging a natural circulation.

hot-air seasoning (*Timber*) See **desiccation.**

hot-blast stoves (*Met.*). Large stoves, filled with a brick chequerwork, used for pre-heating the air blown into the blast-furnace.

hot-cathode discharge lamp (*Illum.*). A discharge lamp employing a heated cathode to increase its efficiency, improve the starting, and reduce the voltage drop across the tube.

hot-cathode rectifier (*Thermionics*). A rectifier which includes a cathode heated by some agent other than the rectified current, from which electrons are thermionically emitted. The term usually refers to a mercury-vapour rectifier with separately heated cathode, in contradistinction to the pool type.

hot-ground pulp (*Paper*). Mechanical wood pulp prepared rapidly from the raw wood, using the minimum of water.

hot plate (*Elec. Eng.*). An electrically heated plate maintained at a moderate temperature so that dishes placed upon it may be kept warm; not intended for boiling purposes. Cf. *boiling plate.*

hot-pressed (*Paper*). Paper finished by glazing with hot plates.

hot pressing (*Acous.*). A water-wave effect produced on the surface of a gramophone record by exposure to the air before it is sufficiently cool.

hot-rolled (*Paper*). Paper glazed by means of steam-heated cylinders.

hot saw (*Eng.*). A metal-cutting circular saw used to cut off the ends of heated steel forgings, billets, etc., in a steelwork.

hot-short or **red-short** (*Met.*). Said of metals that tend to be brittle at temperatures at which hot-working operations are performed, and which can only be worked with difficulty, if at all.—*ns.* **hot-shortness, red-shortness.**

hot spot (*Cables*). A location in a cable at which thermal generation is high. Thermal instability at the point usually occurs.

hot spot (*I.C. Engs.*). Part of the wall surface of the induction manifold of a petrol-engine on which the mixture impinges; heated by exhaust gases to assist vaporisation and distribution.

hot top (*Met.*). Refractory insulation at the top of an ingot mould, the function of which is to maintain a reservoir of molten metal at the top of the ingot until the main part has completely solidified. See **ingot** and **ingot mould.**

hot well (*Eng.*). The tank or pipes into which the condensate from a steam-engine or turbine condenser is pumped, and from which it is returned by the feed pump to the boiler.

hot-wire (*Elec. Eng.*). Said of an electrical indicating instrument whose operation depends on the thermal expansion of, or change in resistance of, a wire or strip when it carries a current. See **hot-wire ammeter,** etc.; also **Cardew voltmeter.**

hot-wire ammeter (*Elec. Eng.*). An ammeter operating on the hot-wire principle (see **hot-wire**); of use chiefly for very high frequencies.

hot-wire anemometer (*Meteor.*). An instrument which measures wind velocities by using their cooling effect on a wire carrying an electric current, the resistance of the wire being used as an indication of the velocity.

hot-wire arc lamp (*Illum.*). A form of clutch arc lamp in which the clutch controlling the movement of the carbons is operated by the expansion of a wire, according to the current passing through it.

hot-wire detector (*Radio*). A fine wire which is heated by the passage of high-frequency currents, producing a change in its d.c. resistance.

hot-wire magnifier, Heurtley (*Teleg.*). See **Heurtley hot-wire magnifier.**

hot-wire microphone (*Acous.*). A microphone detector which depends on the cooling of a heated wire by the passage of a sound-wave. Used in the neck of a Helmholtz resonator for detecting acoustic impulses from distant gunfire.

hot-wire oscillograph (*Elec. Eng.*). An oscillograph in which a moving mirror is supported by an arrangement of wires carrying the current to be measured, and which is deflected as a result of the thermal expansion of these wires.

hot-wire voltmeter (*Elec. Eng.*). A voltmeter operating on the *hot-wire* (q.v.) principle. See **Cardew voltmeter.**

hot-wire wattmeter (*Elec. Eng.*). A wattmeter in which the deflection is indicated by means of a mirror mounted on an arrangement of fine wires carrying currents proportional to the main current in the circuit and to the voltage, and which is deflected as a result of the thermal expansion of the wires.

hot-working (*Met.*). The process of shaping metals by rolling, extrusion, forging, etc. at elevated temperatures. The hot-working range varies from metal to metal, but it is, in general, a range in which recrystallisation proceeds concurrently with the working, so that no strain-hardening occurs.

hour angle (*Astron.*). The angle, generally measured in hours, minutes, and seconds of time, which the declination circle of a heavenly body makes with the observer's meridian at the celestial pole; it is measured positively westwards from the meridian from 0 to 24 hours.

hour circle (*Astron.*). (1) As applied to the celestial sphere, a synonym for *declination circle.*—(2) As applied to an instrument, the graduated circle of an equatorial telescope which reads sidereal time and right ascension.

hour-counter (*Elec. Eng.*). See **time-meter.**

hour-glass piston (*I.C. Engs.*). A petrol-engine piston provided with a waisted central portion to reduce the area in contact with the cylinder wall and so reduce friction.

hour-glass stomach (*Med.*). Constriction of the middle part of the stomach, due either to spasm of stomach muscle or to the formation of scar tissue in connexion with a gastric ulcer, the constriction in the latter case being permanent.

hour-meter (*Elec. Eng.*). See **time-meter.**

hour rack (*Horol.*). The toothed quadrant in a striking clock, one tooth of which is picked up by the gathering pallet for each hour struck.

hour wheel (*Horol.*). The wheel in the motion work which carries the hour hand.

house (*Build.*). A building which is intended for human habitation or activities.

house (*Zool.*). In *Protozoa*, a loose-fitting shell with a wide mouth: in *Larvacea*, the test, which is loose-fitting and not attached to the animal.

houseboat. A boat which serves as a dwelling.

housebreaker. One employed in the demolition of buildings.

housemaid's knee (*Med.*). Inflammation of the bursa in front of the patella of the knee.

house service meter (*Elec. Eng.*). An integrating meter for measuring the electrical energy consumption of a domestic installation.

house style (*Typog.*). See **style of the house.**

housed joint (*Furn., etc.*). A fitted joint, such as a tenon in its mortise.

housed string (*Carp.*). A string which has its upper and lower edges parallel to the slope of the stair, and houses, in grooves specially cut in the inner side, the ends of the steps. Also called a CLOSE STRING.

housing (*Carp., Join.*). A method of jointing two timbers in which the whole of the end of one is fitted into a corresponding blind mortise cut in the other.

ho'ven (*Vet.*). See **bloating.**

Howard protective system (*Elec. Eng.*). A form of earth-leakage protection sometimes applied to a.c. machines and equipment. It consists of a current transformer connected between the frame of the machine and earth; if a current flows through the transformer a relay is operated, which opens the main circuit-breaker.

howitzer (*Artillery*) An artillery weapon employed against targets under cover. By decreasing the propellent charge and increasing the elevation, a steeper angle of descent for the shell can be obtained.

howlback (*Acous.*). The audible oscillation arising from acoustic or mechanical feed-back from a loudspeaker to a microphone in the same reproducing system.

howler (*Teleph.*). A device which uses acoustic feed-back between a telephone transmitter and a telephone receiver to maintain a continuous oscillation, and so provides suitable currents for testing telephonic apparatus.

H.P. Abbrev. for *horse-power.*

H.S.L.-type cable (*Cables*). One in which each core has H-paper wrapping and separate lead sheath.

hub (*Plumb.*). See **socket.**—(*Surv.*) See **change point.**

hub, airscrew (*Aero.*). See **airscrew hub.**

hübnerite or **huebnerite,** hüb'ner-it (*Min.*). Tungstate of manganese, one of the end members of a variable series (the other being *ferberite,* tungstate of iron), commonly known as wolfram or wolframite. A product of pneumatolysis; associated with such minerals as scheelite, cassiterite, etc.

huckaback (*Textiles*). A linen or cotton cloth with a spongy structure, used for towels and glass-cloths. Sometimes made from a combination of linen and cotton.

Hudson River Bluestone (or **Flagstone**) (*Geol.*). Well-bedded flags of non-marine deltaic origin occurring in the Hamilton division of the Middle Devonian of N. America.

hue. A particular shade or tinge of a colour; the attribute of colour which differentiates it from grey of equal brilliance.

hue sensibility (*Optics*). The ability of the eye to distinguish small differences of colour.

huebnerite (*Min.*). See **hübnerite.**

Hughes printing telegraph (*Teleg.*). An obsolescent system of transmitting and printing telegraph signals; it uses a piano keyboard to prepare contacts, which are scanned by a rotating switch-arm.

hull (*Ship Constr.*). A term used in its widest sense to signify the ship itself exclusive of masts, funnels, and top hamper. In a more restricted sense, it means the shell of the ship. It is also used to distinguish between ship and engines.

hullite (*Min.*). See **chlorophaeite.**

hum (*Acous.*). The singing note emitted from a sound reproducer, due to alternating components in the power supplies to the amplifiers, or to insufficient smoothing of rectified supplies. See also **sprocket hum.**

hum-bucking coil (*Acous.*). In an electrodynamic receiver, a coil carrying partially smoothed rectified current, arranged to neutralise the currents in the operating coil which would give rise to hum in addition to the required reproduction.

hum note (*Acous.*). The pitch of the note of the sound from a bell which persists after the strike note has died away.

human fat (*Chem.*). Fat occurring in the human body has the following characteristics: m.p. 17·5° C., iodine value 57-66, saponification number 193-199. See also **fats*.**

hu'meral (*Zool.*). (In Vertebrates) pertaining to the region of the shoulder: (in *Insecta*) pertaining to the anterior basal angle of the wing: in *Chelonia,* one of the horny plates of the plastron.

hu'merus (*Zool.*). The bone supporting the proximal region of the fore limb in land Vertebrates.—*adj.* **humeral.**

hu'mic acids (*Chem.*). Complex organic acids occurring in the soil and in bituminous substances formed by the decomposition of dead vegetable matter.

hu'micole, hu'mico'lous (*Bot.*). Growing on soil or on humus.

humid'ifier. An apparatus for maintaining desired humidity conditions in the air supplied to a building.

humidity (*Meteor.*). The *absolute humidity* (q.v.) of the air—that is, the quantity of water vapour present per unit volume; it is of less importance than the *relative humidity* (q.v.).

hu'mifica'tion (*Bot.*). The transformation of organic material into humus.

hu'mite (*Geol.*). A term applied by R. Potonié in 1924 to coals derived from humic material.

hu'moralism, hu'morism (*Med.*). The doctrine that diseases arise from some change in the humours or fluids of the body.

humour, humor (*Zool.*). A fluid; as the *aqueous humour* of the eye.

hump (*Bot.*). A tiny outgrowth on the side of a growing point, the rudiment of a future lateral member.

hump speed (*Aero.*). The speed, on the water, at which the water resistance of the floats or boat body of a seaplane or flying-boat is a maximum. After this is past the craft begins to be partially air-borne.

Humphrey gas pump (*Eng.*). A large water-pump in which periodic gas explosions are made to act directly on an oscillating column of water, thereby effecting a pumping cycle; used in water-works.

hu'mus (*Bot.*). Organic matter present in the soil, and so far decomposed that it has lost all signs of its original structure. It is colloidal, and dark-brown.

humus plant (*Bot.*). A flowering plant, often poorly provided with chlorophyll, which grows in deep humus, with its roots forming a mycorrhiza with a fungus.

hung (*Join.*). Said of a door or window-sash when it is hinged to its frame so as to be capable of being opened or shut within it.

hung sash (*Join.*). A *hanging sash* (q.v.).

Hungarian cat's-eye (*Min.*). An inferior greenish cat's-eye obtained in the Fichtelgebirge in Bavaria. No such stone occurs in Hungary.

hunter (*Horol.*). A watch case with a hinged metal cover over the dial.

hunter's moon (*Astron.*). The name given in popular language to the full moon which occurs next after the harvest moon, and to which the same phenomena apply in a lesser degree.

hunting (*Elec. Eng.*). A phenomenon which sometimes takes place when two or more synchronous machines are operated in parallel; it consists of a periodic variation of their speed above and below normal, together with corresponding variations in current flow between the machines.—(*Eng.*) A periodic variation in the speed of a governed engine, due to governor inertia, lag, or friction in the mechanism.—(*Aero.*) A similar oscillation arising in an aircraft during flight.

hunting selector (*Auto. Teleph.*). A selector of the uniselector or single-motion type which either hunts for a subscriber's line, when the subscriber desires connexions, or hunts for a free outlet before permitting the subscriber to dial. The hunting may be effected by self-interruption, or by taking timed impulses from a source in the exchange.

hunting tooth (*Eng.*). An extra tooth added to a gear-wheel in order that its teeth shall not be an integral multiple of those in the pinion.

Huntington's chorea (*Med.*). Hereditary *chorea* (q.v.) occurring in adults; associated with progressive mental deterioration.

Huppert's test (*Chem.*). A test for the presence of bile based upon precipitation of the bile acids with calcium hydroxide or chloride and ammonium carbonate, with a subsequent colour test of the acidified precipitate in acetic acid and in chloroform solution.

Huronian System (*Geol.*). A major division of the Pre-Cambrian rocks of the Canadian Shield, typically exposed on the northern shores of Lake Huron and following the Timiskaming Series unconformably. The Huronian comprises two Series, the Bruce below, followed unconformably by the Cobalt.

hurricane (*Meteor.*). A wind of force 12 on the Beaufort scale—i.e. a velocity of 75 miles per hour. The name was originally restricted to cyclones occurring in the West Indies, in which the wind often attains a velocity of 130 miles per hour and causes great havoc.

hurricane deck (*Ship Constr.*). A term, not normally in use, for a superstructure deck Sometimes termed FLYING DECK. It is independent of the ship from the point of view of strength.

hurter (*Build.*). A cast-iron, timber, stone, or concrete block, which is so placed as to protect a quoin from damage from passing vehicles.

Hurter and Driffield (H. and D.) curve (*Photog.*). The characteristic curve exhibiting the properties of a photographic emulsion, from which can be deduced the inertia of the film and its speed. See also **gamma.**

hushing or **hush** (*Mining*). A washing away of the surface soil to lay bare the rock formation for prospecting.

husk (*Vet.*). Parasitic bronchitis; lungworm disease. Bronchitis or bronchopneumonia of cattle or sheep due to infection of the bronchi by nematode worms.

hutch (*Mining*). (1) A small train or wagon.—(2) A basket for coal.—(3) A compartment of a jig used for washing ores.—(4) The concentrate which passes through a jig screen.

hutch-mender (*Mining*). A repairer of tubs or hutches broken in a mine.

Hutchinson's teeth (*Med.*). Narrowing and notching of the permanent incisor teeth, occurring in congenital syphilis.

Huxley's layer (*Zool.*). The middle layer of the inner root sheath of a hair, composed of polyhedral nucleated cells containing eleidin.

Huxley's membra'na preformati'va (*Zool.*). A fine homogeneous membrane supposed to exist between the ameloblasts and the forming enamel, during the development of the teeth in Mammals.

Huyghens' eyepiece, hī'genz (*Light*). A combination of two plano-convex lenses placed with their plane sides towards the observer, at a distance apart equal to half the sum of their focal lengths, which are in the ratio of three to one, the shorter focus lens being nearer the observer. Huyghens' eyepiece is often used in microscopes, but is not suited for use with cross-wires or an eyepiece scale.

hyacinth (*Min.*). See **jacinth.**

Hyades, hī'ad-ēz (*Astron.*). The name of a star cluster, of the 'open' type, situated in the constellation Taurus; visible to the naked eye.

hyal-, hyalo- (Greek *hyalos*, clear stone, glass) A prefix used in the construction of compound terms; e g. *hyalite* (q.v.).

hy'aline (*Zool.*). Clear, transparent: without fibres or granules; e.g. *hyaline cartilage.*

hy'alite (*Min.*). A colourless transparent variety of *opal* (q.v.), occurring as globular concretions and crusts. Also called MÜLLER'S GLASS.

hy'alogen'esis (*Cyt.*). The secretory process in a cell.

hyal'ogens (*Cyt.*). The particles formed by the secretory process in a cell.

hyalog'raphy (*Photog.*). A process for transferring photographic images to glass; effected generally by applying a bichromate print with a bitumen resist to the glass and subsequently etching.

hy'aloid (*Zool.*). Clear, transparent; as the *hyaloid membrane* of the eye which envelops the vitreous humour.

hyal'ophane (*Min.*). One of the rarer feldspars, consisting of the components of orthoclase and celsian (baryta-feldspar) in combination, and intermediate in composition between these two minerals. It occurs in colourless crystals in dolomite in manganese mines in Sweden, apparently as a contact mineral.

hyalopilit'ic texture (*Geol.*). A texture of andesitic volcanic rocks in which the groundmass consists of small microlites of feldspar embedded in glass.

hy'aloplasm (*Cyt.*). Clear non-granular protoplasm.

hyalop'terous (*Zool.*). Having transparent wings.

hyalospo'rous (*Bot.*). Having hyaline one-celled spores.

hy'brid (*Gen.*). An organism which is the offspring of a union between two different races, species, or genera.—*v.* **hybridise.**—*n.* **hybridisation.**

hybrid coil (*Elec. Comm.*). A coil, comprising four equal windings and an additional winding, used for the separation of incoming and outgoing currents in a two-wire repeater, so that feed-back and consequent oscillation is inhibited.

hybrid rocks (*Geol.*). Rocks which originate by interaction between a body of magma and its wall-rock or roof-rock, which may be another igneous rock, or sedimentary, or metamorphic. See **contaminated rocks.**

hybrid vigour (*Bot.*). The notable increase in strength of growth often exhibited by a hybrid.

hy'dathode (*Bot.*). A water pore, usually at the end of a vein of a leaf, from which liquid water is exuded.

hy'datid cyst (*Zool.*). A sac or vesicle containing a clear watery fluid and encysted, immature larval Cestodes.

hy'datid'iform mole (*Med.*). An affection of the chorionic villi (vascular tufts of the foetal part of the placenta) whereby they become greatly enlarged, the whole of the enlarged villi resembling a bunch of grapes.

hydr-, hydro- (Greek *hydōr*, gen. *hydatos*, water). A prefix used in the construction of compound terms relating to water; e.g. *hydraemia* (q.v.).

Hydra (*Zool.*). A type of solitary non-metagenetic Coelenterate occurring commonly in fresh water; its name is used in the construction of various terms. See **hydroid, Hydrozoa.**

hydracids (*Chem.*). A term formerly applied to acids which do not contain oxygen.

hydracryl'ic acid (*Chem.*). β-Hydroxypropionic acid, $CH_2(OH)\cdot CH_2\cdot COOH$.

hydrae'mia, hydre'mia (*Med.*). A watery state of the blood.

hy'dragogue (*Med.*). Having the property of removing water: a purgative drug which produces watery evacuations.

Hydralime (*Build.*). A proprietary brand of slaked lime.

hydram'nios (*Med.*). Excess of fluid in the amniotic sac of the foetus.

hy'drant. A form of connexion incorporated in a water main to enable a hose to be attached and a continuous supply of water to be obtained for the purpose of extinguishing fires or washing down streets.

hy'dranth (*Zool.*). In *Hydrozoa*, a nutritive polyp of a hydroid colony.

hydrar'gillite (*Min.*). See **gibbsite.**

hydrar'gyrism (*Med.*). The state of being poisoned by mercury and its compounds.

hydrarthro'sis (*Med.*). Swelling of the joint, due to the accumulation in it of clear fluid.

hy'drates (*Chem.*). Salts which contain water of crystallisation. See also **water of crystallisation.**

hydrate of lime, hydrated lime (*Build.*). See **caustic lime.**

hydration (*Geol.*). The addition of water to anhydrous minerals, the water being of atmospheric or magmatic origin. Thus anhydrite, by hydration, is converted into gypsum; and feldspars into zeolites.

hydration (*Paper*). The process of converting raw material into pulp by prolonged beating, thus incorporating water into the fibres. This process is used for the production of hard or transparent paper. See **rattle.**

hy'dratu'ba (*Zool.*). In *Scyphozoa*, the unsegmented polyp stage. Cf. *scyphistoma.*

hydraulics. The science relating to the flow of fluids.

hydraulic accumulator (*Eng.*). A device for storing water under high pressure in order to equalise the load on a pump supply machinery whose demand is intermittent. It consists of a hydraulic ram loaded with a heavy weight.

hydraulic belt (*Eng.*). An endless belt of porous material driven at high speed, with its lower end under water, thus acting in the same way as a *chain pump* (q.v.).

hydraulic brake (*Eng.*). (1) An absorption dynamometer. See **Froude brake.**—(2) A motor-vehicle brake in which the shoes are expanded by small pistons operated by oil-pressure and supplied by a pedal-operated master cylinder and piston.

hydraulic cartridge (*Civ. Eng.*). An apparatus for splitting rock, mass concrete, etc.; it consists of a long cylindrical body which has numerous pistons projecting from one side and moving in a direction at right-angles to the body (under hydraulic pressure from within the body), which is placed in a hole drilled to take it.

hydraulic cement (*Build.*, *Civ. Eng.*). A cement which will harden under water.

hydraulic dredger (*Civ. Eng.*). A *suction dredger* (q.v.).

hydraulic engineering. That branch of engineering chiefly concerned in the design and production of hydraulic machinery, pumping plants, pipe-lines, etc.

hydraulic glue. A glue which is able partially to resist the action of moisture.

hydraulic gradient (*Hyd.*). In respect of any system of fluid flow, the *hydraulic gradient* is the imaginary curve the ordinate to which at any point is the sum of the position and pressure heads at the point.

hydraulic jack (*Eng.*). A *jack* (q.v.) in which the lifting head is carried on a plunger working in a cylinder, to which oil or water is supplied under pressure from a small hand-operated pump.

hydraulic leather. A flexible leather prepared by being heavily treated, after tanning, with cod oil and then stoved; while hot, it may be shaped to requirements.

hydraulic lift (*Eng.*). A lift or elevator operated either directly by a long vertical ram, working in a cylinder to which water is admitted under pressure, or by a shorter ram through ropes. See **jigger.**

hydraulic lime (*Build.*, *Civ. Eng.*). A lime which will harden under water.

hydraulic main (*Gas*). A large horizontal steel pipe, into which the individual retorts of a gas-works discharge the products of distillation through dip pipes which dip into a layer of liquor maintained at constant level. It acts as a reservoir for tar, and provides a liquid seal between the retorts and the remainder of the plant.

hydraulic mean depth (*Hyd.*). The ratio between the sectional area of flow through a pipe or channel and the wetted perimeter.

hydraulic mining or **hydraulicking** (*Mining*). The operation of breaking down and working a bank of gravel or alluvial deposit by means of jets of water under high pressure.

hydraulic mortar (*Build.*, *Civ. Eng.*). A mortar which will harden under water.

hydraulic motor (*Eng.*). A multi-cylinder reciprocating engine, generally of radial type, driven by water under pressure.

hydraulic packing (*Eng.*). L- or U-section rings providing a self-tightening packing under fluid pressure; used on rams and piston-rods of hydraulic machines. See **hat leather packing, U-leather.**

hydraulic press (*Eng.*). A type of *hydrostatic press* (q.v.) for exerting large forces (for steel pressing, baling, etc.). Consists of a ram or piston, working in a cylinder to which high-pressure water is admitted, and carrying a head or platform between which and a stationary table the work is pressed.

hydraulic ram (*Eng.*). (1) The plunger of a hydraulic press.—(2) A device whereby the pressure head produced when a moving column of water is brought to rest is caused to deliver some of the water under pressure.

hydraulic riveter (*Eng.*). A machine for closing rivets by hydraulic power; it consists of a small ram which acts on the rivet either directly or through hinged jaws.

hydraulic squeezer (*Moulding*). See **squeezer.**

hydraulic stowing (*Mining.*). The filling of worked-out portions of a mine with water-borne waste material. The water drains off and is pumped to surface.

hydraulic test (*Eng.*). A test for pressure-tightness and strength applied to boilers, etc.; water is slowly pumped into the vessel until the internal pressure exceeds the working pressure by a specified margin.

hydraulicity (*Build.*, *Civ. Eng.*). The property of a lime, cement, or mortar which enables it to set under water or in situations where access of air is not possible.

hydraulicking (*Mining*). See **hydraulic mining.**

hy'drazides (*Chem.*). The mono-acyl derivatives of hydrazine.

hy'drazine hydrate (*Chem.*). $N_2H_4{\cdot}H_2O$. Diacid base. Strongly basic and forms salts with the acids. Attacks glass, rubber, and cork. Very powerful reducing agent.

hydrazines (*Chem.*). Derivatives of hydrazine, $H_2N{\cdot}NH_2$, a fuming, strongly basic liquid, b.p. 113°, in which one or more of the hydrogen atoms have been replaced by alkyl radicals. Hydrazine is a powerful reducing agent.

hydraz'o compounds (*Chem.*). Symmetric derivatives of hydrazine, colourless, crystalline, neutral substances, obtained by the reduction of *azo-compounds* (q.v.).

hydrazo'ates (*Chem.*). Salts of hydrazoic acid. See also **azides.**

hydrazo'ic acid (*Chem.*). N_3H. The aqueous solution is a strong monobasic acid and forms azides with many common metals.

hy'drazones (*Chem.*). The condensation products of aldehydes and ketones with hydrazine, water being eliminated from the two molecules.

hydremia (*Med.*). See **hydraemia.**

Hy'drida (*Zool.*). See **Eleutheroblastea.**

hy'drides (*Chem.*). Compounds formed by the union of hydrogen with other elements. Those of the non-metals are generally liquids or gases, certain of which dissolve in water (oxygen hydride) to form acid (e.g. hydrogen chloride) or alkaline (e g. ammonia) solutions. The alkali and alkaline earth hydrides are crystalline, salt-like compounds, in which hydrogen behaves as the electronegative element.

hydriod'ic acid (*Chem*). HI. An aqueous solution of hydrogen iodide. Forms salts called *iodides* (q.v.), many with characteristic colours. Easily oxidised.

hydrion (*Chem.*). A synonym for *hydrogen ion.*

hydro-. Prefix. See **hydr-.**

hydro'a (*Med.*). A skin disease in which groups of vesicles appear on reddened patches in the skin, associated with intense itching.

hydrobo'rons (*Chem.*). Six hydroborons have been identified—B_2H_6, B_4H_{10}, B_5H_9, B_5H_{11}, B_6H_{10}, and $B_{10}H_{14}$. The simplest hydroboron, B_2H_6, is sometimes referred to as *boroethane.*

hydrobro'mic acid (*Chem*). HBr. An aqueous solution of hydrogen bromide.

hydrocal'umite (*Min.*). A mnemonic name applied by C. E. Tilley to a new mineral occurring in the metamorphic aureole of the dolerite at Scawt Hill, Antrim; it consists of hydrated calcium aluminate, and has the composition $4CaO{\cdot}Al_2O_3{\cdot}12H_2O$.

hydrocarbons (*Chem.*). A general term for organic compounds which contain only carbon and hydrogen in the molecule. They are divided into saturated and unsaturated hydrocarbons, aliphatic (paraffin or fatty) and aromatic (benzene) hydrocarbons.

hydrocarbons, native (*Geol.*). A series of compounds of hydrogen and carbon formed by the decomposition of plant and animal remains, including the several types of coal, mineral oil, petroleum, paraffin, the fossil resins, and the solid bitumens occurring in rocks. Many which have been allotted specific names are actually mixtures. By the loss of the more volatile constituents as natural gas, the liquid hydrocarbons are gradually converted into the solid bitumens such as ozokerite. See also **asphalt, bitumen, coal, mineral oils, tarpools.**

hydrocar'pic (*Bot.*). Said of aquatic plants which ripen their fruits under water, after pollination has occurred in the air above the water.

hydrocaul'is (*Zool.*). See **coenosarc.**

hy'drocele, —sēl (*Med.*). A swelling in the scrotum due to an effusion of fluid into the sac (tunica vaginalis) which invests the testis.

hydro-celluloses (*Chem.*). Products obtained from cellulose by treatment with cold concentrated acids. They still retain the fibrous structure of cellulose, but are less hygroscopic and have reducing properties.

hydroceph'alis (*Zool.*). The distal part of a polyp, with the mouth and tentacles.

hydrocephalus (*Med.*). An abnormal accumulation of cerebrospinal fluid in the cavities (ventricles) of the brain, distending them and stretching and thinning the brain tissue over them.

hydroceram'ic (*Pot.*). Porous unglazed pottery, used for filters and for cooling vessels.

hydroce'russite (*Min.*). A rare colourless anhydrous basic carbonate of lead occurring as an encrustation on native lead or on galena.

hydrochlor'ic acid (*Chem.*). HCl. Muriatic acid; spirits of salts. An aqueous solution of hydrogen chloride gas. Dissolves many metals forming chlorides and liberating hydrogen. Used extensively in industry for numerous purposes; e g. for the manufacture of chlorine.

hydrochor'ic (*Bot.*). Dispersed by water.

hydroclad'ia (*Zool.*). The hydranth-bearing branches of the main stem of the coenosarc in *Plumularidae.*

hy'drocoel, —sēl (*Zool.*). In *Echinodermata,* the *water-vascular system* (q.v.).

Hy'drocoralli'nae (*Zool.*). An order of *Hydrozoa,* in which the hydroid phase is predominant and colonial and develops polymorphic forms; the medusae are rudimentary and attached; there is a massive calcareous skeleton.

hydrocyan'ic acid (*Chem*). An aqueous solution of *hydrogen cyanide* (q.v.). Dilute solution called *prussic acid.* Monobasic. Forms cyanides. Very poisonous.

hy'drocyst (*Zool.*). See **dactylozooid.**

hydrodynamic governor (*Eng.*). A governor comprising a small centrifugal pump whose pressure head, varying with speed, is caused to act on a piston connected to the regulating valve. See **servomotor.**

hydroe'cium (*Zool.*). In some *Siphonophora,* a cavity at the upper end of the colony, into which the contractile stem with its cormidia can be retracted.

hydro-electric generating set (*Elec. Eng.*). An electric generator driven by a water turbine.

hydro-electric generating station (*Elec. Eng.*). An electric generating station in which the generators are driven by water turbines.

hydro-electric power station (*Elec. Eng.*). A *hydro-electric generating station* (q.v.).

hydro-extractor (*Eng.*). See **whizzer.**

hydrofluor'ic acid (*Chem.*). Aqueous solution of hydrogen fluoride. Dissolves many metals, with evolution of hydrogen. Etches glass owing to combination with the silica of the glass to form silicon fluoride. Hence it is stored in wax or gutta-percha vessels. Produced by the action of concentrated sulphuric acid on fluorides. See **etching test.**

hy'droflu'osilicic acid, —is'ik (*Chem.*). H_2SiF_6. Formed when silicon tetrafluoride is passed into water. With bases it forms fluosilicates. Easily decomposed into silicon tetrafluoride and hydrogen fluoride.

hy'drogel (*Chem.*). A gel the liquid constituent of which is water.

hy'drogen (*Chem.*). Symbol, H. The lightest element known, having both non-metallic and metallic properties. At. no. 1, at. wt. 1·008, valency 1. It is a colourless, odourless, diatomic gas, water being formed when it is burnt; m.p. −259·14° C., b.p. −252·7° C., density 0·08988 gm. per litre at N.T.P. It is widely distributed as water, in many minerals, as petroleum, and in living matter. Hydrogen is manufactured by heating water with iron at 100 atm. pressure, from water gas, and by the electrolysis of caustic soda solution. Hydrogen is used in the oxy-hydrogen blowpipe, for filling balloons, in the Haber process for the fixation of nitrogen, and in the hardening of fats (e.g. in the manufacture of margarine).

hydrogen bromide (*Chem.*). HBr. Hydrogen bromide gas can be made by direct combination of the two elements, particularly in the presence of a catalyst. Closely resembles hydrogen chloride, and forms bromides in the same way as hydrogen chloride forms chlorides.

hydrogen chloride (*Chem.*). HCl. A colourless gas which dissolves in water to form hydrochloric acid. Produced by the action of dilute sulphuric acid on chlorides.

hydrogen cooling (*Elec. Eng.*). A method of cooling rotating electric machines; the machine is totally enclosed and runs in an atmosphere of hydrogen.

hydrogen cyanide (*Chem.*). HCN. Deadly poisonous liquid, b.p. 26°, m p. $-13{\cdot}4°$ C., dielectric constant 95, ionisation constant $1{\cdot}3 \times 10^{-9}$ at 18° C. Dissolves in water to form hydrocyanic acid and prussic acid.

hydrogen dioxide (*Chem.*). See **hydrogen peroxide.**

hydrogen electrode (*Chem.*). A system consisting of a platinised platinum electrode, around which hydrogen is circulated, half immersed in an aqueous solution. It is largely used for the determination of *p*H-values.

hydrogen fluoride (*Chem*). HF. A liquid which fumes strongly in air. Dissolves in water to form hydrofluoric acid. A dangerous and difficult material to manipulate. Produced by the action of sulphuric acid on fluorides.

hydrogen iodide (*Chem.*). HI. A heavy colourless gas, formed by the direct combination of hydrogen and iodine; fumes strongly in air. Usually made by the decomposition of phosphorus iodide by the action of water. M.p. $-50°$, b.p. $-35°$ C. See **hydriodic acid.**

hydrogen ion (*Chem.*). An atom of hydrogen carrying a positive charge, i e a proton; in aqueous solution, hydrogen ions are hydrated, H_3O^+.

hydrogen ion concentration (*Chem.*). A measure of the acidity of a solution. In a neutral aqueous solution, it has a value of 10^{-7}. See ***p*H-value.**

hydrogen oxide (*Chem.*). Water.

hydrogen peroxide (*Chem.*). H_2O_2. A viscous liquid with strong oxidising properties. Powerful bleaching agent; and, as its decomposition products are water and oxygen, it is much used as a disinfectant. The strength of an aqueous solution is represented commercially by the number of volumes of oxygen which 100 c.c. of the solution will give on decomposition.

hydrogen phosphide (*Chem.*). PH_3. See **phosphine** (1).

hydrogen scale (*Chem.*). A system of relative values of electrode potentials, based on that for hydrogen gas, at a pressure of one atmosphere, against hydrogen ions at unit *activity* (2), as zero.

hydrogen sulphide (*Chem.*). H_2S. May be prepared by direct combination of the two elements or by the action of dilute hydrochloric or sulphuric acid on iron sulphide. It is readily decomposed. Reacts with bases forming sulphides and with some metals to produce metal sulphides and liberate hydrogen. Poisonous.

hydrogenation, hi-droj'— (*Chem.*). Chemical reactions involving addition of hydrogen, present as a gas, to a substance, in the presence of a catalyst. Important processes are:—the hydrogenation of coal, which is effected at high pressures (200 atm.) and high temperatures, resulting in the formation of liquid products; the hydrogenation of fats and oils; the hydrogenation of naphthalene and other substances.

Hydrogenite (*Chem.*). Commercial name for aluminium amalgam.

hydrographical surveying (*Surv.*). A branch of surveying dealing with bodies of water at the coast-line and in harbours, estuaries, and rivers.

hydrog'raphy. The study, determination, and publication of the conditions of navigable water, ocean or inland—viz. charting of coasts and rivers, supplying particulars of depth, bottom, tides, currents, etc.

hydrohae'matite or **turgite** (*Min.*). $Fe_2O_3{\cdot}nH_2O$. Probably a mixture of the two minerals *haematite* and *goethite*, the former being in excess. It is fibrous and red in the mass, with an orange tint when powdered.

hydroid (*Zool.*). Resembling Hydra.

hydroid person (*Zool.*). An individual of the asexual stage in *Coelenterata* which show alternation of generations.

hydrol (*Chem.*). A name that has been given to the simple water molecule H_2O.

hy'drolith (*Chem.*). Calcium hydride, CaH_2.

hydrol'ysis (*Chem.*). (1) The formation of an acid and a base from a salt by interaction with water; it is caused by the ionic dissociation of water.—(2) The decomposition of organic compounds by interaction with water, either in the cold or on heating, alone or in the presence of acids or alkalies; e.g. esters form alcohols and acids; disaccharoses on boiling with dilute acids yield monosaccharoses.

hydromag'nesite (*Min.*). Magnesium hydroxide and carbonate, occurring as whitish amorphous masses, or rarely as monoclinic crystals in serpentines. An alteration product of the magnesium silicate minerals in the ultramafic rocks.

Hydromedu'sae (*Zool.*). See **Hydrozoa.**

hydrome'lia (*Med.*). Dilatation of the central canal of the spinal cord.

hydrome'teor (*Meteor.*). Any weather phenomenon which depends on the moisture content of the atmosphere.

hydrom'eter (*Phys.*, *etc*). An instrument by which the specific gravity or density of a liquid may be determined by measuring the length of the stem of the hydrometer immersed, when it floats in the liquid with its stem vertical.

See **Hicks—** **Nicholson—** **Sikes—**

Hy'drone (*Chem.*). An alloy of sodium with lead, which generates hydrogen when in contact with water.

hydrone theory (*Chem.*). The theory that liquid water consists largely of associated molecules, H_4O_2, H_6O_3, etc.

hydronephro'sis (*Med.*). Distension of the kidney with urine held up as a result of obstruction elsewhere in the urinary tract.

hydroni'tric acid (*Chem.*). See **hydrazoic acid.**

hydropericar'dium (*Med.*). Collection of clear fluid in the pericardial sac.

hydroperitone'um (*Med.*). Ascites. Accumulation of clear fluid in the abdominal cavity.

hy'drophane (*Min.*). A variety of cachalong opal which, when dry, is almost opaque, with a pearly lustre, but becomes transparent when soaked with water, as implied in the name.

hydrophilic colloid (*Chem.*). A colloid which readily forms a solution in water.

hy'drophi'lous (*Bot.*). (1) Living in water.—(2) Pollinated by water.

hydropho'bia (*Med.*). *Rabies* (q.v.) in man.

hydrophobic colloid (*Chem.*). A colloid which forms a solution in water only with difficulty.

hydrophyl'lium (*Zool.*). In some *Siphonophora*, a leaf-like bract, believed to represent a modified medusoid, which hangs down over the cormidia and protects them from impact.

hy'drophyte (*Bot.*). A plant which lives on the surface of, or submerged in, water.

hydrophy'ton (*Zool.*). In a hydroid colony, the coenosarc together with the hydrorhiza.

hydroplane. (1) A motor-boat which skims the surface of the water.—(2) A planing surface which enables a submarine to submerge.

hy'dropore (*Zool.*). In the dipleurula larva of Echinoderms, the opening by which the right hydrocoel communicates with the exterior.

hy'dropote (*Bot.*). A cell, or a group of cells, occurring in a leaf submerged in water, easily permeable to water and dissolved salts.

hy'drops follic'uli (*Med.*). An ovarian cyst formed by the accumulation of clear fluid in a Graafian follicle.

hydroquinone' (*Chem.*). *Quinol* (q.v.).

hydrorhi'zae (*Zool.*). Root-like processes of the coenosarc by which some hydrozoan colonies are attached to their substratum.

hydrorrhoe'a (or **hydrorrhe'a**) **tu'bae intermit'tens** (*Med.*). The condition in which fluid from a hydrosalpinx intermittently escapes into the uterus and thence through the vagina.

hydrosal'pinx (*Med.*). Accumulation of clear fluid in a Fallopian tube which has become shut off as a result of inflammation.

hy'drosere (*Bot.*). A sere beginning in a wet habitat.

hydrosil'icons (*Chem.*). See **silicon hydrides.**

hy'drosol (*Chem.*). A colloidal solution in water.

hy'drosome (*Zool.*). A colony of hydranths.

hydrosphere. The water on the surface of the earth.

hydrostatics (*Phys.*). The mechanics of fluids at rest. See **hydraulics.**

hydrostat'ic joint (*Plumb.*). A joint of the spigot-and-socket type, formed in a large water-main by forcing sheet-lead into the socket under hydraulic pressure.

hydrostatic level (*Surv.*). A *water-level* (q.v.).

hydrostatic press (*Hyd.*). A hydrostatic machine for magnifying force, consisting of two connected cylinders (one much larger than the other) fitted with water-tight pistons enclosing water. A small force applied through a linkage to the piston in the smaller cylinder sets up a pressure in the water, and this pressure acting over the much greater area of the other piston gives rise to the magnified force. Also called BRAMAH'S PRESS.

hydrostatic test (*San. Eng.*). A test to find leakage in a drain. The latter is plugged at the outlet end and filled with water; any fall of level of the water indicates leakage.

hydrostatic valve (*Eng.*). Apparatus which tends to maintain an underwater body (e.g. a moving torpedo) at the desired depth.

hydrosul'phides (*Chem.*). Formed by the action of hydrogen sulphide on some of the hydroxides.

hydrosulphuric acid (*Chem.*). An aqueous solution of hydrogen sulphide.

hydrosulphurous acid (*Chem.*). See **hyposulphurous acid** (1).

hydrotax'is (*Biol.*). Response or reaction of an organism to the stimulus of moisture.—*adj.* **hydrotactic.**

hydrothe'ca (*Zool.*). The cup-like expansion of the perisarc which surrounds a hydranth.

hydrother'mal metamorphism (*Geol.*). That kind of change in the mineral composition and texture of a rock which was effected by water under conditions involving high temperatures.

hydrotho'rax (*Med.*). Clear fluid in the pleural cavity formed by transudation from blood-vessels.

hydrotro'pism (*Biol.*). See **hydrotaxis.**

hy'drovane (*Aero.*). A small planing surface, usually of aerofoil form, fitted to a land plane to help to preserve longitudinal stability when alighting on water in an emergency.

hydrox'ides (*Chem.*). Compounds of the basic oxides with water. The term *hydroxide* (a contraction of *hydrated oxide*) is applied to compounds that contain the $-OH$ or hydroxyl group.

hydrox'yl (*Chem.*). $-OH$. A monovalent group consisting of a hydrogen atom and an oxygen atom linked together.

hydroxyl'amine (*Chem.*). Hydroxy-ammonia, NH_2OH, rather explosive, deliquescent, colourless crystals, which may be obtained by the reduction of nitric oxide, ethyl nitrate, or nitric acid under suitable conditions; m.p. 33°, b.p. 58° at 22 mm. Its aqueous solution is alkaline and its salts are powerful reducing agents.

hydroxylamines (*Chem.*). Derivatives of hydroxylamine, NH_2OH, in which the hydrogen has been exchanged for alkyl radicals.

hydrozinc'ite or **zinc bloom** (*Min.*). A monoclinic hydroxide and carbonate of zinc, in some specimens partly replaced by copper. It is an uncommon ore, occurring with smithsonite in the oxide zone of some lodes.

Hydrozo'a (*Zool.*). A class of *Cnidaria*, in which alternation of generations typically occurs; the hydroid phase is usually colonial, and gives rise to the medusoid phase by budding; the polyp is without gastral ridges and filaments; the medusa has a velum and nerve-ring; the gonads are of ectodermal origin. Zoophytes.

hy'etograph (*Meteor.*). An instrument which collects, measures, and records the fall of rain (Greek *hyetos*, rain).

hygro- (Greek *hygros*, wet, moist). A prefix used in the construction of compound terms; e.g. *hygrometer* (q.v.).

hy'grodeik, —dīk (*Meteor.*). A psychrometer in a frame, with indexes for the rapid estimation of the relative humidity.

hygrom'eter (*Meteor.*). An instrument for measuring the amount of moisture in the atmosphere.

hygromet'ric movement (*Bot.*). Curvature or other change of form, commonly in dead plant material, caused by the entry of moisture into the material.

hygrom'etry (*Meteor.*). The measurement of the hygrometric state, or *relative humidity* (q.v.), of the atmosphere

hygropet'rical fauna (*Ecol.*). Animals living in the thin film of water surrounding stones not truly submerged.

hy'gropha'nous (*Bot.*). Darkening in colour following the entry of water into or between the cells; having a soaked appearance.

hy'grophile, hy'grophi'lous (*Bot.*). Living where moisture is abundant.

hy'grophobe (*Bot.*). Living best in dry situations, where moisture is scanty.

hygroscop'ic (*Bot.*). (1) Absorbing water readily, and showing a change of form as a result.—(2) Moving as a result of the loss, or of the intake, of water.

hygroscopic (*Chem.*). Tending to absorb moisture; in the case of solids, without liquefaction.

hygroscopic (or **imbibition**) **mechanism** (*Bot.*). A means of bringing about movement in plant material, depending upon the uneven swelling or shrinking following intake or loss of moisture from cell walls which are not of the same thickness throughout. Dead cell walls most often show this behaviour.

hygrotro'pism (*Zool.*). Reaction or response of an animal to the stimulus of atmospheric water vapour.

hyloph'agous (*Zool.*). Wood-eating.

hy'lophyte (*Bot.*). A plant characteristic of damp woods.

hylot'omous (*Zool.*). Wood-cutting.

hy'men (*Zool.*). In Mammals, a fold of mucous membrane which partly occludes the opening of the vagina in young forms.

hyme'nial layer (*Bot.*). See **hymenium.**

hymeni'tis (*Med.*). Inflammation of the hymen.

hyme'nium (*Bot.*). A layer of asci and paraphyses, more or less parallel with one another, in the fructification of an ascomycete: the layer of basidia, paraphyses, and sometimes of cystidia, covering the gills or lining the pores of an autobasidiomycete.

Hymenomyce'tes (*Bot.*). A large subdivision of the *Autobasidiomycetes*, with about 12,000 species, in which the hymenium is exposed to the air from an early stage in its development; the toadstools belong here.

hyme'nophore (*Bot.*). Any fungal structure which bears a hymenium.

Hymenop'tera (*Zool.*). An order of *Endopterygota* having usually two almost equal pairs of transparent wings, which are frequently connected during flight by a series of hooks on the hind-wing; mandibles always occur but the mouth-parts are often suctorial; the adults are usually of diurnal habit; the larvae show great variation of form and habit. Saw-flies, Gall-flies, Ichneumons, Ants, Bees, and Wasps.

hymenot'omy (*Surg.*). Surgical cutting of the hymen.

hyo- (Greek *hyoeidēs*, U-shaped). A prefix used (with reference to the shape of the hyoid apparatus in higher Vertebrates) in Zoology in the construction of compound terms; e.g. *hyoepiglottic*, pertaining to the hyoid and the epiglottis.

hy'oid (*Zool.*). In higher Vertebrates, a skeletal apparatus lying at the base of the tongue, derived from the hyoid arch of the embryo.

hyoid arch (*Zool.*). The second pair of visceral arches in lower Vertebrates and in the embryos of higher Vertebrates, lying between the mandibular arch and the first branchial arch.

hyoid segment (*Zool.*). Third segment of the head of a Vertebrate embryo, lying behind the mandibular somite and in front of the first metotic somite.

hyoideus, hī-oi'— (*Zool.*). In Vertebrates, the post-trematic branch of the facial (seventh cranial) nerve, which runs to the mucosa of the mouth and to the muscles of the hyoid region, and, in aquatic forms, to the neuromast organs of the region below and behind the orbit.

hy'omandib'ular (*Zool.*). In lower Vertebrates, a cartilage forming part of the jaw suspension: a bone formed by the ossification of part of this cartilage: more generally, pertaining to the hyoid and the mandible.

hyoplas'tron (*Zool*). In *Chelonia*, one of the plates composing the plastron, lying between the hypoplastron and the entoplastron.

hyoscine, hī'o-sēn (*Chem.*). *Scopolamine* (q.v.).

hyoscy'amine (*Chem.*). $C_{17}H_{23}O_3N$, a coca base alkaloid, optically active, stereoisomeric with atropine, forming colourless needles or plates, m.p. 109° C.; it can be prepared from *Datura stramonium.*

hyosta'pes (*Zool.*). See **extracolumella.**

hyoster'num (*Zool.*). See **hyoplastron.**

hyosty'ly (*Zool.*). A type of jaw suspension, found in some Fish, in which the upper jaw is attached to the cranium anteriorly by a ligament, posteriorly by the hyomandibular.—*adj.* **hyostylic.**

hy'pabys'sal rocks (*Geol.*). Literally, igneous rocks that are not quite abyssal (deep-seated), occurring as minor intrusions. One of the three main divisions (based on mode of occurrence) into which igneous rocks are grouped in some schemes of classification. A more precise classification is based on grain size.

hypae'thral (*Arch.*). Said of a building without a roof, or with an opening in its roof.

hypalge'sia (*Med.*). Diminished sensitivity to pain.

hypan'thium (*Bot.*). The flat or concave receptacle of a perigynous flower.

hypantho'dium (*Bot.*). The deeply hollowed receptacle of the fig, which provides the edible material.

hy'papoph'ysis (*Zool.*). An additional articular facet on a vertebra, as in Birds: a strong ventral process of the anterior vertebral centra of some Snakes, which represents the fused haemapophyses.

hyparte'rial (*Zool.*). Placed beneath an artery.

hypax'ial (*Zool.*). Below the axis, especially below the vertebral column, therefore ventral; as the lower of two blocks into which the myotomes of fish embryos become divided.

hyper- (Greek *hyper*, above). A prefix used in the construction of compound terms; e.g. *hyperphalangy*, having above the normal number of digits.

hyperacid'ity (*Med.*). Excessive acidity, especially of the stomach juices.

hyperacu'sis (*Med.*). Abnormally increased acuity of hearing.

hyperadren'alism (*Med.*). Abnormally increased activity of the adrenal gland.

hyperae'mia, hypere'mia (*Med.*). Congestion, or excess of blood, in a part of the body.

hyperaesthe'sia, hyperesthesia (*Med.*). Heightened sensitivity of the body to sensory stimuli.

hyperalge'sia (*Med.*). Heightened sensitivity to painful stimuli.

hyperapoph'ysis (*Zool.*). A dorsolateral posterior process of a vertebra.

hyperbi'lirubinae'mia, hyperbilirubinemia (*Med.*). Excess of the bile pigment *bilirubin* in the blood.

hyper'bola (*Maths.*). A conic section which may be defined as the locus of a point which moves so that the difference between its distances from two fixed points (the *foci*) is constant. The equation to a hyperbola is of the form:

$$\frac{x^2}{a^2}-\frac{y^2}{b^2}=1.$$

hyperbol'ic functions (*Maths.*). A set of six functions, analogous to the trigonometrical functions sin, cos, tan, etc. The hyperbolic sine is written *sinh* and may be defined by:

$$sinh\ x=\frac{e^x-e^{-x}}{2};$$

similarly: $$cosh\ x=\frac{e^x+e^{-x}}{2}.$$

The other four functions, *tanh*, *cosech*, *sech* and *cotanh* may be derived from sinh and cosh by the same rules as apply to the trigonometrical forms. In electrical communication they are useful in calculations involving the transmission of currents along wires and in filters.

hyperbolic (or **natural**) **logarithms** (*Maths.*). Logarithms to the base *e* (q.v.). To convert from natural logarithms to those to the base 10, or vice versa, the following rules are used:

$$\log_e x = 0{\cdot}434294 \log_{10} x,$$
$$\log_{10} x = 2{\cdot}302585 \log_e x.$$

hypercalcae'mia, hypercalce'mia (*Med.*). Rise in the calcium content of the blood beyond normal limits.

hypercap'nia (*Med.*). Excess of carbon dioxide in the lungs or the blood.

hyperchimae'ra (*Bot.*). A chimaera in which the components are intimately mixed.

hyperchlorhy'dria (*Med*). Increased secretion of hydrochloric acid by the acid-secreting cells of the stomach.

hypercholes'terolae'mia, hypercholes'terole'mia (*Med.*). Increase of cholesterol in the blood beyond normal limits.

hyperchromato'sis (*Cyt.*). Excess of chromatin in a cell.

hypercryalge'sia (*Med.*). Abnormally increased sensitivity to cold.

hypercye'sis (*Med.*). Superfoetation.

hyperdac'tyly (*Zool.*). The condition of having more than the normal number (five) of rows of phalanges.

hyperdip'loidy (*Cyt.*). The condition where the full chromosome complement is present, as well as a portion of one chromosome which has been translocated.

hyperem'esis (*Med.*). Excessive vomiting.

hyperemesis gravida'rum (*Med.*). Continued vomiting during pregnancy.

hyperemia (*Med.*). See **hyperaemia.**

hyperesthesia (*Med.*). See **hyperaesthesia.**

hyper-eutectoid steel (*Met*). Steel with more carbon than is contained in pearlite. In carbon steels a hyper-eutectoid steel is one containing more than 0 9% carbon.

hyperfo'cal distance (*Photog.*). The distance in front of a lens beyond which all objects are substantially in focus, as defined by the focus of a point source of light not exceeding the *circle of confusion* (q.v.).

hyperfrequency waves. Electromagnetic waves whose wavelength is of the order of twenty centimetres or less.

hypergame'sis (*Zool*). Utilisation by a female Insect, during oviposition, of surplus spermatozoa as nutriment.

hyperglycae'mia, hyperglyce'mia (*Med*). An increase in the sugar content of the blood beyond normal limits. See also **diabetes mellitus.**

hyperhidro'sis, hyperidro'sis (*Med.*). Excessive perspiration.

hyperin'sulinism (*Med.*). A condition in which the blood sugar falls below normal limits, due to oversecretion of insulin by the pancreas; usually associated with pancreatic tumours, which provide the excess insulin.

hy'perite (*Geol.*). An obsolete term, introduced by Elie de Beaumont, for gabbroic igneous rocks containing both ortho- and clino-pyroxene. Today hyperite would be called *hypersthene-gabbro* if the ortho-pyroxene is subordinate to clinopyroxene, and *norite* (q.v.) if the former is in excess.

hyperkerato'sis (*Med.*). Overgrowth of the horny layer of the skin.

hyperkine'sia (*Med.*). Excessive motility of a person, or of muscles.

hypermetamor'phic (*Zool.*). (Of *Insecta*) passing through two or more sharply distinct larval instars.—*n.* **hypermetamorphosis.**

hypermetro'pia (*Med.*). Long-sightedness. An abnormal condition of the eyes in which parallel rays of light come to a focus behind the retina instead of on it, the eyes being at rest.

hypermnesia, hī-per-nē'si-a (*Med.*). Exceptional power of memory.

hypernephro'ma (*Med.*). Grawitz's tumour. A tumour occurring in the kidney, thought by Grawitz to arise from adrenal tissue displaced there.

Hypernik (*Met.*). An iron-nickel magnetic alloy of Permalloy type containing 50% of each metal; it is melted and annealed in hydrogen, which increases the initial and maximum permeabilities.

hypero'pia (*Med.*). See **hypermetropia.**

hyperpar'asitism (*Zool.*). The condition of being parasitic on a parasite.—*n.* **hyperparasite.**

hyperphal'angy (*Zool.*). The condition of having more than the normal number of phalanges, as in Whales.

hyperpharynge'al (*Zool.*). Above the pharynx.

hyperpiesia, —pi-ē'zi-a (*Med.*). The condition in which the blood-pressure is persistently raised above normal, in the absence of chronic nephritis.

hyperpiesis, —pī-ē'zis (*Med.*). Blood-pressure raised above the normal.

hyperpitu'itarism (*Med.*). Overactivity of the pituitary gland: any condition due to overactivity of the pituitary gland; e.g. acromegaly, gigantism.

hyperpla'sia (*Med., Zool.*). Excessive multiplication of cells of the body: an overgrowth of tissue due to increase in the number of tissue elements: generally, overgrowth.—*adj.* **hyperplastic.**

hy'perploid (*Cyt.*). Having a chromosome number slightly exceeding an exact multiple of the haploid number.

hyperpnoe'a, hyperpnea, —pnē'a (*Med.*). Increase in the depth and frequency of respiration: overventilation of the lungs.

hyperpyrex'ia (*Med.*). A degree of body temperature greatly above normal (e.g. 105° F. or more). See **heat-stroke.**

hypersensitisation (*Photog.*). Treatment of a sensitive emulsion (e.g. by certain dyes or by ammonia) in such a way as to increase its speed.

hy'persthene, —sthēn (*Min.*). An important rock-forming silicate of magnesium and iron, $(Mg,Fe)SiO_3$, crystallising in the orthorhombic system; an essential constituent of norite, hypersthene-pyroxenite, hypersthenite, hypersthene-andesite, and charnockite.

hypersthene-gabbro (*Geol.*). See **hyperite.**

hypersthen'ic (*Med.*). Having increased strength or tonicity.—HYPERSTHENIC GASTRIC DIATHESIS, the constitutional disposition in which the stomach is short and overactive in secretion and movement.

hypersthe'nite (*Geol*). A coarse-grained igneous rock, consisting essentially of but one component, hypersthene, together with small quantities of accessory minerals.

hyperstomat'ic (*Bot*). Having stomata on the upper surface of the leaf.

hyperte'lorism (*Med.*). The condition of excessive width between two organs or parts.

hyper'tely (*Zool*). The progressive attainment of disproportionate size, either by a part or by an individual.

hypertension (*Med.*). Increase in tension: a blood-pressure higher than normal.

hyperthy'roidism (*Med.*). The condition which accompanies oversecretion of the thyroid gland. See also **Basedow's disease.**

hyperthy'rum (*Arch.*). The part of the architrave above a door or window opening.

hyperton'ic (*Chem*). Having a higher osmotic pressure than a standard, e.g. that of blood, or of the sap of cells which are being tested for their osmotic properties.

hypertricho'sis, hypertrichi'asis (*Med.*). Abnormal overgrowth of hair; excessive hairiness.

hypertroph'ic pylor'ic steno'sis (*Med.*). A disorder in children in which there is hypertrophy of the muscle in the pyloric region of the stomach, leading to obstruction to the passage of food into the small intestine and vomiting.

hyper'trophy (*Bot., Zool*). An abnormal, usually pathological, enlargement of a plant cell or of a plant member, or of an animal cell or an animal member.

hypervitamino'sis (*Med.*). The condition arising when too much of any vitamin (especially vitamin D) has been taken by a person.

hy'pha (*Bot.*). (1) One of the simple or branched filaments of the thallus (mycelium) of a fungus. —(2) A simple or branched filamentous outgrowth from internal cells in the thallus of a large seaweed.

hyphal body (*Bot*). A thin-walled multinucleate segment of a hypha, serving for propagation and reproduction in some fungi which live as parasites in insects.

hyphen (*Typog.*). A mark of punctuation (-) inserted in a word to aid pronunciation (e.g. re-echo), or between words to avoid misconception of meaning (e.g. poor-rate collection, poor rate-collection). Also used at end of line when a word commences in one line and carries over to the line following; certain well-established rules for the placing of the hyphen are followed in such cases (e.g. double letters are usually divided, diphthongs are not, standard prefixes and suffixes are separable).

Hy'phomyce'tes (*Bot.*). A subdivision of the *Fungi imperfecti*, including thousands of species, characterised by the formation of their spores on hyphae standing clear of the matrix on which the fungus is growing.

hyphomyce'tous (*Bot.*). (1) Relating to a Hyphomycete.—(2) Mould-like, cobwebby.

hyphopo'dium (*Bot.*). A more-or-less lobed outgrowth from a hypha, often serving to attach an epiphytic fungus to a leaf.

hypid'iomor'phic or **subhedral** (*Geol.*). A term referring to the texture of igneous rocks in which some of the component minerals show crystal contours, the others occurring in irregular grains. Cf. *idiomorphic*.

hyp'nocyst (*Bot.*). A resting spore formed by some algae.

hyp'nody (*Zool.*). The resting period in larval forms.

hypno'sis (*Psychol.*). A condition, induced in a person by suggestion, in which conscious control is discouraged and the person is in a state of relaxation favourable to sleep. In a light stage of hypnosis, the patient is in communication with the hypnotist, can answer questions put to him, and can produce more readily than in the conscious waking state forgotten memories of past painful events, with accompanying affect. (See **abreaction.**) In a deep stage of hypnosis, the person shows complete unconsciousness to his surroundings, including the hypnotist, and is in a state of waxy flexibility (see **flexibilitas cerea**).

hyp'nospore (*Bot.*). A thick-walled spore able to live for some time in an inert condition.

hypnot'ic (*Med.*). Of the nature of, or pertaining to, hypnosis: a medicinal agent which induces sleep.

hypnozy'gote (*Bot.*). A zygote which remains inert for some time after its formation.

hypo- (Greek *hypo*, under). A prefix used in the construction of compound terms; e.g. *hypotympanic*, below the tympanum.

hypo- (*Chem.*). A prefix which signifies that a compound or group contains fewer radicals or atoms than the normal number.

hypo (*Photog.*). A colloquial abbrev. for *sodium thiosulphate*, the normal fixing solution for silver halide emulsions, the unreduced silver being removed by the hypo.

hypo eliminator (*Photog.*). A chemical, e.g. percarbonate, for expediting washing of plates or films, and for the complete removal of the last traces of hypo, which otherwise would in course of time depreciate the silver image.

hypo-acidity (*Med.*). A deficiency of acid, especially in the gastric juice.

hypo-adren'alism (*Med.*). The condition in which the activity of the adrenal glands is below normal.

hypoaria, —ā'ri-a (*Zool.*). In some Fish, small lobes of the brain lying just below the corpora bigemina.

hypoascid'ium (*Bot.*). An abnormal cup-shaped outgrowth from a leaf, or a transformation of a leaf; the inner surface corresponds to the lower surface of the leaf.

hy'pobasal half (*Bot.*). The posterior portion of an embryo.

hypobasid'ium (*Bot.*). An enlarged cell of a hypha in which a nuclear fusion occurs before the true basidium is formed.

hy'poblast (*Zool.*). The innermost germinal layer in the embryo of a metazoan animal, giving rise to the endoderm and sometimes also to the mesoderm. Cf. *epiblast*.

hypobran'chial (*Zool.*). The lowermost element of a branchial arch.

hypocalcae'mia, hypocalcemia (*Med.*). A calcium content of the blood below normal limits.

hypocar'pogen'ous (*Bot.*). Flowering and fruiting underground.

hy'pocaust (*Build.*). A hollow space beneath the floor of a room or bath, serving as a flue for the hot gases from a furnace which, in circulating, give warmth to the room or bath.

hypocen'trum (*Zool.*). See **subnotochord.**

hypochlorhy'dria (*Med.*). Diminished secretion of hydrochloric acid by the acid-secreting cells of the mucous membrane of the stomach.

hypochlo'rites (*Chem.*). See **hypochlorous acid.**

hypochlo'rous acid (*Chem.*). HClO. An aqueous solution of chlorine monoxide. Monobasic acid which forms hypochlorites with bases. Weak acid, easily decomposed.

hypochlorous anhydride (*Chem.*). See **chlorine monoxide.**

hypochondri'asis (*Med.*). Morbid preoccupation with bodily functions and sensations, with the false belief that the latter indicate bodily disease.

hy'pochord (*Zool.*). See **subnotochord.**

hypochor'dal (*Zool.*). Below the notochord; said of the lower lobe of a caudal fin.

hypocleidium, —klā'di-um (*Zool.*). See **interclavicle.**

hypocot'yl (*Bot.*). The part of the axis of a seedling between the insertion of the cotyledons and the radicle.

hypocra'teriform (*Bot.*). Having the lower part cylindrical, widening upwards, and with the upper edge expanding more or less horizontally.

hypocrystalline rocks (*Geol.*). See **hemicrystalline rocks.**

hy'poderm, hypoder'mis (*Bot.*). A layer, one or more cells thick, of strongly constructed cells, lying immediately beneath the epidermis and reinforcing it.—(*Zool.*) In *Arthropoda* and other *Invertebrata* with a distinct cuticle, the epithelial cell-layer underlying the cuticle, by which the cuticle is secreted.—*adj.* **hypodermal.**

hypoder'mic (*Med.*). Under the skin: a medical agent injected under the skin.

hypodermocly'sis (*Med.*). The injection of fluid (e.g. salt solution) under the skin.

hypo-eutectoid steel (*Met.*). Steel with less carbon than is contained in pearlite, i.e. the iron-cementite eutectoid. In carbon steels, a hypo-eutectoid steel is one containing less than 0·9% carbon.

hypoge'al, hypogae'ous (*Bot.*). (1) Living beneath the surface of the ground.—(2) Germinating with the cotyledons remaining in the soil.

hypogen'esis (*Zool.*). Direct development without metagenesis.

hy'pogen'ous (*Bot.*). Placed on the under side.

hypoglos'sal (*Zool.*). Underneath the tongue: the twelfth cranial nerve of higher Vertebrates, running to the muscles of the tongue.

hypoglot'tis (*Zool.*). In *Vertebrata*, the under part of the tongue: in *Coleoptera*, part of the labium.

hypoglycae'mia, hypoglyce'mia (*Med.*). A concentration of sugar in the blood below normal limits.

hypog'nathous (*Zool.*). Having the under jaw protruding beyond the upper jaw: having the mouth-parts directed downwards.

hypogon'adism (*Med.*). The condition in which there is a deficiency of the internal secretion of the gonads.

hypogy'nous (*Bot.*). (1) Said of a flower in which the calyx, corolla, and androecium, or one or more of these, arise from the receptacle below the gynaecium.—(2) Said of the floral members so placed, provided they are not attached to the calyx or calyx tube.—(3) Said of an antheridium which develops in a branch arising from the stalk of the oögonium.

hypohidro'sis (*Med.*). Abnormal diminution in the secretion of sweat.

hypohy'al (*Zool.*). An element of the hyoid arch corresponding to the epibranchials of the branchial arches.

hypoid bevel gear (*Eng.*). A bevel gear in which the axes of the driving and driven shafts are at right-angles but not in the same plane, resulting in some sliding action between the teeth; used in the back-axle drive of some automobiles.

hypoischium, hī-pō-is′ki-um (*Zool.*). In some Lizards, an ossification of the posterior part of a ligament, which represents the part of the epipubis between the fenestrae and supports the ventral wall of the cloaca. Also called OS CLOACAE.

hypoma′nia (*Med*). Simple mania. A condition characterised by mental excitement in the absence of mental confusion or of symptoms of insanity.

hypomen′orrhoe′a, hypomenorrhea (*Med*). The condition in which the interval between two menstrual periods is increased to between 35 and 42 days.

hypom′eral bones (*Zool.*). In some Fish, slender bones developed in connexion with the hypomeres.

hy′pomere (*Zool.*). The lateral muscle-plate zone of the mesothelial wall of a developing Vertebrate.

hy′ponas′ty (*Bot.*). (1) The more vigorous growth of the under side of a flattened organ, usually causing some change in the position of that organ.—(2) Eccentric secondary thickening of the lower side of a stem or root, when this lies in an approximately horizontal posture.

hy′ponome (*Zool.*). In *Cephalopoda*, the funnel by which water escapes from the mantle cavity.

hypony′chium (*Zool.*). In *Mammalia*, the epidermal layer underlying the nail.

hy′popharе (*Zool.*). In the rhagon type of Sponge colony, the lower basal wall which is without flagellated chambers. Cf. *spongophare.*

hypopharynge′al (*Zool*). Below the pharynx, as the *hypopharyngeal* groove of *Cephalochorda.*

hypopharyngeal bone (*Zool*). In some Fish, one of a pair of elements constituting the fifth gill-arch.

hypophar′ynx (*Zool*). In Insects, a median tongue-like structure arising from the floor of the mouth.

hypophloeodal, —flē′dal (*Bot.*). Growing just within the surface of bark.

hypophos′phites (*Chem.*). See **hypophosphorous acid.**

hypophosphor′ic acid (*Chem.*). H_2PO_3, or $H_4P_2O_6$. Obtained by the slow oxidation of phosphorus in moist air. Stable at ordinary temperatures Hydrolysed by mineral acids, forming a mixture of phosphoric and phosphorous acids.

hypophos′phorous acid (*Chem.*). H_3PO_2. Feeble monobasic acid, which forms a series of salts called *hypophosphites*, oxidised to phosphates by oxidising agents.

hy′pophyll (*Bot.*). A scale leaf which subtends a cladode.

hypophyl′lous (*Bot.*). Attached to, or growing from, the under side of a leaf.

hypophysec′tomise (*Surg.*). To remove the pituitary gland.

hypophysec′tomy (*Surg.*). Surgical removal of the pituitary gland.

hypophys′ial cachexia (*Med.*). See **Simmonds' disease.**

hypoph′ysis (*Bot.*). (1) A cell between the suspensor and the embryo proper, in a flowering plant.—(2) A swelling beneath the sporangium.

hypophysis (*Zool.*). A downwardly growing structure: in *Cephalochorda*, the olfactory pit: in *Vertebrata*, the pituitary body.—*adj.* **hypophysial.**

hypopiesis, —pī-ē′zis (*Med.*). Abnormally low blood-pressure.

hypopitu′itarism (*Med.*). A general term for any condition caused by diminished activity of the pituitary gland; characterised usually by obesity and imperfect sexual development.

hypopla′sia (*Zool.*). Under-development: deficiency.—*adj.* **hypoplastic.**

hypoplas′tron (*Zool.*). In *Chelonia*, one of the plates composing the plastron, lying between the xiphiplastron and the hyoplastron.

hypopleu′ron (*Zool.*). In *Diptera*, a thoracic sclerite lying below the metapleuron and above the coxae of the mesothorax and the metathorax.

hy′poploid (*Cyt.*). Having a chromosome number a little less than some exact multiple of the haploid number.

hypopterono′sis cys′tica, hī-pō-ter— (*Vet.*). An inherited disease of the feather-follicles of canaries.

hypoptilum, hī-pō-tī′lum (*Zool.*). See **aftershaft.**

hy′popus (*Zool.*). In *Tyroglyphidae* (Cheese-mites) and allied forms, a stage in the development which appears when conditions are unfavourable, and which is responsible for the dispersal of the species to more favourable conditions.

hypopy′gium (*Zool.*). In certain male *Diptera*, an organ formed by the curvature beneath the body of the apical segments of the abdomen.

hypopy′on (*Med.*). A collection of pus in the anterior chamber of the eye, between the iris and the cornea.

hyporha′chis (*Zool.*). In Birds, a secondary feather shaft arising from the calamus, just proximally to the superior umbilicus.

hypospa′dias (*Med.*). A congenital deficiency in the floor of the urethra.

hypos′tasis (*Med.*). Sediment or deposit. Passive hyperaemia in a dependent part owing to sluggishness of the circulation.

hypostat′ic (*Gen.*). Recessive, when relating to one of two characters which are not allelomorphs.

hyposthe′nic (*Med.*). Having diminished strength or tonicity.—HYPOSTHENIC GASTRIC DIATHESIS, the constitutional disposition in which the stomach is long, sluggishly acting, and secretes little acid.

hypos′thenu′ria (*Med.*). The secretion of a pale urine of unusually low specific gravity.

hyposto′ma or **hy′postome** (*Zool.*). In some *Coelenterata*, the raised oral cone: in *Insecta*, the labrum: in *Crustacea*, the lower lip or fold forming the posterior margin of the mouth: in some *Acarina*, the lower lip formed by the fusion of the pedipalpal coxae.

hypostomat′ic (*Bot.*). Bearing stomata on the lower surface.

hyposto′matous (*Zool.*). Having the mouth placed on the lower side of the head, as Sharks.

Hypostomides, —stō′mi-dēz (*Zool.*). An order of *Neopterygii* in which the body is entirely covered by bony plates, the upper part of the snout is produced into a process, and an air-bladder is lacking; small tropical coastal fish. Dragon-fish.

hypostro′ma (*Bot.*). A stroma formed by a parasitic fungus beneath the surface of the epidermis of the host.

hy′postyle hall (*Arch.*). A hall having columns to support the roof.

hyposul′phates (*Chem.*). Salts of hyposulphuric acid.

hyposul′phites (*Chem.*). See **hyposulphurous acid.**

hyposulphu′ric acid (*Chem.*). Dithionic acid, $H_2S_2O_6$.

hyposul′phurous acid (*Chem.*). (1) $H_2S_2O_4$. Unstable. Powerful reducing agent. Salts are hyposulphites.—(2) An old term for *thiosulphuric acid*, $H_2S_2O_3$.

hypotar′sus (*Zool.*). In Birds, the fibulare.

hypotension (*Med.*). Low blood-pressure.

hypotenu′sal allowance (*Surv.*). The distance added to each chain length, when chaining along sloping ground, in order to give a length whose horizontal projection shall be exactly one chain. For the 100-link chain the hypotenusal allowance is 100 (sec. $\theta-1$), where θ is the angle of slope of the ground from the horizontal.

hypothal′amus (*Zool.*). In the Vertebrate brain, the ventral zone of the thalamencephalon.

hypothal′lus (*Bot.*). (1) A film of waste material left on the substratum as the plasmodium of a Myxomycete moves about —(2) The first-formed weft of hyphae in the development of the thallus of a lichen, often remaining at the base or edge of the thallus.

hypothe'ca (*Bot.*). The younger of the two valves in the cell-wall of a diatom.

hypothe'cium (*Bot.*). A layer of hyphae beneath the hymenium in an apothecium; the sub-hymenial layer.

hypothenusal allowance (*Surv.*). See **hypotenusal allowance.**

hypothesis. A reasonable explanation of observed phenomena, tentatively adopted to deduce critical conditions which can be tested experimentally, so as to ascertain whether the hypothesis is valid in the light of previous scientific experience.

hypothetical exchange (*Teleph.*). A telephone exchange which, until a new exchange is constructed, is made up from parts of existing exchanges, the subscribers being numbered according to the system required for the new exchange.

hypothy'roidism (*Med.*). The condition accompanying the diminished secretion of the thyroid gland. See also **cretinism** and **myxoedema.**

hypoton'ic (*Chem.*). Having a lower osmotic pressure than a standard, e.g. that of blood, or of the sap of cells which are being tested for their osmotic properties.

hypotrache'lium (*Arch.*). The junction between the shaft and capital of a column.

Hypotre'mata (*Zool.*). An order of *Euselachii* characterised by the possession of five ventral gill clefts, enlarged pectoral fins, a dorso-ventrally flattened body, and the absence of an anal fin. Skates and Rays.

hypotremat'ic (*Zool.*). In *Cyclostomata*, the lower lateral bar of the branchial basket.

Hypotricha, —trik'-a (*Zool*). An order of *Ciliata* the members of which are generally of creeping habit; they possess a permanent gullet with undulating membranes, and have a depressed body, with locomotor cilia on the ventral surface only.

hypotrich'ous (*Zool.*). Having cilia principally on the lower surface of the body.

hy'potro'phy (*Bot.*). Eccentric thickening of the under side of an approximately horizontal shoot or root.

hypovitamino'sis (*Med.*). The condition resulting from deficiency of a vitamin in the diet.

hypoxyloid, —zi'loid (*Bot.*). Forming a cushion-shaped or crust-like stroma.

hypso- (Greek *hypsos*, height). A prefix used in the construction of compound terms.

hyp'sochrome (*Chem.*). A radical which shifts the absorption spectrum of a compound toward the violet end of the spectrum.

hyp'sodont (*Zool.*). Said of Mammals having cheek teeth with high crowns, such that the bases of the infoldings of the enamel are hidden: used also of the teeth. Cf. *brachyodont.*

hyp'sograph (*Elec. Comm.*). A recording device for recording the transmission levels on a circuit, either during testing, or continuously during transmission of signals.

hypsom'eter (*Phys.*). An instrument used for determining the boiling-point of water, either with a view to determining altitude, by calculating the pressure, or for correcting the upper fixed point of the thermometer used.

hypsophyl'lary leaf (*Bot.*). A bract.

hypu'ral (*Zool.*). Below the tail: one of a set of large plates formed by the fusion of the haemal elements of the caudal vertebrae, and supporting the hypochordal lobe of the tail-fin in some Fish.

Hyracoi'dea (*Zool.*). An order of small eutherian Mammals having four digits on the fore limb and three on the hind limb, pointed incisor teeth with persistent pulps, lophodont grinding teeth, no scrotal sac and six mammae; terrestrial African forms. Dassies.

hyster-, hystero- (Greek *hystera*, womb). A prefix used in the construction of compound terms; e g. *hysterectomy* (q.v).

hysteran'thous (*Bot.*). Said of leaves which develop after the plant has flowered.

hysterec'tomy (*Surg.*). Removal of the uterus by operation.

hystere'sis (*Elec. Eng.*).
See **dielectric— magnetic—**

hysteresis coefficient (*Elec. Eng.*). See **Steinmetz coefficient.**

hysteresis curve (*Elec. Eng.*). A curve showing the relation between the magnetising force and flux density in a sample of iron or steel, the curve being taken with ascending and descending values of magnetising force, in order to illustrate the magnetic hysteresis loop.

hysteresis loop (*Elec. Eng.*). See **magnetic hysteresis loop.**

hysteresis loss (*Elec. Eng.*).
See **dielectric— magnetic—**

hysteresis tester (*Elec. Eng.*). A device, invented by Ewing, for making a direct measurement of magnetic hysteresis in samples of iron or steel.

hysteria (*Psycho-an.*). A psychoneurosis in which repressed complexes become split off or dissociated from the personality, forming independent units, partially or completely unrecognised by consciousness. It gives rise to hypnoidal states, such as amnesia, fugues, somnambulisms, etc., and may also be manifested by various physical symptoms, such as tics, paralysis, blindness, deafness, etc. See **conversion hysteria.** General features of this neurosis are an extreme degree of emotional instability and an intense craving for affection.

hysteria, canine (*Vet.*). A disease of dogs, of unknown cause, characterised by periodic attacks of abnormal mental behaviour varying from somnolence to hysteria.

hyster'iform, hyster'iaeform (*Bot.*). Having the shape of a long narrow ridge, with a longitudinal opening along the top.

hys'terocolpec'tomy (*Surg.*). Surgical removal of the vagina (or part of it) and the uterus.

hysterogen'ic (*Zool.*). Developing later.

hys'teropexy (*Surg.*). The fixation of a displaced uterus by surgical measures.

hysteroso'ma (*Zool.*). In *Acarina*, the region of the body comprising the metapodosoma and the opisthosoma.

hys'terothe'cium (*Bot.*). An elongated perithecium, remaining closed as it develops, and opening when ripe by a cleft at the top.

hysterot'omy (*Surg.*). Incision of the uterus.

Hythe Beds (*Geol.*). A division of the Lower Greensand occurring in the Weald of Kent and Sussex; it consists of glauconitic sands locally containing much chert, and in E. Kent stone bands (' Kentish rag ') interbedded with sands.

i (*Chem.*). A symbol for *van't Hoff's factor.*

i- (*Chem.*). An abbrev. for: (1) Optically inactive; (2) *iso-*, i.e. containing a branched hydrocarbon chain.

i (*Maths.*). The mathematical operator $i^2 = -1$, used in physics and mathematics. See ***j.***

I (*Chem.*). The symbol for *iodine.*

I (*Chem.*). A symbol for *ionic strength.*

I (*Eng.*). The symbol for *moment of inertia.*

I-beam (*Build., Civ. Eng., etc.*). See **H-beam.**

I.A. (*Phys.*). Abbrev. for *international Ångstrom* (q.v.).

iatrochemistry, ī-at′rō— (*Chem.*). The study of chemical phenomena in order to obtain results of medical value; practised during the sixteenth century.

I.C. engine. See **internal-combustion engine.**

ice (*Meteor.*). Ice is formed when water is cooled below its freezing-point. It is a transparent crystalline solid of specific gravity 0·916 and specific heat 0·50. On account of the fact that water attains its maximum density at 4° C., ice is formed on the surface of ponds and lakes during frosts, and thickens downwards.

ice action (*Geol.*). The work and effects of ice on the earth's surface. See **glacial action, glaciation, glacier.**

ice-apron, ice-breaker (*Civ. Eng.*). A construction covering the upstream side of a bridge pier, and serving to break floating ice, or in default of this, to afford protection against the thrust of the ice upon the pier.

iceberg (*Meteor.*). A large mass of ice, floating in the sea, which has broken away from a glacier or ice barrier. Icebergs are carried by ocean currents for great distances, often reaching latitudes of 40° to 50° before having completely melted. Approximately one-tenth of an iceberg shows above the surface.

iceblink (*Meteor.*). A whitish glare in the sky over ice which is too distant to be visible.

ice-breaker (*Civ. Eng.*). (1) An *ice-apron* (q.v.).—(2) A projecting pier so arranged in relation to a harbour entrance that floating ice is kept outside.—(3) A vessel specially equipped for clearing a passage through ice-bound waters.

ice calorimeter (*Heat*). See **Bunsen's ice calorimeter.**

ice colours (*Chem.*). Dyestuffs produced on the cotton fibre direct, by the interaction of a second component with a solution of a diazo-salt cooled with ice.

ice contact slope (*Geol.*). The steep slope or back face of a deltaic accumulation originally formed at an ice front and in contact with it.

Iceland agate (*Min.*). A name quite erroneously applied to the natural glass *obsidian* (q.v.).

Iceland spar (*Min.*). A very pure transparent and crystalline form of calcium carbonate, first brought from Iceland. It has perfect cleavage, is noted for its double refraction, and hence is used in construction of the nicol prism.

ich′nograph (*Build.*). A view showing the ground plan of a building or part of a building.

ichor, ī-kor (*Geol.*). The name applied by Sederholm to highly penetrating granitic liquids, charged with magmatic vapours (emanations), which he believed to operate in palingenesis.

ichor (*Med.*). A thin, watery discharge from a wound or a sore.—*adj.* **ichorous.**

ichthy-, ichthyo- (Greek *ichthys*, fish). A prefix used in the construction of compound terms; e.g. *ichthyopterygia.*

ich′thyic (*Zool.*). Pertaining to, or resembling, Fish.

ichthyopterygia, —op-ter-ij′i-a (*Zool.*). The paired fins of Fish.

ichthyo′sis (*Med.*). Xerodermia. A disease characterised by dryness and scaliness of the skin, due to lack of secretion of the sweat and the sebaceous glands.—(*Vet.*) A congenital hardening of the skin of calves.

i′cicling (*Paint.*). A varnishing defect in which some of the varnish flows to the lower edge of the work and there forms drops or icicles.

Icon′oscope (*Television*). A form of *electron camera* (q.v.) comprising a mosaic of photo-emissive material upon which the optical image is focused, and which is scanned by a cathode ray beam.

i′cositetrahe′dron (*Min.*). A solid figure having 24 trapezoidal faces, and belonging to the cubic system.

icter′ic (*Med.*). Of the nature of, or affected with, jaundice.

ic′terus (*Med.*). *Jaundice* (q.v.).

ictus (*Med.*). A stroke or sudden attack.

I.C.W. (*Radio*). Abbrev. for *interrupted continuous waves.*

id (*Psycho-an.*). A term originally introduced by Groddeck and later used by Freud to denote the sum total of the primitive instinctual forces in an individual. It subserves the pleasure-pain principle, in which the activities of the organism are concerned with the immediate increase of pleasurable and reduction of painful stimuli. It is dominated by blind impulsive wishing.

ideal articulation (*Teleph.*). The articulation of a circuit or system which would be obtained by a perfectly trained crew. See **crew factor.**

ideal gas (*Chem.*). See **perfect gas.**

ideal transducer (*Elec. Comm.*). Any transducer which converts without loss all the power supplied to it.

ideal transformer (*Elec. Comm.*). A transformer with infinite winding impedances, no leakage, and no self-capacity in its windings. Its correct introduction into a circuit entails no attenuation loss but provides a reflection gain, if the source and load impedances are not equal.

idealism or **mentalism.** The conception of natural phenomena as arising within the mind, the external world being ultimately unknowable to the human mind. The reverse of *positivism* (q.v.). See also **empiricism.**

I.D.F. (*Elec. Comm.*). Abbrev. for *intermediate distribution frame* (q.v.).

idio- (Greek *idios*, peculiar, distinct). A prefix used in the construction of compound terms; e.g. *idiomuscular.*

id′ioblast (*Bot.*). A non-chlorophyllous, thick-walled cell having supporting functions, usually elongated, and occurring among cells containing chlorophyll: more generally, a cell which differs in form, contents and wall-thickening from its neighbours.

idioblast (*Min.*). A crystal which developed in metamorphic rocks and is bounded by crystal contours; cf. *idiomorphic.*—*adj.* **idioblastic.** See also **porphyroblastic.**

idiochro′matin (*Cyt.*). A substance within the nucleus which controls the reproduction of the cell.

idiochromid′ia (*Zool.*). *Chromidia* (q.v.) which can replace or be reformed into the nucleus; generative chromidia.

idioglos′sia (*Med.*). The wrong use of consonants by a child, making speech unintelligible.

idiomor'phic (euhedral) crystals (*Geol.*). Rock minerals which are bounded by the crystal faces peculiar to the species. Cf. *allotriomorphic* (anhedral) and *hypidiomorphic* (subhedral).

idiomus'cular (*Zool.*). Said of a special type of muscular contraction produced by artificial stimulation.

idiop'athy (*Med.*). Any morbid condition arising spontaneously, having no known origin.—*adj.* **idiopath'ic.**

id'ioplasm (*Zool.*). Modified cytoplasm on the concave side of the Golgi platelets.

idioso'ma (*Zool.*). In *Acarina*, the prosoma plus the opisthosoma.

id'iosome (*Zool.*). A cell which differs markedly in size, form, or contents from its neighbours.

idiosphaerothe'ca (*Zool.*). See **acroblast.**

idiostat'ic method (*Elec. Eng.*). A method of using the quadrant electrometer in which the voltage is applied between the needle and one pair of quadrants.

idiot (*Med.*). A person so defective in mind from birth as to be unable to protect himself against ordinary physical dangers; one afflicted with the severest grade of feeble-mindedness.

idiother'mous (*Zool.*). See **warm-blooded.**

idioventric'ular (*Med.*). Pertaining to the ventricle of the heart alone.

id'iozome (*Zool.*). The attraction sphere or region of clear protoplasm surrounding the centrosome.

idle component (of current, voltage, volt-amperes) (*Elec. Eng.*). See **reactive component.**

idle current wattmeter (*Elec. Eng.*). A name sometimes given to an electrical measuring instrument for measuring reactive volt-amperes.

idle wheel (*Eng.*). A wheel interposed in a gear train, either to reverse rotation, or to obtain the required spacing of centres, without affecting the ratio of the drive. Also called IDLER.

idle wheel (*Horol.*). See **intermediate wheel.**

idle wire (*Elec. Eng.*). The part of the armature winding of an electric machine which does not actually cut the lines of force, i.e. that part comprising the end connexions.

idler (*Eng.*). See **idle wheel.**

idling (*I.C. Engs.*). The slow rate of revolution of an automobile or aero engine, when the throttle pedal or lever is in the closed position.

idling adjustment (*Automobiles, etc.*). A setting of the slow-running jet and throttle position of a carburettor, so as to give regular *idling* (q.v.).

i'docrase (*Min.*). A hydrated silicate of lime and alumina, crystallising in the tetragonal system. Also called VESUVIANITE.

i'doses (*Chem.*). Monosaccharoses belonging to the group of aldohexoses.

Idwall stone (*Geol.*). An oil-stone quarried near Snowdon.

i.f., I. F. (*Radio*). A frequently used abbrev. for *intermediate frequency.*

Igmerald (*Min.*). Trade-name for artificial emerald made at Bitterfeld in Germany, the first two letters of the name signifying Interessengemeinschaft.

igneous complex (*Geol.*). A group of rocks, occurring within a comparatively small area, which differ in type but are related by similar chemical or mineralogical peculiarities. This indicates derivation from a common source.

igneous (or magmatic) cycle (*Geol.*). The sequence of events usually followed in igneous activity; it consists of an eruptive phase, a plutonic phase, and a phase of minor intrusion.

igneous intrusions (*Geol.*). The several types of emplacement of igneous rocks. See **bathylith, dyke, sill.**

igneous magma (*Geol.*). The molten fluids and gaseous fractions generated within the earth, from which igneous rocks are considered to have been derived by crystallisation or other processes of consolidation.

igneous rocks (*Geol.*). Rock masses formed by the solidification of magma injected into the earth's crust, or extruded on its surface.

ignite (*Chem.*). To heat a gaseous mixture to the temperature at which combustion takes place, particularly by means of an electric **spark.**

igni'ter (*Civ. Eng.*). A blasting fuse or other contrivance used to fire an explosive charge.

ignition (*Elec. Eng., I C. Engs.*). The firing of an explosive mixture of gases, vapours, or other substances, by means of an electric spark.

See **battery—**
coil—
dual—
high tension—
low tension—
magneto—
firing order.

ignition advance (*Eng*). The crank angle before top dead-centre, at which the spark is timed to pass in a petrol or gas engine. See **ignition timing.**

ignition coil (*Automobiles*). An induction coil for converting the low-tension current supplied by the battery into the high-tension current required by the sparking-plug.

ignition lag (*Eng.*). (Of a combustible mixture in an engine cylinder) the time interval between the passage of the spark and the resulting pressure rise due to combustion.

ignition plug (*Elec. Eng.*). See **sparking-plug.**

ignition rating (*Elec. Eng.*). A special rating (in *ampere-hours*, q.v.) employed for accumulators used for supplying ignition systems; it is generally twice the continuous rating at a low discharge rate.

ignition rectifier (*Elec. Eng.*). A mercury-arc rectifier in which the cathode spot is initiated by a voltage impulse applied to a special electrode dipping into the mercury pool.

ignition system (*Automobiles*). (Of petrol or gas engines) the arrangement for providing the high-tension voltage required for the ignition. See **ignition coil, magneto ignition.**

ignition temperature (*Eng.*). See **flash point, spontaneous ignition temperature**; also Suppl.

ignition timing (*I.C. Engs.*). The crank angle relative to top dead-centre at which the spark passes in a petrol or gas engine. See **angle of advance.**

ignition voltage (*Elec. Eng.*). The voltage required to start the discharge in an electric discharge tube.

I.H.P. (*Eng.*). Abbrev. for *indicated horse-power.*

ijolite, ĕ'ō-lit (*Geol.*). A coarse-grained igneous rock, consisting of nepheline, aegirine-augite, with usually melanite garnet as a prominent accessory, occurring in nepheline-syenite complexes in the Kola Peninsula, White Sea, the Transvaal, and elsewhere.

Il (*Chem.*). The symbol for *illinium.*

ile-, ileo-, il'e-o *or* ēl'— *or* il'—. A prefix which refers to the part of the intestine of Vertebrates known as the *ileum* (q.v.); it is used in the construction of compound terms; e.g. *ileocolic*, pertaining to the ileum and the colon.

ileitis, —e-i'tis (*Med.*). Inflammation of the ileum.

ileocoli'tis (*Med.*). Inflammation of the ileum and the colon.

ileocolos'tomy (*Surg.*). The making of a communication between the ileum and the colon, by operation.

ileos'tomy (*Surg.*). An artificial opening in the ileum, made surgically.

i'leum (*Zool.*). In Vertebrates, the posterior part of the small intestine.

i'leus (*Med.*). Colic due to obstruction in the intestine; obstruction of the intestine.

ileus, paralytic (*Med.*) A condition in which, from various causes, there is extensive paralysis of the intestines, leading to persistent vomiting, pain being absent.

Ilfracombe Beds (*Geol.*). A local group of rocks belonging to the Devonian System, found in N. Devon and W Somerset.

Ilgner system (*Elec. Eng*). See **Ward-Leonard-Ilgner system.**

il'io- (*Zool.*). A prefix which refers to that part of the pelvic girdle of a Vertebrate known as the *ilium*; used in the construction of compound terms; e g. *iliofemoral,* pertaining to the ilium and the femur.

il'ium (*Zool.*). A dorsal cartilage bone of the pelvic girdle in Vertebrates.—*adj.* **iliac.**

ill-conditioned (*Surv*) A term used to describe triangles of such a shape that the distortion resulting from errors made in measurement and in plotting may be great, the criterion often used being that no angle in a triangle should be less than 30°.

illam (*Geol.*). A gem-bearing gravel occurring in Ceylon, and worked extensively for the gem-corundums, spinels, zircons, etc. which it contains; these have been derived from white pegmatite veins in the island.

illegitimate pollination (*Bot.*). The transfer of pollen from the anthers to the stigmas of the same flower when the general arrangement of the flower indicates that it is adapted for cross-pollination.

illinium or **florentium** (*Chem.*). Symbol, Il or Fr. A metallic element, a member of the rare earth group. At. no. 61, at. wt 147.

illuminated diagram (*Elec. Eng.*). A circuit diagram on a switchboard, or a track diagram in a railway signal box, so arranged that lamps behind the diagram illuminate any part of the circuit which is alive or any part of the track upon which a train is standing.

illuminated-dial instrument (*Elec. Eng*). An electric measuring instrument for switchboard use, having a scale of translucent glass illuminated from behind.

illuminating engineer (*Elec. Eng.*). An engineer whose work is concerned with the design and operation of lighting installations.

illumination (*Light*). The quantity of light or luminous flux falling on unit area of a surface. Illumination is inversely proportional to the square of the distance of the surface from the source of light, and proportional to the cosine of the angle made by the normal to the surface with the direction of the light rays. The unit of illumination is the *metre-candle* (or *lux,* q.v.) or the *foot-candle* (q v.).

illumination photometer (*Illum*). See **photometer.**

illuminom'eter (*Illum.*). A name sometimes given to certain types of photometer.

illusion (*Psychol.*). A false interpretation of something perceived through the special senses.

il'menite (*Min.*). An oxide of iron and titanium, crystallising in the trigonal system; a widespread accessory mineral in igneous rocks, especially in those of basic composition.

ilmenoru'tile (*Min.*). A black variety of titanium oxide, containing iron in the form of ferrous titanate, niobate, and tantalate; crystallises in the tetragonal system.

il'vaite (*Min.*). (Latin *Ilva*, Elba.) Silicate of iron and calcium, a little oxide of manganese frequently being present. It crystallises in the orthorhombic system. Also called DIEVRITE, YENITE.

image (*Light*). Optical images may be of two kinds, real or virtual. A *real image* is one which is formed by the convergence of rays which have passed through the image-forming device (usually a lens) and can be thrown on a screen, as in the camera and the optical projector. A *virtual image* is one from which rays appear to diverge. It cannot be projected on a screen or on a sensitive emulsion.

See **aerial—** **after—** **latent—**

image attenuation constant (*Elec. Comm.*). The real part of the transfer constant of a network.

image dissector (*Television*). A form of electron camera in which the optical image is focused on a photo-emissive surface, from which the electrons are emitted in straight lines in the form of the image. Suitably arranged electric or magnetic fields cause this pattern to sweep across a point anode, which thus effectively scans the image.

image dissector multiplier (*Television*). A combination of *image dissector* (q.v.) and *electron multiplier* (q v.) in one unit.

image frequency (*Radio*). A frequency which is as much greater (or less) than the local oscillator frequency as the signal frequency is less (or greater) in a supersonic heterodyne receiver.

image impedance (*Elec. Comm.*). The impedance which terminates a network without introducing reflection losses at the junction. This implies image termination at the other end of the network

image phase constant (*Elec. Comm.*). The imaginary part of the transfer constant of a network.

image response (*Radio*). The unwanted response of a supersonic heterodyne receiver to the image frequency.

imaginal bud (or **disc**), im-aj'in-al (*Zool.*). One of a number of masses of formative cells which are the principal agents in the development of the external organs of the imago, during the metamorphosis of the *Endopterygota.*

imagination (*Psychol.*). The faculty of forming images in the mind, either by revivifying and recasting past perceptional experience (*reproductive imagination*) or by creating virtually new concepts (*constructive imagination*). See also **phantasy.**

imag'o (*Zool*). The form assumed by an Insect after its last ecdysis, when it has become fully mature; final instar.—*adj.* **imaginal.**

imbalance (*Med.*). A lack of balance, as between the ocular muscles, or between the activities of the endocrines, or between parts of the involuntary nervous system.

im'becile (*Med.*). A person whose defective mental state (present since birth or an early age) does not amount to idiocy, but who is incapable of managing his own affairs.

imbibition (*Chem.*). The absorption or adsorption of a liquid by a solid or a gel, accompanied by swelling of the latter.

imbibition (*Photog.*). The mechanical printing of dye images. A relief or matrix is contacted with an absorbing surface, with a differential transference of dye, forming the positive image. Used in *Technicolor* (q.v.).

imbibition matrix (*Photog.*). A relief in gelatine capable of transferring, differentially, a dye to another absorbing surface, and providing a continuous print.

imbibition mechanism (*Bot.*). See **hygroscopic mechanism.**

imbowment (*Arch.*). A term sometimes applied to an arch or vault.

im'bricate, im'bricated (*Bot., Zool.*). Said of leaves, scales, etc. which overlap like the tiles on a roof.

imbricate aestivation (*Bot.*). Aestivation in which the perianth leaves overlap at the edges.

imbricate structure (*Geol.*). A structure produced in mountain-building by intense pressure, individual blocks of rock being thrust over each other, like a pack of fallen cards.

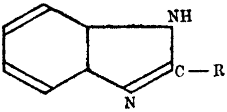
imbricated (*Build.*). Said of slates or tiles which are laid so as to overlap.

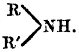
I.M.E.P. (*Eng.*). See **indicated mean effective pressure.**

Im'hoff tank (*Sewage*). A form of settling tank to which sewage is passed, the solid matter being exposed to a fermentation process, with the production of methane gas and an inoffensive sludge which can be easily dried.

im'ides (*Chem.*). Organic compounds containing the group —CO·NH·CO—, derived from acid anhydrides.

iminaz'oles (*Chem.*). Heterocyclic compounds produced by substitution in a five-membered ring containing two nitrogen atoms on either side of a carbon atom. Benziminazoles are formed by the condensation of *ortho*-diamines with organic acids, and contain a condensed benzene nucleus:



im'ino group (*Chem.*). The group  $\begin{matrix}R\\R'\end{matrix}\!\!>\!\mathrm{NH}$.

Imino compounds are secondary amines obtained by the substitution of two hydrogen atoms in ammonia by alkyl radicals.

imitation art paper (*Paper*). See **art paper.**

imitation backed cloths (*Textiles*). Worsted fabrics woven from one warp and one weft, but, owing to the distribution of threads, presenting the appearance of backed cloths; used for coatings.

imitation gauze (*Textiles*). See **mock leno.**

imitation parchment (*Paper*). A wood-pulp paper to which strength, transparency, and grease-proof properties have been imparted by prolonged beating of the pulp.

immar'ginate (*Bot.*). Lacking a distinct edge.

immediate germination (*Bot.*). The germination of a spore as soon as it is ripe, and not after a period of inactivity.

immersed (*Bot.*). (1) Embedded in the tissues of the plant.—(2) Arising beneath the surface of the substratum.

immersed liquid-quenched fuse (*Elec. Eng.*). A fuse in which liquid is used for extinguishing the arc, the fuse-link being totally immersed in the liquid.

immersible apparatus (*Elec. Eng.*). Electrical apparatus designed to operate continuously under water.

immersion (*Astron.*). The entry of the moon, or other body, into the shadow which causes its eclipse.

immersion heater (*Elec. Eng.*). An electric heater designed for heating water or other liquids by direct immersion in the liquid.

immiscibility (*Chem.*). The property of two or more liquids of not mixing and of forming more than one phase when brought together.

immune (*Med.*). Protected against any particular infection: one who is in this state.—*v.* **immunise,** to make immune against infection.—*n.* **immunisation,** the process of making a subject immune against a particular infection.—(*Bot.*) Treatment given to a plant to give it resistance to a parasite, or to increase its powers of resistance.

immune bodies (*Chem.*). A group of substances, produced in an organism by natural or artificial immunisation, which have a specific action on bacterial species.

immunotransfusion (*Med.*). The transfusion of blood to an infected person from a healthy person who has been immunised with a vaccine made of bacteria obtained from the infected person.

impact (*Mech.*). For the direct impact of two elastic spheres, the ratio of the relative velocity after impact to that before impact is constant and is called the *coefficient of restitution* for the material of which the spheres are composed. This constant has the value 0 95 for glass and 0·2 for lead, the values for most other solids lying between these two figures.

impact test (*Met*). Usually means a *notched-bar test* (q.v.), but it may also mean an Izod, Charpy, or Fremont test performed on unnotched specimens, or a test in which the suddenly applied load is in tension instead of bending.

impacted (*Med.*). Firmly fixed, pressed closely in; said of a tooth which has failed to erupt, or of a fracture in which the broken bones are firmly wedged together.

impage, im-pāj (*Join.*). A rail, or horizontal member of a door-frame.

imparipin'nate (*Bot.*). Said of a pinnate leaf which has a terminal leaflet.

impas'to (*Pot.*). Colour thickened with an appropriate vehicle applied in relief on the raw clay before firing.

impedance (*Elec. Eng., etc.*). The ratio of the r m.s. value of the voltage applied to an electric circuit, to the current flowing in the circuit. Sometimes called the APPARENT RESISTANCE.

See **acoustic—**
bilateral—
blocked—
conjugate—
control—
driving-point—
earth—
image—
iterative—
matching—
motional—
static—
synchronous—
transfer—
unilateral—

impedance bond (*Elec. Eng.*). A special rail-bond of high reactance and low resistance so designed that it will allow the passage of d c. traction current but not the a.c. used for signalling purposes.

impedance drop (or **rise**) (*Elec. Eng.*). A drop or rise in the voltage at the terminals of a circuit, caused by current passing through the impedance of the circuit.

impedance factor (*Elec. Eng.*). The ratio of the impedance of a circuit to its resistance.

impedance level (*Elec. Comm.*). See **characteristic impedance.**

impedance protective system (*Elec. Eng.*). A discriminative protective equipment in which discrimination is secured by a measurement of the impedance between the point of installation of the relays (impedance relays) and the point of fault. Also called DISTANCE PROTECTION.

impedance relay (*Elec. Eng.*). A relay, used in discriminative protective gear, whose operation depends on a measurement of the impedance of the circuit beyond the point of installation of the relay; if this falls below a certain value, when a fault occurs, the relay operates. Also called a DISTANCE RELAY.

impedance rise (*Elec. Eng.*). See **impedance drop.**

impedance transforming filter (*Elec. Comm.*). A filter network which has differing image impedances, and which can therefore act as a transformer over a band of frequencies.

impedance triangle (*Elec. Eng.*). The right-angled triangle formed by the vectors representing the resistance drop, the reactance drop, and the impedance drop of a circuit carrying an alternating current.

impedance voltage (*Elec. Eng.*). The voltage produced as a result of a current flowing through an impedance.

impeller (*Eng.*). The rotating member of a centrifugal pump or blower, which imparts kinetic energy to the fluid.

imperfect (*Struct.*). Said of a structural framework which has either more or fewer members than it would require to be perfect.

imperfect flower (*Bot.*). A flower in which either the stamens or the carpels are lacking, or, if present, non-functional.

Imperfect Fungi (*Bot.*). See **Fungi (Imperfecti).**

imperfect hybridisation (*Bot.*). An abortive attempt to form zygospores between the hyphae of two distinct species of *Zygomycetes*.

imperfect stage (*Bot.*). The conidium-bearing stage of a fungus.

imperforate (*Med*). Not perforated; closed abnormally.—(*Zool.*) Lacking apertures, especially of shells, said of gastropod shells which have a solid columella.

imperial (*Build.*). A domed roof shaped to a point at the top.

imperial (*Build.*). A slate size, 33 × 24 in.

imperial (*Paper*). A standard size of paper, 22 × 30 in.; U.S., 23 × 31 in.

imperial (*Textiles*). A heavy cotton fustian fabric, generally drab in colour and occasionally with a raised surface.

imperial cap (*Paper*). A standard size of brown paper, 22 × 29 in.

impermeable (*Chem., Geol.*). Not permitting the passage of liquids or gases.

impervious (*Build., etc.*). Said of materials which have the property of satisfactorily resisting the passage of water.

impervious (*Zool.*). Said of nostrils in which the nasal cavities are separated by a septum.

impetiginous, —ij'en-us (*Med*). Resembling, or of the nature of, impetigo.

impeti'go (*Med*). A contagious skin disease, chiefly of the face and hands, due to infection with pus-forming bacteria.

impetigo, bovine (*Vet.*). A contagious vesicular eruption of the skin of the teats of cows, due to infection by streptococci. Also known as FALSE COW-POX.

implex (*Zool.*). In *Arthropoda*, an inpushing of the integument for muscle attachment.

imposing stone (*Typog.*). A heavy iron-topped table on which type matter is locked up preparatory to printing. In the early days of printing, level stone-topped tables were used.

imposition (*Typog.*). The process of assembling type pages in their proper order on the stone, arranging appropriate furniture or spacing material, and locking the whole into a chase. The unit is now known as a *forme*, and from it a book section or signature is printed.

impost (*Build.*). The top member of a pier or pillar from which an arch springs.

impregnated carbon (*Illum.*). An arc-lamp carbon consisting of carbon intimately mixed with some other material in order to produce a flame arc.

impregnation (*Timber*). The process of saturating timber with creosote or some other preparation, in order to preserve it. See **creosoting cylinder, Bethell's process.**

impregnation (*Zool.*). The passage of spermatozoa from the body of the male into the body of the female.

impressed (*Bot.*). Having the surface marked by slight depressions.

impression (*Print.*). (1) All copies of a book printed at one time from the same type or plates. —(2) The pressure applied to a type forme by the cylinder or platen.

impressionism (*Photog.*). A style of photographic art in which the immediate impression is the primary value, as contrasted with *realism*, in which the presentation must bear leisurely scrutiny and be true to nature.

improving (*Met.*). See **softening.**

impulse (*Elec. Comm.*). A unidirectional flow of current of non-repeated wave-form, i.e. it consists of a transient and a component of zero frequency which is greater than zero.

See **break—** **make—**
dial—

impulse (*Horol.*). The force or blow imparted to the pendulum or balance by the escape wheel through the escapement.

impulse circuit (*Auto. Teleph.*). In an automatic switching exchange, a source of machine-generated impulse trains for operating step-by-step switches, controlled by relays.

impulse circuit-breaker (*Elec. Eng.*). A circuit-breaker, requiring only a small quantity of oil, in which the arc is extinguished by a mechanically produced flow of oil across the contacts.

impulse-driven clock (*Elec. Eng.*). A clock in which the hands are driven forward by current impulses originating usually from a master-clock.

impulse excitation (*Radio*). A method of exciting the grid of a thermionic tube in which the anode current is allowed to flow for only a very short period during each cycle.

impulse flashover voltage (*Elec. Eng.*). The value of the impulse voltage which just causes flashover of an insulator or other apparatus.

impulse frequency (*Teleph.*). The number of impulses per second in the impulse trains used in dialling and operating selectors. See **dot frequency.**

impulse generator (*Elec. Eng*). See **surge generator.**

impulse machine (*Auto. Teleph.*). A machine which generates accurately timed impulses for operating selector switches.

impulse period (*Teleph.*). The time between identical phases of a train of impulses: the time between the start of one impulse and the start of the next.

impulse pin (*Horol.*). The vertical pin in the roller of the lever escapement which receives the impulse from the pallets, via the notch in the lever. It also effects the unlocking, on the reverse vibration.

impulse plane (*Horol.*). That part of the pallet upon which a tooth of the escape wheel acts when giving impulse.

impulse ratio (*Auto. Teleph.*). The ratio of the time during an impulse to the total time of impulse plus interval before another impulse.

impulse ratio (*Elec. Eng.*). The ratio between the breakdown voltage of an insulator or piece of insulating material when subjected to an impulse voltage to the breakdown when subjected to a normal-frequency (50 cycle) voltage.

impulse-reaction turbine (*Eng.*). See **disc-and-drum turbine.**

impulse repeater (*Auto. Teleph.*). A relay mechanism for repeating impulses from one circuit into another.

impulse turbine (*Eng.*). A steam-turbine in which steam is expanded in nozzles and directed on blades carried by a rotor, in one or more stages, there being no change in pressure as the steam passes the blade-ring. See **combined-impulse turbine.**

impulse voltage (*Elec. Eng.*). A transient voltage lasting only for a few microseconds; very frequently used in high-voltage testing of electrical apparatus in order to simulate voltage due to lightning strokes or other similar causes.

impulsive current (*Elec. Comm.*). A current which comprises one or more impulses in one direction round a circuit, as in dialling.

in-. A prefix (derived from the Latin, meaning either 'in(to)' or 'not') used in the construction of compound terms; e.g. *incurvate*, curved inwards; *inco-ordination*, lack of co-ordination.

in-and-in (*Paper*). A method of packing paper too large to travel flat. The ream is divided in half, folded over, and interlocked.

in-and-out movement (*Cinema.*). That part of the intermittent motion in a motion-picture camera which inserts and withdraws the claws which pull the film into position at the gate.

in-between drawings (*Cinema.*). The drawings which are made to fit between key drawings, in number corresponding to the time intervals demanded by the rhythm, there being 24 frames to be photographed to correspond to the projection time of one second. After the drawings have been made in pencil, over illumination and the previous drawings, they are traced in black ink on thin sheets of celluloid, and coloured.

in-gate (*Foundry*). The channel, or channels, by which the molten metal is led from the runner hole into the interior of a mould.

ingate (*Mining*). The entrance from any point in a shaft to the workings of a mine.

in-line engine (*I.C. Engs.*). A multi-cylinder engine, consisting of a bank of cylinders mounted in line along a common crankcase.

in parallel (*Elec. Eng.*). See **parallel.**

in-phase (*Elec. Eng.*). Two alternating currents or voltages of the same frequency are said to be *in-phase* with each other when they reach their maximum values at the same instant.

in-phase component (*Elec. Eng.*) See **active component.**

in register (*Print., etc.*). See **register.**

in series (*Elec. Eng.*). See **series.**

in step (*Elec. Eng.*). See **step.**

in vitro (*Med.*). In a glass: in a test-tube; said especially of observations and experiments (e.g. on the action of drugs on bacteria) conducted outside the body.

in vivo (*Med.*). In the living body; said of observations of processes or actions (e.g. of drugs on bacteria) in the body.

In (*Chem.*). The symbol for *indium.*

in (*Timber*). See **eng.**

inactivation (*Chem.*). The destruction of the activity of a catalyst, serum, etc.

inactive gases (*Chem.*). See **rare gases.**

inanition (*Med.*). Exhaustion and wasting of the body from lack of food.

Inartic'ula'ta (*Zool.*). See **Ecardines.**

inarticulate (*Bot.*). Not jointed.

inband (*Masonry*). A header stone.

inband rybat (*Masonry*). A header stone laid to form the jamb of an opening.

inbreeding (*Zool.*). Breeding within the descendants of a foundation stock of related animals; endogamy.

inbye (*Mining*). The direction from a haulage way to a working face.

incandes'cence. The emission of light by a substance because of its high temperature, e.g. a glowing electric-lamp filament; or through ionisation or other cause, e.g. the glowing gas in a vacuum discharge tube. In the case of solids and liquids, there is a relation between the colour of the light and the temperature. Cf. *luminescence.*

incandescent lamp (*Illum.*). A lamp in which light is produced by heating some substance to a white or red heat; e.g. a filament lamp.

incandescent mantle (*Illum.*). See **gas mantle.**

incarna'tio un'guis (*Vet.*). Penetration of the heel-pad of dogs and cats by an abnormally incurved dew-claw.

incendiary. Tending to cause combustion.

incendiary bomb (*Ammunition*). **See Supplement.**

in'cept (*Bot.*). The rudiment of an organ.

incertum (*Masonry*). An early form of masonry work in which squared stones were used as a facing, with rubble filling as a backing.

inch, miner's (*Mining*). See **miner's inch.**

inch-tool (*Masonry*). A steel chisel having a cutting edge 1 in. wide, used by the mason for dressing stone.

inching starter (*Elec. Eng.*). An electric-motor starter in which provision is made for inching the motor, i.e. running it very slowly for such purposes as the threading of the paper in a printing press.

incidence, angle of (*Aero.*). See **angle of incidence.**

incidence indicator (*Aero.*). An instrument for measuring the angle between the longitudinal axis of an aircraft and its flight path. Not to be confused with *longitudinal clinometer.*

incipient plasmolysis (*Bot.*). The stage in plasmolysis when the cell wall is fully contracted, but when the protoplast has not yet shrunk away from the wall at any point.

incise (*Arch.*). To cut in: to carve.

incise, incised (*Bot.*). Cut sharply and rather deeply on the margin.

incised meander (*Geol.*). An intrenched winding or bend of a river, which results from renewed down-cutting at a period of rejuvenation.

incision (*Surg.*). The act of cutting into something: a cut made by a surgical knife.

inci'sors (*Zool.*). The front teeth of Mammals; they have a single root, are adapted for cutting, and are usually borne by the premaxilla.

incisu'ra (*Anat.*). A cut or notch. (Various notches in the body are thus designated.)

inclination (*Elec. Eng.*). See **dip.**

inclinato'rium (*Elec. Eng.*). See **dipping needle.**

incline (*Mining*). A sloping tunnel along which rails are laid from one level to another: a mechanically worked inclined haulage way in a coal-mine.

incline engine (*Mining*). A stationary haulage engine at the top of an incline.

incline man, incline braker (*Mining*). The man in charge of an incline in a coal-mine. Also called JINNIER.

inclined-carbon arc lamp (*Illum.*). An arc lamp in which the carbons are set at an angle to each other, as in some projector lamps and flame-arc lamps.

inclined-catenary construction (*Elec. Eng.*). A catenary construction for the overhead contact wire of an electric traction system; in it the catenary wire is not placed vertically above the contact wire.

inclined plane (*Mech.*). For a smooth plane inclined at an angle θ to the horizontal, the force parallel to the plane required just to move a mass up the plane is $mg \sin \theta$. The inclined plane may therefore be regarded as a machine having a velocity ratio of $\operatorname{cosec} \theta$.

inclined shore (*Carp.*). See **raking shore.**

inclining experiment (*Hyd. Eng.*). A practical method of determining the metacentric height and the height of the centre of gravity of a floating vessel; accomplished by observing the angle of heel of the vessel resulting from a measured transverse movement of a known weight across the deck.

inclinom'eter (*Surv., etc.*). An instrument for measuring ground and embankment slopes.

included (*Bot.*). Not projecting beyond the surrounding members.

included angle (*Surv.*). Either of the two angles between two survey lines meeting at a station.

inclusion. A particle or lump of foreign matter embedded in a solid.—Specifically (*Met.*), a particle of non-metallic material retained in a solid metal. Such inclusions are generally oxides, sulphides, or silicates of one or other of the component metals of the alloy, but may also be particles of refractory materials picked up from the furnaces or ladle lining.—(*Min.*) A foreign body (gas, liquid, glass, or mineral) enclosed by a mineral. See also **xenolith.**

inclusion (*Cyt.*). A body occurring in the cytoplasm of a cell. Inclusions may be of two kinds—*protoplasmic inclusions* (as the nucleus, the Golgi apparatus, etc.) and *deuteroplasmic inclusions* (as granules of secreted material, food particles, etc.).

inclusion bodies (*Med.*). Particulate bodies found in the cells of tissue infected with a filter-passing virus.

incoming (*Teleph.*). The indication of the direction of the passage of a call as it is set up, with respect to a position, a selector, or other apparatus in an exchange. Cf. *outgoing.*

incoming feeder (*Elec. Eng.*). A feeder in a substation through which power is received.

incompatibility (*Bot.*). (1) Any difference in the physiological properties of the protoplasts of a host and a parasite which limits or stops the development of the latter.—(2) Some difference, probably usually physiological, which prevents the completion of fertilisation.

incompetence (*Med.*). Inability to perform proper function; said especially of diseased valves of the heart which allow the blood to pass in the wrong direction; e.g. *aortic incompetence, mitral incompetence.*

Incomple'tae (*Bot.*). A group of dicotyledons in which the perianth is absent or incompletely developed; the group is not a natural one.

incomplete flower (*Bot.*). A flower in which the calyx and corolla (or one of these) are lacking.

incomplete metamorphosis (*Zool.*). In *Insecta*, a direct metamorphosis, i.e. a more or less gradual change from the immature to the mature state, a pupal stage being absent and the young forms resembling the parents, except in the absence of wings and mature sexual organs and occasionally in the possession of adaptive structure.

incomplete reaction (*Chem.*). A reversible reaction which is allowed to reach equilibrium, a mixture of reactants and reaction products being obtained.

incompressible volume (*Chem.*). See **co-volume.**

inconsequent drainage (*Geol.*). A river system which is essentially unrelated to the rocks over which it flows.

incontinence (*Med.*). Inability to retain voluntarily natural excretions of the body (e.g. faeces and urine): lack of self-control.

inco-ordination (*Med.*). Inability to combine muscular movements in the proper performance of an action, the component muscle groups working independently instead of together.

incras'sate, incras'sated (*Bot.*). Having thickened cell walls.

increaser (*Plumb.*). A coupling piece used to connect a large pipe to a small one.

incremental iron losses (*Elec. Eng.*). A term sometimes used to denote iron losses occurring in an a.c. machine due to frequencies higher than the fundamental; e.g. tooth pulsation losses.

incremental permeability (*Elec. Comm.*). The permeability of magnetic material when measured with small alternating magnetising forces, but polarised with a steady magnetising force. For small polarising magnetisations, the incremental permeability equals the initial permeability, which is always less than the differential permeability, but diminishes seriously when the polarising magnetisation approaches saturation.

incremental resistance (*Thermionics*). See **differential anode resistance.**

incrustation (*Bot.*). A coating of calcium carbonate, or less often of compounds of iron, on or in the walls of some *Algae.*

incrustation (*Masonry*). A term applied to a wall facing which is of different material from that forming the rest of the wall.

incubation (*Zool.*). The period intervening between the infection of a host by a parasitic organism and the appearance of the first symptoms: the process of causing eggs to hatch by the application of heat, natural or artificial.

in'cubous (*Bot.*). Said of the leaf of a liverwort when its upper border (the border towards the apex of the stem) overlaps the lower border of the next leaf above it and on the same side of the stem.

in'cudate (*Zool.*). (Of *Rotifera*) having the mallei reduced and the rami large and hooked.

incudec'tomy (*Surg.*). Removal of the incus by operation.

incumbent (*Bot.*). Said of a radicle which is bent over and lies on the back of one of the cotyledons.

incunab'ulum (*Print.*). Any book printed in the fifteenth century, i.e. in the infancy of printing.—*pl.* **incunabula.** (Lat. 'cradle.')

incur'rent (*Zool.*). Carrying an ingoing current; said of ducts, and, in certain *Porifera,* of canals leading from the exterior to the prosopyles or prosodi of the flagellated chambers.

incurved (*Bot.*). (1) Curved inwards.—(2) Campylotropous.

in'cus (*Zool.*). In Mammals, one of the ear-ossicles: in *Rotifera,* one of the masticatory ossicles of the mastax: more generally, any anvil-shaped structure.—*pl.* **incu'des.**

in'damines (*Chem.*). Derivatives of phenylated *p*-quinone-diimines. Important as intermediates in the production of azine and sulphide dyes.

indan'threne (*Chem.*). $C_{28}H_{14}O_4N_2$, N-dihydro-1, 2, 2′, 1′-anthraquinone-azine, an anthraquinone vat dyestuff, a dark-blue powder, practically insoluble in water and organic solvents; it is very stable and can be heated to 470° C. without melting or decomposition. Formed by fusion of 2-aminoanthraquinone with caustic potash at 200°-300° C., forming indanthrene A and indanthrene B, of which only the former is valuable. For dyeing purposes indanthrene is reduced by sodium hydrosulphite to the water-soluble salt of the dihydro derivative, and re-oxidised to indanthrene by exposure to air.

indecid'uate (*Zool.*). Said of Mammals in which the maternal part of the placenta does not come away at birth.

indefinite (*Bot.*). (1) Not fixed in number, but numerous.—(2) Not ending in a flower and theoretically capable of continued elongation.—(3) Racemose.

indehis'cent (*Bot.*). Not opening naturally when ripe.

indent (*Carp.*). A notch made in a timber.

indent (*Typog.*). To commence a line with a blank space, which in bookwork paragraphs may be 1, 1½, or 2 ems, according to the width of the line.

indentation test (*Build., Civ. Eng.*). A test for a paving, roofing, or roadmaking asphalt, in which a steady load is applied, under constant temperature conditions, to the asphalt surface, through the sector of a wheel resting upon it, the amount of indentation being measured after a fixed time.

indented bar (*Civ. Eng.*). A special type of reinforcing bar used in ferro-concrete work to provide a mechanical bond, and having for its full length a series of depressions and ridges all round. The depressions and ridges are arranged to be on opposite sides of the bar, so that the full section may be retained throughout the length.

indenter (*Civ. Eng.*). A roller having projections from its curved surface, so that, when it is rolled over newly laid asphalt paving, indentations shall be left in the latter surface to render it non-skid. Also called BRANDING IRON, CRIMPER.

independent axle-drive (*Elec. Eng.*). See **individual axle-drive.**

independent chuck (*Eng.*). A lathe chuck in which each of the four jaws is moved independently by a key; used for work of irregular shape, or when very accurate centring is necessary.

independent drive (*Radio*). A system in which the frequency of a transmitter is determined by an oscillator whose output is amplified and subsequently delivered to the antenna.

independent feeder (*Elec. Eng.*). A feeder in an electric-power distribution system which is used solely for supply to a substation or a feeding point, and not as an interconnector. Also called DEAD-ENDED FEEDER, RADIAL FEEDER.

independent heterodyne (*Radio*). An oscillator, electrically separate from the detector valve, employed for supplying the local oscillations used in heterodyne reception.

independent seconds watch (*Horol.*). A watch having an independent train for driving the seconds hand.

independent suspension (*Automobiles*). A springing system in which the wheels are not connected by an axle beam, but are mounted separately on the chassis through the medium of springs and guide links, so as to be capable of independent vertical movement.

independent time-lag (*Elec. Eng.*). See **definite time-lag.**

independent trip (*Elec. Eng.*). A tripping device for a circuit-breaker, starter, or similar apparatus, in which the current operating the device is independent of the current flowing in the circuit to which the device is connected.

independently heated cathode (*Thermionics*). See **equipotential cathode.**

indestructibility of matter (*Chem.*). See **law of conservation of matter.**

indeterminate (*Bot.*). (1) Without a distinct edge.—(2) Indefinite.

indeterminate (*Struct.*). Said of a structure which is *redundant* (q.v.). Cf. *determinate.*

index (*Horol.*). The regulating lever by means of which the rate of a watch may be adjusted. The lever is usually carried on the balance cock, and its short end carries the curb pins, the long end moving over a scale which indicates the amount of movement given to the curb pins. One end of the scale is marked *A* and the other end *R*. If the watch is losing the index is moved towards *A*, and vice versa.

index (*Paper*). A standard board size, 25½ × 30½ in.

index (*Surv.*). A simple plane table alidade, having sighting vanes at the ends.

index (*Typog.*). (1) The hand, or fist (☞).—(2) The detailed list of page references at the end of a book.

index, colour (*Photog.*). See **colour index.**

index error (*Surv.*). The observed angle of elevation shown on the vertical circle of a theodolite when the line of collimation is in fact horizontal.

index glass (*Surv.*). See **sextant.**

Index Limestone (*Geol.*). A thin yet constant limestone band in the Upper Limestone Group of the Lower Carboniferous rocks found in the Scottish Lowlands.

index of refraction or refractive index (*Light*). The ratio of the sine of the angle of incidence to the sine of the angle of refraction, for a ray of light passing through the surface separating two media. It is also equal to the ratio of the velocity of light in the first medium to that in the second. Unless otherwise stated, it is assumed that one of the media is a vacuum. μ or n is used as symbol for refractive index. See **Snell's law.**—(*Min.*) The determination of the refractive index by the immersion method or by the minimum deviation method with the aid of a spectrometer is a useful aid in the identification of mineral species.

indexing head (*Eng.*). A machine-tool attachment for rotating the work through any required angle, so that faces can be machined, holes drilled, etc., in definite angular relationship.

India paper (*Paper*). A thin, strong, opaque rag paper, made for Bibles and other books where many pages are required in a small compass.

india-rubber (*Chem.*). *Rubber* (q.v.).

india-rubber cable (or **wire**) (*Cables*). Cable or wire in which the insulation consists of pure or vulcanised india-rubber. A further protective or decorative cover of other material may be used in addition.

india-rubber gloves (*Elec. Eng.*). See **rubber gloves.**

Indian clinometer (*Surv.*). A clinometer adapted to plane-table work, consisting of a base adjustable for level and carrying upright sighting vanes at the two ends. The eye vane has simply a sighting hole, while the object vane has a long vertical slit in it, with graduations at the sides in degrees and natural tangents, the zero being horizontally in line with the eye hole, so that the inclination of a line of sight may be read off directly.

Indian cotton (*Textiles*). Cotton of ½ in. to 1 in. staple; chiefly used in India or exported to Japan. It is of low to medium quality.

Indian ink. Ink in a solid form made from lampblack mixed with parchment size or fish glue. Rubbed down in water it produces an intensely black permanent ink, used for line and wash-drawings, etc.

Indian Ocean. An ocean bounded by Africa, Asia, and Australia, and extending to the 40th parallel of south latitude. See **ocean depths,** etc.

Indian topaz (*Min.*). See **citrine.**

in'dianite (*Min.*). See **anorthite.**

in'dican (*Chem.*). (1) A glucoside, $C_{14}H_{17}NO_6$, which hydrolyses to glucose and indoxyl. It forms colourless leaflets, melting at 57° C. and soluble in water. It is obtained from the indigo and woad plants and from certain other *Leguminosae.*—(2) Indoxyl-sulphuric acid, $C_8H_6N{\cdot}O{\cdot}SO_2{\cdot}OH$, a normal constituent of urine.

indicanae'mia, indicane'mia (*Med.*). The presence of indican in the blood.

indicanu'ria (*Med.*). The presence of indican in the urine.

indicated horse-power (*Eng.*). (Of a reciprocating engine) the horse-power developed by the pressure-volume changes of the working agent within the cylinder; it exceeds the useful or brake horse-power at the crankshaft by the power lost in friction and pumping. Abbrev. **I.H.P.**

indicated mean effective pressure (*Eng.*). The average pressure exerted by the working fluid in an engine cylinder throughout the cycle, equal to the mean height of the indicator diagram in pounds per sq. in. Abbrev. **I.M.E.P.**

indicated thermal efficiency (*Eng.*). Of a reciprocating engine, the ratio between the heat energy equivalent to the indicated horse-power output and the heat energy supplied in the steam or fuel.

indicating instrument (*Elec. Eng.*). An electrical measuring instrument in which the value of the quantity being measured is indicated by the position of a pointer on a scale or by some similar device.

indicator (*Bot.*). A plant which grows under special conditions of climate, or on a particular soil, or in a particular community, and thus, by its presence, indicates the general nature of the habitat.

indicator (*Chem.*). (1) A substance whose colour depends on the acidity or alkalinity of the solution in which it is dissolved.—(2) Any substance used to indicate the completion of a chemical reaction, generally by a change in colour.

indicator (*Elec. Comm.*).
See **call—** **coded call—** **volume—**

indicator (*Elec. Eng.*). A signalling device, usually used in connexion with electric bells, to indicate in which of a number of circuits a signal has been made. Also called an ANNUNCIATOR.

See **charge—** **phase-sequence—**
leakage— **potential—**
maximum- **power-factor—**
demand— **indicating instrument.**

indicator (*Eng.*). An instrument for obtaining a diagram of the pressure-volume or pressure-time changes in an engine or compression cylinder during the working cycle.

See **cathode ray—** **optical—**

indicator (*Textiles*). An instrument of tachometer type used in cotton spinning to register the revolutions of a revolving shaft.

indicator card (*Eng.*). A specially prepared paper on which the diagram is drawn by a metallic style in the piston type of indicator.

indicator diagram (*Eng.*). A graphical representation of the pressure and volume changes undergone by a fluid, while performing a work-cycle in the cylinder of an engine or compressor, the area representing, to scale, the work done during the cycle. See **indicated mean effective pressure, light spring diagram.**

indicator exponent (*Chem.*). The *p*H-value at which the change of colour of an *indicator* (1) is most rapid.

indicator range (*Chem.*). The range of *p*H-values within which an *indicator* (1) changes colour.

indices of crystal faces (*Min.*). Numbers or letters used to define the position of crystal faces in space with reference to a set of chosen axes. With the Miller system of notation, the indices are the reciprocals of the parameters.

indicial admittance (*Elec. Comm.*). The current which flows in an electrical circuit when the Heaviside unit function electromotive force is applied. This determines the transient response of the circuit.

indic'olite or **indigolite** (*Min.*). A blue (either pale or bluish-black) variety of tourmaline.

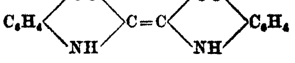
indifferent (*Zool.*). Said of coloration in animals when it is inherited and is neither useful nor detrimental to the species; as the scarlet coloration of many deep-sea forms.

indifferent species (*Bot.*). A species which occurs in two or more distinct communities.

indigenous (*Zool.*). Native; not imported.

indigestion (*Med.*). A condition, marked by pain and discomfort, in which the normal digestive functions are impeded. The causes are very numerous.

in'digo (*Chem.*). $C_{16}H_{10}N_2O_2$, a dye occurring in a number of plants, especially in species of *Indigofera*, in the form of a glucoside. It is an indole derivative and its constitution is expressed by the following formula established by Baeyer:



Indigo is a very important blue vat dyestuff, and can be synthesised in various ways: (*a*) from *o*-nitrophenyl-acetic acid via *o*-aminophenyl-acetic acid, oxindole, isatin, isatin chloride; (*b*) from *o*-nitrobenzaldehyde and acetone via *o*-nitrophenyl-lactyl methyl ketone; (*c*) from aniline via phenylaminoacetic acid and indoxyl; (*d*) from naphthalene via phthalic acid, anthranilic acid, phenylglycine-*o*-carboxylic acid, indoxylic acid, indoxyl to indigo.

indigo copper (*Min.*). See **covellite.**

indig'olite (*Min.*). See **indicolite.**

indirect arc furnace (*Elec. Eng.*). An electric-arc furnace in which the arc is struck between two electrodes mounted above the charge, the latter being heated chiefly by radiation.

indirect fittings (*Illum.*). Lighting fittings which reflect practically all the light from the lamps contained in them into the upper hemisphere; used, therefore, for indirect lighting.

indirect heating (*Build.*). A system of heating by convection. Cf. *direct heating*.

indirect lighting (*Illum.*). A system of lighting in which more than 90% of the total light flux from the fittings is emitted in the upper hemisphere.

indirect ray (*Radio*). That ray of radiation which is reflected from the Heaviside layer on its way from the transmitter to the receiver. Also called INDIRECT WAVE, REFLECTED RAY, SKY WAVE, but preferably termed IONOSPHERIC RAY (or WAVE), the ray being strictly the geometrical path of the wave, perpendicular to the wave-front.

indirectly heated cathode (*Thermionics*). See **equipotential cathode.**

indirectly heated valve (*Thermionics*). A valve using an equipotential cathode.

indium (*Met.*). Symbol, In. A metallic element in the third group of the periodic system. At. no. 49, at. wt. 114·8, m.p. 155° C., sp. gr. 7·28 at 13° C., specific electrical resistivity 9 microhms per c.c. Found in traces in zinc ores The metal is soft and marks paper like lead; it forms compounds with carbon compounds.

individual (*Bot.*). Strictly, a plant derived from the development of a zygote; loosely, any separate plant.—(*Zool.*) A single member of a species: a single person or zooid of a colony of *Coelenterata* or *Polyzoa*: a single unit or specimen.

individual (or **independent**) **axle-drive** (*Elec. Eng.*). A term applied to the arrangement of an electric locomotive in which each driving axle is driven by a separate motor.

individual drive (*Elec. Eng.*). A system used for the electric operation of factories, in which each machine is driven by a separate electric motor. See also **individual axle-drive.**

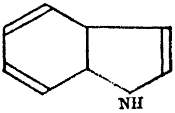
individual line (*Teleph.*). American name for *direct line* (q.v.).

individual psychology. The system of psychology, founded by Adler of Vienna, which stresses the feeling of inferiority as the main factor in neurosis, and the desire for power, as the driving force behind all psychic life, and even sexual life. Adler rejects Freud's conception of the unconscious and the libido, and sees in the goals of the future, rather than in the events in the past, evidence for the causation of neurosis.

individual trunk (*Auto. Teleph.*). A trunk which is used by one group only of a grading scheme.

individuation (*Zool.*). The formation of separate functional units which are mutually interdependent; as the formation of the zooids composing a colony.

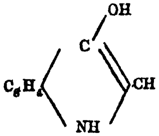
in'dole (*Chem.*). C_8H_7N, colourless plates, m.p. 52° C., b.p. (decomposition) 245° C., volatile in steam. Indole forms the basis of the indigo molecule, and its derivatives, e.g. skatole and tryptophane, are of importance in biochemistry as products formed by the decomposition of albuminous matter. It results from the condensation of a benzene nucleus with a pyrrole ring, and is thus



indolent (*Med.*). Causing little or no pain; e.g. *indolent* ulcer.

indophe'nols (*Chem.*) Derivatives of phenylated *p*-quinone mono-imines; similar in constitution to the indamines; used for dyeing cotton and wool.

indox'yl (*Chem.*). An indole derivative, an isomer of oxindole, yellow crystals, m.p. 85° C. The formula of indoxyl is



It is a very unstable compound which easily resinifies, and is readily oxidised to indigo by atmospheric oxygen.

induced charge (*Elec. Eng.*) An electric charge produced on a conductor as a result of a charge on a neighbouring conductor

induced current (*Elec. Eng.*). The current in an electric circuit which flows as a result of an induced e m f. in the circuit.

induced drag (*Aero.*). That fraction of the total drag of a part inevitably induced by its lift.

induced draught (*Eng.*). A forced draught system used for boiler furnaces, in which a fan placed in the uptake induces an air-flow through the furnace. See **balanced draught, exhausting fan.**

induced e.m.f. (*Elec. Eng.*). An e.m.f. produced in a circuit as a result of a change in the amount of magnetic flux linked with the circuit.

induced reaction (*Chem.*). A chemical reaction which is accelerated by the simultaneous occurrence in the same system of a second, rapid reaction.

inductance (*Elec. Eng.*).

See **inductor** **self-—**
distributed— **variable—**
mutual—

inductance coil (*Elec. Eng.*). See **inductor.**

inductance coupling (*Radio*). Coupling between two circuits by the inclusion of an inductance common to both.

inductance factor (*Elec. Eng.*). A term sometimes used to denote the ratio of the reactive current to the total current in an a.c. circuit, i.e. the *sine* of the angle of lag.

induction (*Elec. Eng.*). A term sometimes used to denote the density of an electric or magnetic field.

See **electromagnetic—** **mutual—**
electrostatic— **self-—**

induction (*Zool.*). The production of a definite condition by the action of an external factor.

induction coil (*Elec. Eng., etc.*). A transformer with a few turns on the primary and a large number of turns on the secondary, designed so that a high secondary voltage is produced when the current in the primary is broken, either automatically, as in the Ruhmkorff coil, or at timed intervals, as in the coil used for ignition in I.C. engines.

induction coil (*Teleph.*). The small transformer located in a subscriber's telephone circuit, on his premises, for isolating the microphone current from his receiver.

induction compass (*Aero.*). See **earth inductor compass.**

induction furnace (*Elec. Eng.*). An electric furnace for melting metals; in it the heat is produced by currents induced in the charge itself.

See **coreless—** **Ajax-Wyatt furnace.**
core-type—

induction generator (*Elec. Eng.*). An electric generator similar in construction and operation to an induction motor; in order to generate, it must be driven above synchronous speed and must be excited from the a.c. supply into which it is delivering power.

induction instrument (*Elec. Eng.*). An electrical measuring instrument in which the pointer is moved as the result of the interaction between an alternating flux produced by the quantity to be measured and currents induced by this flux in a disc.

induction lamp (*Elec. Eng.*). See **neon induction lamp.**

induction machine (*Elec. Eng.*). See **electrostatic generator.**

induction (or **inlet) manifold** (*I.C. Engs.*). In a multi-cylinder petrol-engine, the branched pipe which leads the mixture from the carburettor to each of the cylinders.

induction meter (*Elec. Eng.*). The most common type of a.c. integrating meter; it is a motor meter in which the torque is produced as the result of the interaction between an alternating flux and currents induced in a disc by this flux.

induction motor (*Elec. Eng.*). An a.c. motor in which currents in the primary winding (connected to the supply) set up a flux which causes currents to be induced in the secondary winding (usually the rotor); these currents interact with the flux to produce rotation. Also called ASYNCHRONOUS MOTOR.

See **double squirrel-cage—** **slip-ring—**
polyphase— **squirrel-cage—**
single-phase— **synchronous—**

induction motor-generator (*Elec. Eng.*). A motor-generator set driven by an induction motor.

induction period (*Chem.*). The interval of time between the initiation of a chemical reaction and its actual occurrence.

induction, photochemical (*Chem.*). See **photochemical induction.**

induction port, —valve, etc. (*I.C. Engs.*). The port, valve, etc., through which the charge is induced into the cylinder during the suction stroke; commonly called the INLET PORT (VALVE, etc).

induction regulator (*Elec. Eng.*). A voltage regulator having a winding connected in series with the supply; voltages are induced in this winding from a primary winding connected across the supply, and regulation of the voltage is carried out by varying the relative position of the two windings.

See **single-phase—** **three-phase—**

induction relay (*Elec. Eng.*). A relay, for use in an electrical circuit, in which the contacts are closed as the result of the interaction between an alternating flux and currents induced in a disc by this flux.

induction stroke (*I.C. Engs.*). The suction stroke, charging stroke, or intake stroke, during which the working charge or air is induced into the cylinder of an engine.

inductive (*Elec. Eng.*). Said of an electric circuit or piece of apparatus which possesses self or mutual inductance

inductive capacity (*Diel.*). Dielectric constant.

inductive coupling (*Elec. Comm.*). Coupling between two circuits by means of mutual inductance.

inductive drop (*Elec. Eng.*). Voltage drop produced in an a.c. circuit owing to its self or mutual inductance.

inductive load (*Elec. Eng*). See **lagging load.**

inductive reactance (*Elec. Eng.*). Reactance in an a.c. circuit caused by its inductance.

inductive reaction (*Radio*). See **electromagnetic reaction.**

inductive reasoning. The mental process which recognises uniformity in a set of observations, and thereby forms rules (scientific laws) which describe features in the observations which are revealed by the specified conditions.

inductive resistor (*Elec. Eng.*). A resistor having appreciable inductance.

inductor (*Chem.*). A substance which accelerates a slow reaction between two or more substances by reacting rapidly with one of the reactants.

inductor (*Elec. Eng.*). (1) A piece of apparatus used in an electric circuit because of the fact that it possesses inductance. Also called INDUCTANCE, INDUCTANCE COIL, REACTANCE COIL, CHOKING COIL.—(2) One of the rotating masses of magnetic material used to produce the necessary flux changes in an inductor generator.

inductor generator (*Elec. Eng.*). An electric generator in which the field and armature windings are fixed relative to each other, the necessary changes of flux to produce the e.m.f. being produced by rotating masses of magnetic material.

inductor loudspeaker (*Acous.*). A cone loudspeaker with an electromagnetic drive, in which the magnetic flux passes across gaps in which the driving pin attached to the apex of the cone is free to move. On the pin are located magnetic elements slightly displaced from the centre of the gaps, so that fluctuations in magnetic flux pull the pin normally to the direction across the gap.

in'dulines (*Chem.*). A sub-group of the azine dyestuffs, containing three or four amino groups, belonging to the class of diphenylamine dyestuffs; it is formed by the interaction of aniline hydrochloride and aminoazobenzene.

indumen'tum (*Bot.*). The general downy or hairy covering of a plant.—(*Zool.*) A covering of hair or feathers.

induplicate aestivation (*Bot.*). A form of valvate aestivation in which the edges of the perianth segments are turned inwards.

in'durated. Hardened, made hard.—*n.* **induration.**

indu'sium (*Bot.*). A protective structure associated with the sorus in a fern. It may be a group of hairs or of scales; it may be a cup-shaped structure around the base of the sorus; and it is frequently an umbrella-like scale completely covering the sorus.

indusium (*Zool.*). In some *Insecta*, a third embryonic envelope lying between the chorion and the amnion in the early stages of development of the egg: a cerebral convolution of the brain in higher Vertebrates: an insect larva case. —*adjs.* **indu'siate, indu'siform.**

industrial frequency (*Elec. Eng.*). A term used to denote the frequency of the alternating current used for ordinary industrial purposes, usually 50 or 60 cycles.

industrial reflector (*Illum.*). A lighting fitting, usually of conical shape and whitened or polished internally, suitable for industrial lighting.

inequality (*Astron.*). The term used to signify any departure from uniformity in orbital motion; it may be (1) *periodic*, that is, completing a full cycle within a specified time and then repeating it; (2) *secular*, that is, increasing steadily in magnitude with time.

inequi- (Latin *in*, not; *aequus*, equal). A prefix used in the construction of compound terms; e g. *inequivalve.*

ineq'uipo'tent (*Zool.*). Possessing different potentialities for development and differentiation.

ineq'uivalve (*Zool.*). Having the two valves of the shell unequal.

inert (*Chem.*). Not readily changed by chemical means.

inert cell (*Elec. Eng.*). A dry cell containing ingredients which only form an electrolyte when water is added.

inert filler (*Paint.*). A substance added to paint as an adulterant or to give it body; e.g. barytes, china clay, French chalk, gypsum, whiting.

inert gases (*Chem.*). See **rare gases.**

inertia (*Photog*). The exposure, in candle-metre-seconds, which is indicated for zero density when the linear portion of the gamma curve for an emulsion is extended.

inertia (*Mech., Phys.*). Reluctance of a body to change its state of rest or of uniform velocity in a straight line. Inertia is measured by *mass* when linear velocities and accelerations are considered; and by *moment of inertia* (q.v.) for angular motions (i.e. rotations about an axis).

inertia governor (*Eng.*). A shaft type of centrifugal governor employing an eccentrically pivoted weighted arm, which responds rapidly to speed fluctuations by reason of its inertia and in such a way as to suppress them.

inertia starter (*I.C. Engs.*). A device for turning an aero engine for starting purposes. A light flywheel is accelerated by hand, through gears, to a high speed, and a slow-speed shaft driven by it is then clutched in to the engine crankshaft.

infantile paralysis (*Med.*). See under **poliomyelitis.**

infan'tilism (*Med.*). A disturbance of growth, the persistence of infantile characters being associated with general retardation of development of mind and body.

infarct (*Med.*). That part of an organ which has had its blood supply cut off, the area so deprived undergoing necrosis.

infarction (*Med.*). The formation of an infarct: the infarct itself.

infection (*Med.*). The invasion of body tissue by living micro-organisms, with the consequent production in it of morbid change: a diseased condition caused by invasion of the body with living micro-organisms: the infecting micro-organism itself.

infection tube (*Bot.*). The germ-tube which penetrates the host from the germinating spore of a parasitic fungus.

infecundity (*Med.*). Sterility, barrenness.

infer-, infero- (Latin *inferus*, beneath). A prefix used in the construction of compound terms; e.g. *inferoposterior*, behind and below.

inferior (*Bot.*). (1) Said of the annulus of an agaric when it is placed low down on the stipe.—(2) Said of the gynaeceum of a flower when it is enclosed by the receptacle, so that the calyx, corolla, and stamens are developed above it.—(3) Said of the calyx, corolla, and stamens of a hypogynous flower.

inferior (*Zool.*). Lower; under; situated beneath; as the *inferior* rectus muscle of the eyeball. Cf. *superior.*

inferior conjunction (*Astron.*). See **conjunction.**

inferior figures or **letters** (*Typog.*). Small figures or letters set below the general level of the line; used mostly in chemical formulae, e.g. C_6H_5.

Inferior Oölite Series (*Geol.*). A local division of the rocks belonging to the Middle Jurassic System found in Gloucestershire and Wiltshire, which consist in part of oölitic limestones.

inferior planets (*Astron.*). See **planet.**

inferiority complex (*Psychol.*). Generally, a persisting state of feelings of inferiority; specifically (*Adler and the individual psychologists*), feelings of inferiority arising from some organ or limb defect: (*the Freudian school*) feelings of inferiority resulting from deprivation of love in childhood, this being frequently the main factor in the development of a psychoneurosis.

infero-. Prefix. See **infer-.**

inferobran′chiate (*Zool.*). Having the gills hidden under the margin of the mantle.

inferred zero (*Elec. Eng.*). See **suppressed-zero instrument.**

infestation (*Med.*). The condition of being occupied or invaded by parasites, usually parasites other than bacteria.

infibulation (*Med.*). The fastening of the external genital organs with a clasp.

infilling (*Build.*). Material, such as hardcore, used for making up levels; e.g. under floors.

infiltration (*Med.*). (1) The accumulation of abnormal substances (or of normal constituents in excess) in cells of the body.—(2) The gradual spread of infection in an organ (e.g. tuberculous *infiltration* of the lung).

infinite attenuation (*Elec. Comm.*). The property of some filters of providing a theoretically infinite attenuation for one or more specified frequencies, against which strong discrimination is required. See also **frequency of infinite attenuation.**

infinite gamma (*Photog.*). The same as *gamma infinity.*

infinite line (*Elec. Comm.*). A line of uniform constants which appears to be infinitely long, so that the end termination does not appreciably affect the sending impedance: a short line which is terminated in its characteristic impedance, so that none of the transmitted power is reflected back.

infinity plug (*Elec. Eng.*). A plug in a resistance box which, when withdrawn, breaks the circuit, i.e. introduces an infinite resistance.

infirmary (*Med.*). An institution for the surgical and/or medical treatment of disease.

inflammable air (*Chem.*). A general term once used to describe combustible gases such as hydrogen, hydrocarbons, etc. Now obsolete.

inflammation (*Med.*). The reaction of living tissue to injury or to infection, the affected part becoming red, hot, painful, and swollen, due to hyperaemia, exudation of lymph, and escape into the tissue of blood cells.

inflation (*Aero.*). The process of filling an airship or balloon with gas. Sometimes called GASSING.

inflected arch (*Civ. Eng.*). See **inverted arch.**

inflexed (*Bot., Zool.*). Curved or bent inwards.

infloresʹcence (*Bot.*). (1) In flowering plants, the part of the shoot which bears flowers.—(2) In *Bryophyta*, that part of the plant body which is differentiated to bear the antheridia and archegonia.

influence factor (*Teleph.*). See **telephone interference factor.**

influence line (*Struct., etc.*). An *influence line* for a structure is a curve the ordinate to which at any point represents the value of some variable (such as the bending moment) at another particular point in the structure, due to the presence of a unit load at the point where the ordinate is taken.

influence machine (*Elec. Eng.*). See **electrostatic generator.**

influenza (*Med.*). An acute infectious epidemic disease, attacking especially the upper respiratory tract; now thought to be due to infection with a filter-passing virus.

influenza, equine (*Vet.*). An acute contagious infection of equines due to a filterable virus.

influenza, swine (*Vet.*). An acute contagious infection of swine due to a filterable virus.

infra- (Latin *infra*, below). A prefix used in the construction of compound terms; e.g. *infrahyoid*, beneath the hyoid.

infrabaʹsal (*Zool.*). In *Crinoidea*, one of a whorl of perradial plates lying below the basals.

infrabranʹchial (*Zool.*) Below the gills; as part of the mantle chamber in *Pelecypoda.*

infraclavʹicle (*Zool.*). In some Fish, a membrane bone of the pectoral girdle.

infraclavicʹular (*Zool.*). Situated below the clavicle.

inʹfradyne (*Radio*). A form of super-heterodyne receiver, in which the intermediate frequency is higher than that of the incoming signal.

infra-epimʹeron (*Zool.*). In Insects, the lower part of the epimeron when that sclerite is subdivided.

infra-episterʹnum (*Zool.*). In Insects, the lower part of the episternum when that sclerite is subdivided.

inframarʹginal (*Zool.*). Below the margin: a marginal structure: in *Chelonia*, one of certain plates of the carapace lying below the marginals: in some Echinoderms, one series of ossicles situated on the lower margin of each ray.

infra-neusʹton (*Ecol.*). Aquatic animals associated with the under side of the surface-film; e.g. some Mosquito pupae

infraproteins (*Chem.*). Protein derivatives obtained by hydrolysis.

infra-red (*Phys.*). A term applied to invisible radiation of wavelength longer than 7600 A., the limit of the visible spectrum at the red end. Infra-red rays are heat rays, and may be investigated by means of thermal detectors such as the bolometer and thermo-couple, or by specially sensitised photographic emulsions.

infra-red emulsion (*Photog.*). A photographic emulsion which is sensitive to infra-red light, and capable of registering images, using infra-red rays, of objects when other more actinic and visible rays are filtered out.

infructesʹcence (*Bot.*). The inflorescence after the flowers have fallen and fruits have developed.

infundibuʹliform (*Bot.*). Tubular below, gradually enlarging upwards, i.e. funnel-shaped.

infundibʹulum (*Zool.*). A funnel-shaped structure: in *Vertebrata*, a ventral outgrowth of the brain: a pulmonary vesicle: in *Cephalopoda*, the siphon: in *Ctenophora*, the flattened gastric cavity.—*adj.* **infundibʹular.**

Infusorʹia (*Zool.*). See **Ciliophora.**

Ingenhausz's experiment, ingʹen-hows (*Heat*). Rods of different metals are coated with paraffin wax and their ends immersed in hot water. The relative rate at which heat is conducted along the rods is shown by the rate of melting of the wax.

ingestion (*Zool.*). The act of swallowing or engulfing food material (*ingesta*) so that it passes into the body.—*v.* **ingest.**

ingle-nook (*Build.*). A fireside corner.

ingluvies, —gloo-vēz (*Zool.*). An oesophageal dilatation of Birds; the crop.

ingluviʹtis (*Vet.*). Inflammation of the crop, or ingluvies, of Birds.

ingoing (*Build.*). A Scottish term for a *reveal* (q.v.).

Ingold cutter (*Horol.*). A special cutter used to correct inaccuracies in the teeth of a wheel.

ingot (*Met.*). A metal casting of a shape suitable for subsequent rolling or forging.

ingot iron (*Met.*). Iron of comparatively high purity, produced, in the same way as steel, in the open-hearth furnace, but under conditions that keep down the carbon, manganese, and silicon content.

ingot mould (*Met.*). The mould or container in which molten metal is cast and allowed to solidify in order to form an ingot.

ingot stripper (*Met.*). Mechanism for extracting ingots from ingot moulds.

ingot structure (*Met.*). The general arrangement of crystals in an ingot, which consists typically of chill crystals, columnar crystals, and equi-axed crystals. According to the relation between the mass and the temperature of the molten metal and mould respectively, one or two types of crystals may be absent.

ingrain (*Dec.*) A cheap type of wallpaper which is made from wood pulp and coloured with soluble dyes during the process of manufacture.

ingrain carpet (*Textiles*). See **Kidderminster carpet.**

ingraves'cent (*Med*). Gradually increasing in severity.

ingui'nal (*Zool*). Pertaining to, or in the region of, the groin.

inguinodyn'ia (*Med.*). Pain in the groin.

inha'lant (*Zool.*). Pertaining to, or adapted for, the action of drawing in a gas or liquid; as the *inhalant* siphon in some *Mollusca.*

inhalation (*Med.*). The act of breathing in, or taking into the lungs: any medicinal agent breathed into the lungs.

inhalato'rium (*Med.*). An institution for treating disease by administering inhalations.

inherent regulation (*Elec. Eng*). The change in voltage which takes place at the terminals of an electric generator, convertor, or transformer when the load is changed from no load to full load, all other conditions remaining the same. It is usually expressed as a percentage of the normal terminal voltage. See **regulation, regulation down.**

inherited memory (*Zool.*). See **instinct.**

inhibition (*Zool.*). The stopping or deceleration of a metabolic process; cf. *excitation.—adj.* **inhibitory.**

inhibitor (*Bot.*). A substance which limits or destroys the catalytic activity of an enzyme.—(*Chem.*) A substance which arrests or prevents a chemical reaction.

inhibitory (*Zool.*). Said of a nerve the stimulation of which results in the regulation of the activities of a muscle or gland in the direction of decrease.

inhibitory phase (*Chem.*). The protective colloid in a lyophobic sol.

Ini'omi (*Zool.*). An order of *Neopterygii* characterised by the possession of black or silvery soft fragile bodies, frequently provided with light organs; the air-bladder is small or absent, and there is usually an adipose fin; abyssal forms. Lantern-fish, Lizard-fish.

in'ion (*Anat.*). The external bony protuberance on the occiput, at the back of the skull.

initial cell (*Bot.*). A cell which remains meristematic, divides repeatedly, and gives rise to many daughter cells from which, after further divisions, the permanent tissues of the plant are differentiated.

initial consonant articulation (*Acous.*). See **articulation.**

initial permeability (*Elec. Comm.*). The permeability of magnetic material as measured with small alternating magnetising forces, without polarisation.

initial spindle (*Cyt.*). See **netrum.**

initiator (*Chem.*). The substance or molecule which starts a chain reaction.

injected (*Bot.*). Having the intercellular spaces filled with water.

injection (*Geol.*). The emplacement of fluid rock matter in crevices, joints, or fissures found in rocks. See **intrusive rocks.**

injection (*I.C. Engs.*). The process of spraying oil-fuel into the cylinder of a compression-ignition engine by means of an injection pump.

injection complex (*Geol.*). An assemblage of rocks, partly igneous, partly sedimentary or metamorphic, the former in intricate intrusive relationship to the latter, occurring in zones of intense regional metamorphism. British examples have been described by H. H. Read from the Highlands of Scotland.

injection condenser (*Eng.*). See **jet condenser.**

injection lag (*I.C. Engs.*). In a compression-ignition engine, the time interval between the beginning of the delivery stroke of the fuel injection pump and the beginning of injection into the engine cylinder.

injection moulding (*Plastics*). A method for the fabrication of thermoplastic materials. The viscous resin is squirted, by means of a plunger, out of a heated cylinder into a water-chilled mould, where it is cooled and removed. There is little or no flash.

injection valve (*I.C. Engs.*). See **injector, atomiser.**

injector (*Eng.*) A device by which a stream of fluid, as steam, is expanded to increase its kinetic energy, and caused to entrain a current of a second fluid, as water, so delivering it against a pressure equal to, or greater than, that of the steam; the steam injector is commonly used for feeding boilers. See also **air-ejector, Giffard's injector.**

ink. *Writing ink* usually consists of a fluid extract of galls or of other suitable vegetable materials, with the addition of solutions of iron salts. *Coloured writing inks* are prepared by dissolving suitable dyes in water. *Marking inks* are made from solutions of silver or copper compounds, aniline being sometimes added. See also **Indian ink, printing ink.**

ink sac (*Zool.*) In some *Cephalopoda,* a large gland, opening into the alimentary canal near the anus, which secretes a dark-brown pigment (sepia).

inkers (*Print.*). On a printing machine, the rollers which apply ink to the type surface.

inkies (*Photog.*). Colloquialism for the incandescent lamps in a motion-picture studio.

inlaid parquet (*Build.*). A floor-covering laid, on the ordinary floor boarding, in panels formed of hardwood blocks pressed on to a backing of softwood, one or two feet square.

inlay (*Dec., Furn.*). Wood, metal, ivory, or other material cut to pattern and sunk in a counterpart design on wood, metal, etc.

inlet port,—valve, etc. (*I.C. Engs.*). See **induction port,** etc.

inlier, in'li-er (*Geol.*). An outcrop of older rock surrounded by those of younger age.

innate (*Bot.*). (1) Sunken into the thallus, or originating within the thallus.—(2) Said of an anther which has the filament joined to its base only.

inner bead (*Join.*). See **guide bead.**

inner conductor (*Elec. Eng.*). (1) The central conductor of a concentric cable.—(2) The neutral conductor of a three-wire system.

inner dead-centre (*Eng.*). (Of a reciprocating engine or pump), the piston position at the beginning of the outstroke, i.e. when the crank-pin is nearest to the cylinder.

inner endodermis (*Bot.*). The endodermis internal to the vascular tissues in a solenostele.

inner glume (*Bot.*). See **pale.**

innervation (*Zool.*). The distribution of nerves to an organ.

innings (*Civ. Eng.*). Lands reclaimed from the sea.

innocent (*Med.*). Not malignant; not cancerous. See **tumour.**

innom'inate (*Zool.*). Without a name; as the *innominate artery* of some Mammals, which leads from the aortic arch to give rise to the carotid artery and the subclavian artery; the *innominate vein* of *Cetacea, Edentata, Carnivora,* and *Primates*, which leads across from the jugular-subclavian trunk of one side to that of the other; the *innominate bone*, which is the lateral half of the pelvic girdle.

innovation (*Bot.*). The portion of a branch added during one season of growth.

inoc'ular (*Zool.*). Having the insertion of the antenna close to the eye.

inoculation (*Bot.*). (1) The conveyance of infection to a host plant by any means of transmission.—(2) The entry of the germ tube of a parasitic fungus into the host plant.—(3) The placing of spores or portions of growing fungi or bacteria in a culture medium.

inoculation (*Chem.*). The introduction of a small crystal into a supersaturated solution or supercooled liquid in order to initiate crystallisation.

inoculation (*Med.*). The introduction into an experimental animal, by various routes, of infected material or of pathogenic bacteria: the injection of a vaccine into a person for protection against subsequent infection with the organisms contained in the vaccine.

inoc'ulum (*Med.*). The material used in inoculation.

inop'erable (*Med.*). Not suitable for operation.

inoper'culate (*Bot.*). Lacking a lid to the sporangium.

inordinate (*Bot.*). Not arranged in any definite order.

inorganic chemistry (*Chem.*). The study of the chemical elements and their compounds, other than the compounds of carbon, with the exception of the oxides and sulphide, these generally being included in inorganic chemistry.

in'osite (*Chem.*). A synonym for *inositol* (q.v.).

ino'sitol (*Chem.*). $C_6H_6(OH)_6$. Four out of a possible nine stereoisomeric forms of hexahydroxy-*cyclo*hexane are known by this name: *meso*-inositol, *d*-inositol, *l*-inositol, *d-l*-inositol. The first-named is found in both animals and plants. Inositol is essential for the growth of certain yeasts.

input impedance (*Radio, Thermionics*). The impedance measured between the pair of terminals connected to the grid and cathode of a thermionic tube device, either directly or through a transformer or other coupling device. In the case of a thermionic tube alone, it is the impedance offered by the parallel combination of the conductance and capacitance paths between the grid and all other electrodes.

input transformer (*Elec. Comm.*). A transformer which is designed to operate between a stated source-impedance and the grid of a valve with a given response.

input voltage (*Radio*). The voltage impressed on the control electrode of a thermionic tube, either directly or through a transformer or like circuit.

in'quiline (*Zool.*). A guest animal living in the nest of another animal, or making use of the food provided for itself or its offspring by another animal.

insanity (*Psychiatry*). A medico-legal term used for any mental disorder, usually endogenous, which causes an individual to act against the social or legal demands of the society in which he lives. Not identical with *psychosis* (q.v.).

inscribe. To draw one plane figure so that it is enclosed within another.

insculpt', insculp'tate (*Bot.*). Bearing holes or depressions in the surface.

Insecta (*Zool.*). A subphylum of mainly terrestrial *Arthropoda* which breathe by tracheae; they possess uniramous appendages; the head is distinct from the thorax and bears one pair of antennae; there are three pairs of similar legs attached to the thorax, which may also bear wings; the body is sharply divided into head, thorax, and abdomen.

Insectiv'ora (*Zool.*). An order of small, mainly terrestrial Mammals having numerous sharp teeth, tuberculate molars, well-developed collar-bones, and plantigrade unguiculate pentadactyl feet; insectivorous. Shrews, Moles, and Hedgehogs.

insectiv'orous (*Zool.*). Insect-eating.

in'selberg (*Geol.*). A steep-sided eminence arising from a plain tract; often found in the semi-arid regions of tropical countries.—*pl.* **inselberge.**

insemination (*Zool.*). The approach of the spermatozoon to the ovum, and its subsequent entry, followed by the fusion of the male and female pronuclei.

insert (*Bind.*). See **inset.**

insert (*Cinema.*). A simple shot (e.g. close-up of a letter) which is inserted into a sequence, specifically to give information to the audience.

inserted (*Bot.*). Growing out of another member.

insertion (*Bot.*). (1) The place where one plant member grows out of another, or is attached to another.—(2) The manner of attachment.

insertion (*Lace*). Lace used in connexion with a fabric, often at or near the border, for the purpose of ornamentation. It is narrow, with a plain edge to permit of its insertion in the fabric.

insertion (*Zool.*). The point or area of attachment of a muscle, mesentery, or other organ.

insertion gain (*Elec. Comm.*). The gain in delivered power into a load from a source, because of the introduction of a matching network or transformer between the source and the load.

insertion joint (*Eng.*). Special material used for making watertight joints between the flanges of pipes; it consists usually of rubber-coated canvas or of pure rubber.

insertion loss (*Elec. Comm.*). The loss, in decibels, of the power supplied from a source to a load when a network or transformer is inserted between them.

insertion region (*Bot.*). The part of a chromosome where it is attached to a spindle fibre.

insesso'rial (*Zool.*). Adapted for perching.

inset or **insert** (*Bind.*). (1) An extra leaf or section loosely inserted in a book.—(2) One folded sheet put inside another; an *insetted* (or *inserted*) *book* is one having its sections placed one within the other.

inset (*Mining*). The opening from the mine shaft to a seam of coal.

inside (*Textiles*). In the lace industry the term is used comprehensively for the points, combs, guides, jacks, and trucks, which constitute the chief features of a lace machine.

inside callipers (*Eng*). *Callipers* (q.v.) with the points turned outwards, used for taking inside dimensions.

inside-colour-sprayed lamp (*Illum.*). An electric filament lamp the bulb of which is sprayed on the inside with a white or coloured material in order to diffuse the light and give it a coloured effect.

inside crank (*Eng.*). A crank, with two webs, placed between bearings, as distinct from an outside or overhung crank.

inside cylinders (*Eng.*). In a locomotive, those cylinders which are fixed inside the frame.

inside-frosted lamp (*Illum.*). An electric filament lamp the bulb of which is etched or sand-blasted on the inside in order to diffuse the light. Also called a PEARL LAMP.

inside lap (*Eng.*). See **exhaust lap.**

inside lead (*Eng.*). The amount by which the exhaust port of a steam-engine is opened by the slide valve, when the piston is at the bottom dead-centre.

insides (*Paper*). The eighteen quires inside a ream of paper, the top and bottom quires being known as *outsides*; composed entirely of 'good' sheets.

insidious (*Med*.). (Of a disease) coming on gradually.

insistent (*Zool.*). (In Birds) said of the hind toe when it is so placed that only the tip touches the ground.

insolation (*Med.*). Sunstroke. It results from exposure of the head and the neck to the direct rays of the sun, and is characterised by high fever, headache, and mental excitement, followed by unconsciousness.

insolation (*Meteor.*). The radiation received from the sun. This depends on the position of the earth in its orbit, the thickness and transparency of the atmosphere, the inclination of the intercepting surface to the sun's rays, and the *solar constant* (q.v.).

insol'ilith (*Geol.*). A pebble, more or less rounded, with a rough surface produced by cracking under exfoliation due to insolation. (Term applied (1934) by F. Raw to Triassic specimens.)

insoluble (*Chem*.). Incapable of being dissolved. Most insoluble salts have a definite, though very limited, solubility.

inspection chamber (*San. Eng.*). A pit formed at regular points in the length of a drain or sewer, in order to give access for purposes of inspection.

inspection fitting (*Elec. Eng.*). A bend, elbow, or tee used in a conduit wiring system, which is fitted with a removable cover to facilitate the drawing-in of the wires and subsequent inspection.

inspection gauges (*Eng.*). Gauges used by the inspection department of a works for testing the accuracy of finished parts before assembly.

inspection junction (*San. Eng.*). A special length of drain-pipe having a branch socket into which a short vertical pipe, reaching up to ground-level, can be fitted to provide a means of access for inspection.

inspection-lamp (*Illum.*). See **hand-lamp.**

inspection plug (*Elec. Eng.*). A plug fitted in the cover of an accumulator, through which the electrolyte can be inserted and its level observed.

inspersed (*Bot.*). Having granules penetrating the substance of the thallus.

inspiration (*Zool.*). The drawing-in of air or water to the respiratory organs.

inspissation (*Chem.*). The thickening of a liquid by evaporation.—(*Med.*) The thickening of pus as a result of the removal of fluid.

instability (*Aero.*). An aircraft possesses *instability* when any disturbance of its steady motion tends to increase, unless it is overcome by a movement of the controls by the pilot.

See **rolling—**
spiral—
weathercock—

instability (*Mech.*). See under **equilibrium.**

installation (*Elec. Eng.*). The wiring, and its associated apparatus, for the supply of electrical energy throughout a building.

instantaneous carrying-current (*Elec. Eng.*). (Of switches, circuit-breakers, and similar apparatus) the maximum value of current which the apparatus can carry instantaneously.

instantaneous fuse (*Demolitions*). A fuse for transmitting a detonating wave instantaneously from point to point. Cf. *safety fuse.*

instantaneous photography (*Photog.*). Photography using cameras with very short automatic exposures, as contrasted with time-exposures.

instantaneous recording (*Acous.*). A system of recording and reproducing which does not involve appreciable delay in processing.

instantaneous value (*Elec. Eng.*). A term used in connexion with alternating quantities (e.g. current, voltage, or power) to denote the value of the quantity concerned at some particular instant in the cycle.

instantaneous water-heater (*Build.*). A *geyser* (q.v.).

instar (*Zool.*). The form assumed by an Insect during a particular stadium.

instinct (*Psychol.*). An innate force in an organism attaching to certain biological ends, such as self-preservation and reproduction. These are the two most fundamental instincts; others are fear, pugnacity, curiosity, ambition, and acquisitiveness.

instinct (*Zool.*). A complex co-ordination of reflex actions which results in the achievement of adaptive ends without foresight or experience.

instrument (*Elec. Eng.*). A term generally employed to denote an indicating instrument but also used to denote other pieces of small electrical apparatus.

See **change-coil—**
chart-recording—
direct-reading—
edgewise—
electrodynamic—
electrolytic—
electromagnetic—
electrostatic—
Ferraris—
graphic—
gravity-controlled—
illuminated-dial—
indicating—
induction—
inferred zero—
measuring—
moving-coil—
moving-iron—
permanent magnet—
portable—
precision—
projected-scale—
recording—
rectifier—
registering—
sector-pattern—
shielded-pole—
single-pivot—
soft-iron—
suppressed zero—
switchboard—
thermal—
thermo-couple—
transfer—*
unipivot—
vibrating-reed—
hot-wire
integrating
shaded-pole
spring-control.

instrument room (*Teleg.*). The room in which is located, generally on racks, all the apparatus not immediately required by the operators.

instrument-transformer (*Elec. Eng.*). A transformer for use in conjunction with measuring instruments or similar apparatus. See **current-transformer, voltage-transformer.**

insufflation (*Med.*). The action of blowing gas, air, vapour, or powder into a cavity of the body; e.g. into the lungs.

in'sufflator (*Med.*). An instrument used for insufflation.

in'sula (*Zool.*). See **Reil's island.**

in'sulance (*Elec. Eng.*). See **insulation resistance.**

in'sulant (*Elec. Eng.*). See **insulating material.**

insulated (*Build.*). Said of any building or column which stands detached from other buildings.

insulated bolt (*Elec. Eng.*). A bolt having a layer of insulating material around its shank.

insulated clip (*Elec. Eng.*). A clip, incorporating an insulated eye, used for supporting flexible electrical connexions.

insulated eye (*Elec. Eng.*). An eye for supporting flexible electric connexions; it has an insulating bush to prevent these from making contact with the metal.

insulated hanger (*Elec. Eng.*). A hanger for the trolley wire of an electric traction system, which insulates the contact wire from the main supporting system.

insulated hook (*Elec. Eng.*). A hook terminating in an insulated eye through which flexible electric connexions may be passed and supported.

insulated neutral (*Elec. Eng.*). A term used to denote (1) the neutral point of a star-connected generator or transformer when it is not connected to earth directly or through a low impedance; (2) the middle wire of a three-wire distribution system when the wire is an insulated cable.

insulated pliers (*Elec. Eng.*). Pliers having the handles covered with insulating material; used by electricians in order to avoid electric shocks when working on live conductors.

insulated-return system (*Elec. Eng.*). A system of supply for an electric traction system, in which both the outgoing and the return conductors are insulated from earth.

insulated screw-eye (*Elec. Eng.*). A screw terminating in an insulated eye through which flexible electric connexions may be passed and supported.

insulated system (*Elec. Eng.*). A system of electric supply in which each of the conductors is insulated from earth for its normal voltage.

insulated wire (*Elec. Eng.*). A solid conductor insulated throughout its length.

insulating beads (*Elec. Eng.*). Beads of glass or similar material strung over a bare conductor in order to provide an insulating and heat-resisting covering which is also flexible.

insulating compound (*Elec. Eng.*). An insulating material which is liquid at fairly low temperatures so that it can be poured into joint-boxes of cables and other similar pieces of apparatus and then allowed to solidify.

insulating lacquer (*Elec. Eng.*). See **insulating varnish.**

insulating material (*Elec. Eng.*). Material which offers a high resistance to the passage of an electric current; usually of a vitreous or resinous nature. Also called DIELECTRIC, INSULANT, INSULATION, INSULATOR.

insulating oils (*Elec. Eng.*). Special types of oil having good insulating properties; used for oil-immersed transformers, circuit-breakers, etc.

insulating tape (*Elec. Eng.*). Tape impregnated with insulating compounds, frequently adhesive; used for covering joints in wires, etc.

insulating varnish (*Elec. Eng.*). A type of varnish which has high insulating properties. The lighter forms are often called INSULATING LACQUER.

insulating water-bottle (*Ocean.*). An instrument used for the accurate determination of the temperature of the sea at moderate depths. Also called NANSEN-PETTERSSON WATER-BOTTLE.

insulation resistance or **insulance** (*Elec. Eng.*). The resistance between two conductors, or between a conductor and earth, when they are separated only by insulating material. See **fault resistance.**

insulation test (*Elec. Eng.*). A test made to determine the insulation resistance of a piece of apparatus or of a system of electric conductors.

insulation tester (*Elec. Eng.*). An instrument for measuring insulation resistance. See **megger, ohmmeter.**

insulator (*Elec. Eng.*). An appliance used to insulate a conductor from earth, or from another conductor, and frequently also serving to support the conductor.

See **accumulator—**
cap-and-pin-type—
conductor-rail—
fog-type—
fourth-rail—
leading-in—
pin—
shackle—
stand—
strain—
suspension—
swan-neck—
tension—

insulator arcing horn (*Elec. Eng.*). A metal projection placed at the upper and lower ends of a suspension-type or other insulator, in order to deflect an arc away from the insulator surface.

insulator cap (*Elec. Eng.*). A metal cap placed over the top of a suspension insulator, which serves to attach it to the next insulator in the string.

insulator pin (*Elec. Eng.*). The central metal support of a pin-type insulator, or the metal projection on the under side of a suspension-type insulator, serving to attach it to the cap of the next unit in the string.

insulator rating number (*Diel.*). The voltage (in kilovolts) used in the 'thirty-seconds rain test.'

in'sulin (*Med.*). A hormone produced by the islets of Langerhans of the pancreas. It is a protein-like substance, readily destroyed by trypsin and pepsin, but when applied subcutaneously or intravenously it induces immediately combustion of the sugar content of the blood. It is obtainable in a crystalline form, and the following tentative empirical formula has been assigned to it: $C_{90}H_{138}O_{28}N_{22}S_2+6H_2O$.

intaglio, in-tal'yō (*Print.*). A printing process in which the ink-carrying areas of the printing surface are hollows below the surface. The thickness of the layer of ink transferred to the paper varies according to the depth of the hollow, giving very rich effects.

intake (*Build.*). A Scottish term for an *offset.*

intake (*Mining*). The road through which the fresh air is conducted to the working places in a mine.

intake belt course (*Masonry*). A projecting course of stones or bricks, serving as an intake at a place where the thickness of a wall is diminished.

integral calculus (*Maths.*). The inverse of the *differential calculus* (q.v.), its chief concern being to find the value of a function of a variable when its differential coefficient is known. This process, termed *integration*, is used in the solution of such problems as finding the area enclosed by a given curve, the length of a curve, or the volume enclosed by a given surface.

integral, Fourier (*Elec. Comm.*). See **Fourier integral.**

integrating meter (*Elec. Eng.*). An electrical instrument which sums up the value of the quantity measured with respect to time.

See **integrating frequency meter**
energy meter
volt-ampere-hour meter
reactive volt-ampere-hour meter.

integrating frequency meter (*Elec. Eng.*). A meter which sums the total number of cycles of an a.c. supply in a given time. Also called a MASTER FREQUENCY METER.

integrating photometer (*Illum.*). A piece of apparatus which, together with a photometer, enables the total luminous flux emitted from a source of light to be obtained from a single reading of the photometer.

integration (*Maths.*). See **integral calculus.**

integripal'lial, integripal'liate (*Zool.*). (Of Mollusca) having a smooth mantle line, i.e. with siphons small or absent.

integ'ument (*Bot.*). (1) One or more cell layers covering the ovule, leaving only a small pore, the *micropyle.*—(2) The seed-coat or testa.—*adj.* **integumented.**

integument (*Zool.*). A covering layer of tissue: especially, the skin.

intelligence quotient (*Psychol.*). The ratio, expressed as a percentage, of an individual's mental age to his actual age; the mental age being the age for which he scores 100% when tested in a specified manner, e.g. by the Binet tests. Abbrev. **I.Q.**

intelligibility (*Teleph.*). Intelligibility, intelligibility of words, and intelligibility of phrases, is the percentage of words correctly received in a continuous conversation, or of isolated words and isolated sentences, respectively, when these are called regularly over a telephone circuit.

intensification (*Photog.*). The increase of contrast in a negative or print, obtained by further deposit (e.g. of mercury) on the exposed parts.

intensity modulation (*Television*). Modulation of the luminosity of the fluorescent screen of a cathode ray tube by variation of the current carried in the beam. Cf. *velocity modulation.*

intensity of field (*Elec. Eng.*). The vector quantity by which an electric or magnetic field at a point is measured. Precisely, it is the same number of units of intensity as the force in dynes on a unit charge (unit electric charge or unit fictitious pole) placed at the point in the electric or magnetic field respectively.

intensity of magnetisation (*Elec. Eng.*). This is defined as the magnetic moment per cubic centimetre, and is proportional to the amount of additional magnetisation present in a magnetic circuit due to the presence in that circuit of material having a permeability greater than unity.

intensity of pressure (*Hyd.*). The pressure exerted by a fluid upon a unit area.

intensity of sound (*Acous.*). The magnitude of a sound-wave, measured by the transmitted power, in ergs per second, through a square centimetre which is normal to the direction of propagation.

intensive reflector (*Illum.*). A reflector for incandescent lamps, of such a shape as to produce an intense illumination at the point where it is required.

intention tremor (*Med.*). Tremor of the arms on carrying out a voluntary movement, indicative of disease of the nervous system.

inter- (Latin *inter*, between). A prefix used in the construction of compound terms; e.g. *intermandibular*, between the rami of the mandibles.

interaction factor (*Elec. Comm.*). That fraction of the insertion loss between a source and a load, when a network is interposed, which is not due to reflection at the ends of the network or to attenuation within it.

interaction loss (*Elec. Comm.*). The decibel loss in power level due to the *interaction factor* (q.v.).

interam'bula'crum (*Zool.*). In *Echinodermata*, especially *Echinoidea*, the region intervening between two ambulacral areas.—*adj.* **interambulacral.**

interbreeding (*Gen.*). Experimental hybridisation of different species or varieties of animals or plants.

intercalar'e (*Zool.*). A cartilage or ossification lying between the basiventrals, or between the basidorsals of the vertebral column: intercentrum.

intercala'rium (*Zool.*). In *Ostariophysi*, one of the Weberian ossicles.

interca'lary (*Bot.*). Lying between other bodies in a row, or placed somewhere along the length of a stem, filament, or hypha.

intercalary cell (*Bot.*). A small cell between two aecidiospores, which disintegrates as the spores ripen, and breaks down as they are set free.

intercalary meristem (*Bot.*). A meristem located somewhere along the length of a plant member, and by its activity giving *intercalary growth.*

intercalate' (*Zool.*). To add, to insert; as an *intercalated somite.*—*adj.* **interca'lary.**

intercel'lular (*Zool.*). Between cells, as the *intercellular* matrix of connective tissue.

intercellular mycelium (*Bot.*). The mycelium of a parasitic fungus which inhabits the intercellular spaces of the host plant.

intercellular space (*Bot.*). A space, usually containing air, between cells in a tissue. It may be formed by the partial separation of the cells, by the extensive separation of cells, or by the breakdown of cells.

intercen'trum (*Zool.*). In those types of vertebral column which possess two rings to each myotomic somite, the ring without arches. Also termed HYPAPOPHYSIS.

interceptor or **intercepting trap** (*San. Eng.*). A trap fitted in the length of a house drain, close to its connexion to the sewer, which provides a water seal against foul gases rising up into the drain. Also called a DISCONNECTOR.

interchange (*Cyt.*). The mutual transfer of portions between two chromosomes.

interchon'dral (*Zool.*). Said of certain ligaments and articulations between the costal cartilages.

interclav'icle (*Zool.*). In Vertebrates, a bone lying between the clavicles, forming part of the pectoral girdle.

intercolumniation (*Build.*). The distance between the columns in a colonnade, in terms of the lower diameter of the columns as a unit.

interconnected star connexion (*Elec. Eng.*). See **zigzag connexion.**

interconnecting (*Auto. Teleph.*). The commoning of outlets for the bank multiples of selectors on different shelves, when there is an insufficiency of outlets for full availability. See **grading.**

interconnector or **interconnecting feeder** (*Elec. Eng.*). A feeder which serves to interconnect two substations or generating stations, and along which energy may flow in either direction.

intercooler (*Eng.*). A cooler, generally consisting of water-cooled tubes, interposed between successive cylinders or stages of a multi-stage compresser or blower, to reduce the work of compression.

intercos'tal (*Zool.*). Between the ribs.

intercrystalline failure (*Met.*). This refers to metal fractures that follow the crystal boundaries instead of passing through the crystals, as in the usual transcrystalline fracture. It is frequently due to combined effect of stress and chemical action, but may be produced by stress alone when the conditions permit a certain amount of recrystallisation during the test.

interdeferen'tial (*Zool.*). Between the vasa deferentia.

interden'til (*Build.*). The space between successive *dentils* (q.v.).

interdigital cysts, —dij'it-al (*Vet.*). A vesicular eruption in the interdigital space of one or more feet of dogs; the cause is unknown.

interdor'sal (*Zool.*). An intercalary element lying between adjacent basidorsals of the vertebral column.

inter-electrode ' capacity (*Thermionics*). The capacity of the condenser system formed by any two of the electrodes of a thermionic tube. That of the anode-grid system is usually the most important.

interface (*Chem.*). The surface of separation of two phases.

interfacial surface tension (*Phys.*). The *surface tension* (q.v.) at the surface separating two non-miscible liquids.

interfascic'ular cambium (*Bot.*). A strand of cambium between two adjacent vascular bundles. The formation of interfascicular cambium is the first stage in the normal secondary thickening of a stem.

interference (*Aero.*). The aerodynamic influence of one body upon another. Usually, the head resistance, or drag, of two bodies placed close together will be greater than the total of their separate drags, because of interference.

interference (*Elec. Comm.*). The introduction of electromotive forces, and consequent currents in communication circuits, by electrostatic or electromagnetic induction from external currents (generally in power-lines or traction systems, or from disturbances on these).—(*Radio*) Any signal—whether naturally generated, such as atmospherics, or generated by radio transmitters or electrical machinery—other than that to which it is intended that a radio receiver should respond.

interference (*Phys.*). The effect of superposing two or more trains of waves of equal wavelength. The resultant amplitude is the algebraic sum of the amplitudes in the interfering trains. When two sets of circular waves interfere, a system of hyperbolic stationary nodes and antinodes is formed, which in optics are known as *interference fringes* (q.v.).

interference colours (*Light*). See **colours of thin films.**

interference factor (*Teleph.*). See **telephone interference factor.**

interference figure (*Min.*). The more or less symmetrical pattern of concentric rings or lemniscates, cut by a black cross or hyperbolae, exhibited by a section of anisotropic mineral when viewed in convergent light between crossed nicols. See also **uniaxial** and **biaxial crystal.** Sometimes called the DIRECTIONS IMAGE.

interference fringes (*Light*). Alternate light and dark bands which are seen when two beams of homogeneous light having a constant phase relation overlap and illuminate the same portion of a screen. For methods of producing and utilising optical interference fringes, see **Fresnel's bi-prism, Lloyd's mirror, Fabry and Pérot interferometer, Newton's rings.** See also **interference** (*Phys.*).

interfering (*Vet.*). An injury inflicted by a horse's foot on the opposite leg during progression.

interferom'eter (*Light*). An instrument used for comparing optical wavelength with a standard of length, by means of interference fringes. See **Fabry and Pérot interferometer, Michelson interferometer.** The name may also be applied to any measuring instrument which employs interference fringes. See **stellar interferometer.**

interfil'amen'tar (*Zool.*). Between the filaments; as the junctions between the filaments of the gills in *Pelecypoda.*

in'terfluve (*Geol.*). A ridge separating two parallel valleys.

interfron'tal (*Zool.*). In some *Amphibia,* a bone lying between the frontal and the nasals.

interglacial period (*Geol.*). A period of milder climate ensuing between two glacial periods.

intergranular corrosion (*Met.*). Corrosion in a polycrystalline mass of metal, taking place preferentially at the boundaries between the crystal grains. This leads to disintegration of the metallic mass before the majority of the metal has been attacked by the corrosive agent.

intergranular texture (*Geol.*). A texture characteristic of holocrystalline basalts and doleritic rocks, due to the aggregation of augite grains between feldspar laths arranged in a network.

inter'gular (*Zool.*). In *Chelonia,* an unpaired shield anterior to the gulars.

interhyal, —hi'al (*Zool.*). In some Fish, a small cranial bone lying between the hyomandibular and the rest of the hyoid.

interkine'sis (*Cyt.*). See **intermitosis.**

interlaced fencing (*Build.*). See **interwoven fencing.**

interlaced scanning (*Television*). A form of line scanning; the image is alternately scanned in two sets of lines in successive frames, the lines of one frame falling midway between those of the next.

interlamel'lar (*Zool.*). Between the lamellae; as the junctions between the lamellae of the gills, in certain *Pelecypoda.*

in'terlay (*Typog.*). Paper inserted between a printing plate and its mount in order to raise the plate to type height.

interlo'bar (*Med.*). Situated or happening between two lobes, especially between two lobes of the lung.

in'terlock (*Elec. Eng.*). An electrical or mechanical device used in connexion with electrical control gear to make the operation of one piece of the equipment dependent on that of another.

interlock (*Textiles*). A double-faced knitted fabric of smooth texture, generally made from single cotton yarn of fine counts.

interlock system (*Cinema*). The arrangement for the synchronous drive of cameras and sound recorders in the Western Electric system; in it all such drives are switched on to a special main from a three-phase generator, which is started by a motor and brings all the motors on the line up to speed in synchronism.

intermat (*Textiles*). A term applied to fibres which are liable to become matted easily; e.g. wool.

intermaxil'la (*Zool.*). See **premaxillary.**

intermaxil'lary (*Zool.*). Pertaining to the premaxilla: between the maxillaries.

intermediate (*Chem.*). A general term for any chemical compound which is manufactured from a substance (see **primary**) obtained from natural raw materials, and which serves as a starting material for the synthesis of some other product; e.g a number of substituted benzene-sulphonic acids are intermediates for dyestuffs.

intermediate circuit (*Radio*). A closed tuned circuit used for coupling an antenna to a transmitter or receiver.

intermediate constituent (*Met.*). A constituent of alloys that is formed when atoms of two metals combine in certain proportions to form crystals with a different structure from that of either of the metals. The proportions of the two kinds of atoms may be indicated by formulae, e.g. CuZn; hence these constituents are also known as *intermetallic compounds.*

intermediate distribution frame (*Teleph.*). A frame inserted between the main distribution frame and the exchange proper to combine additional circuits with the pairs, before they appear on the switchboard in front of the operators. Abbrev. **I.D.F.**

intermediate frequency (*Radio*). The frequency of the carrier wave of the output from the frequency changer of a supersonic heterodyne receiver. It is equal to the difference between (or in some cases the sum of) the frequencies of the incoming signal and that of the locally generated oscillation.

intermediate frequency amplifier (*Radio*). The amplifier in a supersonic heterodyne receiver which immediately follows the frequency changer. It amplifies the signal after its carrier frequency has been changed to the intermediate frequency, prior to its entry into the second detector.

intermediate frequency oscillator (*Radio*). An oscillator generating an oscillation with a frequency substantially the same as the intermediate frequency of a supersonic heterodyne receiver, such as is used for heterodyning continuous-wave telegraph signals in such a receiver.

intermediate frequency transformer (*Radio*). A transformer specially designed to operate at intermediate frequencies, such as is used as an interstage coupling in an intermediate frequency amplifier.

intermediate host (*Zool.*). In the life-history of a parasite, a secondary host—one which is occupied by the young forms, or by a resting stage between the adult stages in the primary host.

intermediate igneous rocks (*Geol.*). Igneous rocks containing from 55% to 66% silica, and essentially intermediate in composition between the acid (granitic) and basic (gabbroic or basaltic) rocks. See **syenite, syenodiorite, diorite.**

intermediate oxides (*Chem.*). Also called AMPHOTERIC OXIDES. See **amphoteric.**

intermediate rafter (*Build.*, *Civ. Eng.*). See **common rafter.**

intermediate sight (*Surv.*). Any levelling staff reading other than the first or last, at any given set-up of the levelling instrument, i.e. other than the back or fore sight respectively. See also **back sight** and **fore sight.**

intermediate switch (*Elec. Eng.*). A switch for controlling a circuit where more than two positions of control are required; it is connected between the two-way switches which must also be used in such a scheme.

intermediate waves (*Radio*). Electromagnetic waves whose wavelength lies in the range from 50 to 200 metres, between the short and medium wave-bands.

intermediate (or **idle**) **wheel** (*Horol.*). A wheel used to connect two other toothed wheels when their distance apart is such that without the use of an intermediate wheel their diameters would be too large. It has the effect of altering the relative direction of rotation of the followers.

intermedium (*Zool.*). A small bone of the proximal row of the basipodium, lying between the tibiale and fibulare, or between the radiale and ulnare.

intermen'strual (*Med.*). Occurring between two menstrual periods.

intermetallic compounds (*Met.*). See **intermediate constituents.**

intermission (*Med.*). Temporary cessation, as of fever or of the normal pulse.

intermito'sis (*Cyt.*). The period between two mitotic divisions of a cell.

intermittent claudication (*Med.*). Intermittent lameness. See **dysbasia angiosclerotica.**

intermittent earth (*Elec. Eng.*). An accidental earth connexion which is present intermittently and is therefore often difficult to locate.

intermittent fever (*Med.*). See **malaria.**

intermittent filtration (*Sewage*). The *land treatment* (q.v.) process of sewage purification, in which the land is drained artificially by ordinary earthenware pipes. Cf. *broad irrigation.*

intermittent loading, intermittently loaded cable (or **circuit**) (*Elec. Comm.*). A cable, generally for submarine telephony, in which the conductors are loaded continuously for sections of their length only. By staggering the intermittent loading on a number of conductors in a multi-cored cable, economy in weight and cost is effected.

intermittent printing (*Cinema.*). Printing by means of a step-by-step cinematograph printer, which prints a frame at a time.

intermittent rating (*Elec. Eng.*). A type of rating applied to electrical equipment to denote the maximum load with which the equipment can deal without exceeding certain specified temperature rise or other limits when operating intermittently. See **one-hour rating, half-hour rating.**

intermodil'lion (*Build.*). The space between successive *modillions* (q.v.).

intermodulation distortion (*Elec. Comm.*). Amplitude distortion in which the intermodulation products are of greater importance than the harmonic products, as in an audio-frequency amplifier for high-quality speech or music.

intermy'oto'mic (*Zool.*). Said of vertebrae which arise by the fusion of the cranial elements of one somite with the caudal elements of the somite next in front. Cf. *intrasegmental.*

intern, interne (*Med.*). An assistant physician or surgeon resident in a hospital.

internal capacity (*Thermionics*). The same as inter-electrode capacity, but especially applied to the anode-cathode capacity.

internal characteristic (*Elec. Eng.*). A curve showing the relation between the load on an electric generator and the internal e.m.f.

internal-combustion engine (*Eng.*). An engine in which heat is added to the working agent (air) by the combustion of a gaseous, liquid, or pulverised solid fuel within the cylinder, and converted into mechanical work through a piston. See **compression-ignition engine, Diesel engine, petrol engine, gas engine.**

internal compensation (*Chem.*). Neutralisation of optical activity within the molecule by the combination of two enantiomorphous groups.

internal conductor (*Elec. Eng.*). The inner conductor of a concentric cable. Also called INNER CONDUCTOR.

internal e.m.f. (*Elec. Eng.*). A term used to denote the e.m.f. generated in an electric machine; the voltage appearing at the terminals is the internal e.m.f. minus any voltage drop which takes place due to the current in the machine.

internal-expanding brake (*Eng.*). A wheel brake consisting of a drum against the inner surface of which two or more fabric-faced shoes may be forced or expanded by a cam or other device.

internal factor (*Bot.*). Any factor which depends on the genetic constitution of the plant and which influences its growth and development

internal flue (*Eng.*). A furnace tube, or fire tube, running through the water space of a boiler.

internal focusing telescope (*Surv.*). A modern form of surveying telescope in which focusing is effected by the movement of an internal concave lens fitted between the object glass and the eye-piece, both of which are fixed in position.

internal gear (*Eng.*). A spur gear in which teeth formed on the inner circumference of an annular wheel mesh with the external teeth of a smaller pinion. Both wheels revolve in the same direction.

internal grinding (*Eng.*). The grinding of internal cylindrical surfaces by an abrasive wheel, which is either traversed along the revolving work or (in addition) given a planetary motion, the work being fixed.

internal hazard (*Build.*). A fire risk in connexion with a building, arising from the building itself or its contents.

internal impedance (*Thermionics*). The impedance to alternating currents presented by the anode and cathode terminals of a thermionic tube under normal operating conditions. It is made up of the differential anode resistance in parallel with the inter-electrode capacities.

internal indicator (*Chem.*). An indicator which is dissolved in the solution in which the main reaction takes place.

internal phloem (*Bot.*). Phloem lying between the xylem and the centre of the stem.

internal screw-thread (*Eng.*). A screw-thread cut on the inside of a cylindrical surface, as distinct from an *external screw-thread.* Also called a FEMALE THREAD.

internal secretion (*Zool.*). A secretion which is poured into the blood-vessels, or into the canal of the spinal cord; a hormone. Cf. *external secretion.*

internal stress (*Met.*). Residual stress existing between different parts of metal products, as a result of the differential effects of heating, cooling or working operations, or of constitutional changes in the solid metal.

internally fired boiler (*Eng.*). A boiler whose fire box or furnace is inside the boiler and surrounded by water, as in the Lancashire, marine, and locomotive types.

international ampere (*Elec. Eng.*). The current which, when passed through a solution of silver nitrate in water, will deposit silver at the rate of 0·001118000 gramme per second. The unit of current in common use.

international Ångström (*Phys.*). A unit which, although very nearly equal to the Ångström unit (10^{-8} cm.), is defined in a different way. It is such that the red cadmium line at 15° C. and 760 mm. pressure would have a wavelength of 6438 4696 I.A. This definition is not affected by future corrections of the wavelength of this line in Ångström units. Abbrev. **I.A.**

international candle or simply **candle** (*Illum.*). A unit of luminous intensity arrived at by common agreement between the National Physical Laboratory of Great Britain, the Laboratoire Central de l'Électricité of France, and the Bureau of Standards of the United States of America. It is equal to 0·98 of the old English *standard candle*, and was originally defined as the luminous intensity of a candle of specified weight burning at a specified rate; it was, however, replaced by standard lamps such as the Hefner amyl acetate lamp, the Vernon-Harcourt pentane lamp, and the Carcel lamp. Specially constructed electric lamps are now used as photometric standards, but the unit is still the *international candle*.

international circuit (*Teleph.*). A circuit connecting two trunk centres in different countries; used for international telephone connexions.

international ohm (*Elec. Eng.*). The unit of resistance in common use. It is the resistance offered, at the temperature of melting ice, to an unvarying electric current by a column of mercury 14·4521 grammes in mass, of uniform cross-sectional area, and 106·300 centimetres in length. See **B.A. ohm, legal ohm.**

international screw-thread (*Eng*) A metric system in which the pitch of the thread is related to the diameter, the thread having a rounded root and flat crest.

international units (*Elec. Eng*). A system of units based upon the internationally accepted values for the international ampere and the international ohm.

international volt (*Elec. Eng.*). The unit of potential difference in common use. It is the potential difference which, when applied to a conductor having a resistance of one international ohm, produces a current of one international ampere.

interne. See **intern.**

interneu'rals (*Zool.*). See **interspinals.**

in'ternode (*Bot.*). The length of a stem between two successive nodes.—(*Zool.*) The part of a nerve between two adjacent nodes of Ranvier.

interocep'tor (*Zool.*). A sensory nerve-ending, specialised for the reception of impressions from within the body. Cf. *exteroceptor*.

interoper'culum (*Zool.*). In Fish, a ventral membrane bone supporting the operculum.

interpari'etal (*Zool.*). A median dorsal membrane bone of the Vertebrate skull, situated between the parietals and the supraoccipital.

interpenetration twins (*Min.*). Two or more crystals united in a regular fashion, according to a fixed plan (the *twin law*), the individual crystals appearing to have grown through one another. Cf. *juxtaposition twins*.

interphase (*Chem.*). See **interface.**

interphase (*Cyt.*). See **intermitosis.**

interplane struts (*Aero.*). In a multiplane structure, those struts, either vertical or inclined, connecting the spars of any pair of planes, one above the other.

interplantation (*Zool.*). In experimental zoology, the culture of a part or organ in a cavity of the body of an older animal; cf. *explantation*.—*n.* **interplant.**

interpolation of contours (*Surv.*). The process of drawing contours by inferring their location from spot levels or from other contour lines, assuming the intervening ground to have uniform slope.

interpole (*Elec. Eng.*). See **compole.**

interpole motor (*Elec. Eng.*). An electric motor fitted with compoles (interpoles).

inter-radium (*Zool.*). In a radially symmetrical animal, the area between two adjacent radii.

inter-radius (*Zool.*). In a radially symmetrical animal, a radius which bisects the angle between two adjacent per-radii.

inter-renal body (*Zool.*). In selachian Fish, a ductless gland which lies between the kidneys and corresponds to the cortex of the suprarenal gland of higher Vertebrates.

interrupted (*Bot.*). Said of organs which are not evenly spaced out along an axis.

interrupted continuous waves (*Radio*). Electromagnetic waves radiated from an antenna driven from a valve oscillator the output from which is interrupted periodically at an audible frequency, so that the received signal is directly audible in the telephones after rectification, without heterodyning. Abbrev. **I.C.W.** Also called CHOPPED CONTINUOUS WAVES, TONIC TRAIN.

interrupted ringing (*Teleph.*). The signal to attract the attention of a subscriber to a call that is awaiting him; it is made more effective by the interruptions.

interruptedly pinnate (*Bot.*). Said of a pinnate leaf when pairs of small leaflets alternate with pairs of larger leaflets.

interrupter gear (*Aero.*). Any mechanism which is arranged to prevent the firing of a gun mounted on an aircraft when any part of the airscrew is in the line of fire. See **synchronising gear.**

interscap'ular (*Anat.*). Between the two shoulder blades

intersection (*Surv.*). A method of plane table surveying in which the plane table is set up consecutively at each end of a measured base line; rays are drawn on paper at each set-up to show the direction of the point that it is required to fix on the plan, the intersection of these rays giving the position of the point. Also called TRIANGULATION.

intersection angle (*Surv.*). The angle of deflection, as measured at the intersection point between the straights of a railway or highway curve.

intersection point (*Surv.*). The point in which the straights of a railway or highway curve would meet if produced.

intersection theory (*Textiles*). A theory used to determine the number of threads per inch in a woven fabric of compact structure, the number being determined from the diameter of the yarn and the number of interlacings of the threads.

intersegmenta'lia (*Zool.*). In Insects, small detached sclerites occurring between adjacent segments.

interser'tal texture (*Geol.*). The texture characterised by the occurrence of interstitial glass between divergent laths of feldspar in basaltic rocks.

intersex (*Bot., Zool.*). An individual which exhibits characters intermediate between those of the male and those of the female of the same species.

intersheath (*Cables*). Cylindrical electrodes in the interior of a cable dielectric, used for the purpose of keeping the variation of stress a minimum. The intersheaths must be kept at certain potentials to achieve this purpose. See **stress.**

interspecif'ic (*Cyt.*). Said of a cross between two separate species.

interspersed (*Bot.*). Said of marginal ray cells which are scattered among other cells.

interspi′nals (*Zool.*). In Fish the basal element or elements of a pterygophore.

inter-station interference (*Radio*). Interference which arises from the presence of another transmitter on the same (or on an adjacent) wavelength as that to which a receiver is tuned, as distinguished from atmospheric interference.

interstitial, —stish′al (*Zool.*). Occurring in the interstices between other structures; as the *interstitial* cells of *Coelenterata*, which are small rounded embryonic cells occurring in the interstices between the columnar cells forming the ectoderm and endoderm.

intertentac′ular (*Zool.*). Between the tentacles; as the *intertentacular* organ of *Polyzoa*, consisting of a ciliated tube which lies between, and at the base of, the tentacles leading from the coelom to the exterior, and serves for the escape of the genital products.

inter-tie (*Carp.*). In a trussed partition or in half-timbered work, a horizontal timber framed between posts and located between floor levels.

intertrabec′ula (*Zool.*). In some Birds, a cartilaginous plate lying between the anterior ends of the trabeculae during the development of the skull.

intertrack bond (*Elec. Eng.*). A conductor for connecting electrically the rails of separate tracks on electric railways or tramways in order to reduce the total resistance of the return path.

intertrochanter′ic (*Anat.*). Situated between the two trochanters of the upper part of the femur.

Intertype (*Typog.*). A patented type-setting machine equipped with various main magazines and side magazines. A *mixer* enables matrices from several magazines to be mixed together in a line, so that almost any kind of composition, including display work, can be produced directly from the keyboard. The units of equipment are standardised and interchangeable.

interval (*Acous.*). The musical distance apart of two notes on a musical scale, precisely measured by the logarithm of their frequencies. They are described by the number of notes on a stated scale which they span; they may be major, minor, perfect, augmented, or diminished.

intervalve coupling (*Radio*). The arrangement of circuit elements whereby changes of anode current in one valve are caused to produce changes of grid potential of another.

intervalve transformer (*Elec. Comm.*). A transformer which is designed to operate between the anode circuit of a valve and the grid of another valve with a specified response.

intervalve transformer coupling (*Elec. Comm.*). The use of an iron-cored transformer, the primary in the anode circuit of one valve and the secondary connected to the grid of the next valve, for coupling thermionic valves in an amplifier.

inter-vari′etal (*Gen.*). Said of a cross between two varieties of the same species.

interven′tral (*Zool.*). An intercalary element lying between adjacent basiventrals of the vertebral column.

interwoven fencing (*Build.*). Solid wood fencing built up of very thin boards interlaced. Also called INTERLACED FENCING or WOVENBOARD.

interxylary phloem, —zi′la-ri (*Bot.*). A strand of secondary phloem surrounded by secondary xylem.

intestine (*Zool.*). In Vertebrates, that part of the alimentary canal leading from the stomach to the anus: in Invertebrates, that part of the alimentary canal which corresponds to the Vertebrate intestine, or was thought by the early investigators so to correspond.—*adj.* **intestinal.**

in′tima (*Zool.*). The innermost layer of an organ or part; e.g. the innermost layer of the wall of a blood-vessel.

in′tine (*Bot.*). (1) The inner layer of the wall of a pollen grain.—(2) The endospore in spores of *Bryophyta*.

intra- (Latin *intra*, within). A prefix used in the construction of compound terms; e.g. *intranuclear*, within the nucleus.

intra-annular tautomerism (*Chem.*). The redistribution of bonds in a ring of carbon or other atoms, as in the benzene nucleus.

intracap′sular (*Anat.*). Situated within a capsule, especially within the ligamentous joint capsule enveloping the head and neck of the femur.

intracav′itary (*Med.*). Applied within cavities of the body, said, e.g., of radium applied in the cavity of the uterus.

intracel′lular (*Biol.*). Within the cell.

intracer′ebral (*Anat.*). Situated in the substance of the brain.

intracervi′cal (*Anat.*). Situated in, or applied to, the canal of the cervix uteri (the lowest part or neck of the uterus).

intracra′nial (*Anat.*). Situated within the skull.

intrader′mal (*Anat.*). Situated in, or introduced into, the skin.

intra′dos (*Build., Civ. Eng.*). The inferior surface of an arch. See **soffit.**

intrafu′sal (*Zool.*). Situated within the spindle; as the fibres in a neurotendinous junction, or the fasciculi in a neuromuscular spindle.

intrahepat′ic (*Anat.*). Situated or occurring in the substance of the liver.

intralamel′lar tissue (*Bot.*). See **trama.**

intramam′mary (*Anat.*). Situated or occurring in the breast.

intramat′rical (*Bot.*). Said of a parasitic fungus which lives inside the host cell, or in the matrix.

intramedul′lary (*Anat.*). In the substance of the medulla oblongata (the brain stem): situated or occurring in the substance of the spinal cord.

intramercu′rial planet (*Astron.*). A hypothetical planet, to which the name Vulcan was given, believed by some to exist between the Sun and Mercury. Its existence was postulated to explain certain motions of Mercury's perihelion, which have since been accounted for by Einstein's theory of gravitation.

intramolec′ular respiration (*Bot.*). See **anaerobic respiration.**

intra-oc′ular (*Anat.*). Situated within the eyeball.

intraperitone′al (*Anat.*). Situated in, or introduced into, the peritoneal cavity.

intrapleu′ral (*Zool.*). Within the thoracic cavity.

intrasegmen′tal (*Zool.*). Said of vertebrae which arise by the fusion of the cranial and caudal elements of the same somite. Cf. *intermyotomic*.

intratar′sal (*Zool.*). Within the tarsus: in Reptiles, a joint of the tarsus.

intrathe′cal (*Anat.*). Within the sheath of membranes investing the spinal cord.

intrathy′roid (*Zool.*). Within the thyroid: a cartilage lying between and joining the laminae of the thyroid cartilage, during the early stages of development.

intratrache′al (*Anat.*). Within, or introduced into, the trachea.

intratu′bal (*Anat.*). Situated within a Fallopian tube.

intra-u′terine (*Anat.*). Situated within, or developing within, the uterus.

intrave′nous (*Anat.*). Within, or introduced into, a vein.

intrave′sical (*Zool.*). Within the bladder.

intra-vi′tam staining (*Biol.*). The artificial staining of living cells.

intravitel′line (*Zool.*). Within the yolk of an ovum.

intraxylary phloem, —zi′lar-i (*Bot.*). See **internal phloem.**

intricate (*Bot.*). Intertwined, entangled.

intrinsic (*Zool.*). Said of appendicular muscles of

Vertebrates which lie within the limb itself, and originate either from the girdle or from the limb-bones. Cf. *extrinsic*.

intrinsic brilliancy, —brilliance, —brightness (*Light*). The quotient obtained by dividing the luminous intensity (luminosity) of a surface from a given direction by the area of the surface normal to that direction. Expressed in candle-power or lumens per sq. in., sq. cm., or sq. ft.

intrinsic energy (*Chem.*). The store of energy possessed by a material system. It is not usually possible to determine its absolute magnitude, but changes in its value can be measured. Changes in the intrinsic energy of a system depend only upon the initial and final conditions, and are therefore independent of the paths of change.

introfaction (*Chem.*). The change in the fluidity and wetting properties of an impregnating material produced by an introfier, which tends to convert a colloidal solution into a molecular solution.

intro'itus (*Anat.*). The entry to any cavity; usually said of the vagina.

introjection (*Psycho-an.*). A mental swallowing. The function of the mind whereby it incorporates objects with their accompanying characteristics from the outside world and adopts them as its own; specially well marked at the oral phase of development; also an important factor in the development of the *superego* (q.v.), when the child introjects the moral standards of its parents.

intromission (*Med.*). The insertion of one part into another, especially of the penis into the vagina.

intromit'tent (*Zool.*). Adapted for insertion, as the copulatory organs of some male animals.

introrse' (*Bot.*). Said of an anther which opens towards the centre of the flower.

introrse (*Zool.*). Directed or bent inwards.

introspection (*Psychol.*). The habit, which may become pathological, of 'looking within' one's self, i.e. of preoccupying one's self with one's own feelings, thoughts, experiences, etc.

introversion (*Med.*). The turning inside-out of an organ.

in'trovert (*Psychol.*). An individual interested mainly in his own mental processes and attitudes and in the way in which he is regarded by others; given to introspection and phantasy; shy and retiring in manner. Introverts are generally deep thinkers, philosophers, and mystics; cf. *extravert*.—*n.* **introversion.**

introvert (*Zool.*). A structure or part of the body which may be involuted; as the proboscis of a nemertinean worm.

intrusions (*Geol.*). Bodies of igneous rocks of varying size and structure which, in the condition of magma, were intruded into the pre-existing rocks of the earth's crust. Such rocks are referred to as *intrusive rocks*. Cf. *extrusive rocks*.

intubation (*Med.*). The introduction of a tube, especially through the larynx into the trachea, to facilitate the passage of air into the lungs.

intumes'cence (*Bot.*). A localised pathological swelling consisting chiefly of parenchyma.

intumescence (*Chem.*). The swelling of crystals on heating, often with the violent escape of moisture.

intumescence (*Med.*). The process of swelling: the swelling itself.

in'tussuscep'tion (*Bot.*). Growth of the cell wall by the interpolation of sub-microscopic particles between those already present in the wall.

intussusception (*Med.*). The pushing down, or invagination, of one part of the intestine into the part below it.

intussuscep'tum (*Med.*). The part of the intestine which has been invaginated into the part below it. See **intussusception.**

intussuscip'iens (*Med.*). The part of the intestine receiving the intussusceptum.

in'ulin (*Chem.*). A polysaccharose obtained from the tubers of the dahlia and the roots of chicory (*Chicorium intybus*); it is hydrolysed by water into *d*-fructose.

in'ulinase (*Chem.*). An enzyme hydrolysing inulin.

invader (*Bot.*). A plant occurring in a community to which it does not belong.

invagination (*Zool.*). Insertion into a sheath: the development of a hollow ingrowth: the pushing-in of one side of the blastula in embolic gastrulation; cf. *evagination*.—*adj.* **invaginate.**

Invar (*Met.*). Iron-nickel alloy. Based on composition 36% nickel 64% iron, but contains other elements. Coefficient of thermal expansion is very small. Used for measuring-tapes, tuning-forks, pendulums, and in instruments.

invariable plane (*Astron.*). A certain plane, containing the centre of the sun, which remains absolutely unchanged by any mutual action between the planets in the solar system; defined by the condition that, if the radius vector to each planet be projected on to this plane and its areal constant multiplied into each planet's mass, then the sum of all the products shall be a maximum.

invariant (*Chem.*). Possessing no *degrees of freedom* (1).

invasion (*Bot.*). The movement of plants from one area to another, and their establishment in the latter.

inverse (*Bot.*). Said of the condition of an embryo in which the radicle is turned towards a point in the seed at the opposite end to the hilum.

inverse networks (*Elec. Comm.*). Networks the product of whose impedances is resistive at all frequencies.

inverse power factor (*Elec. Eng.*). A term sometimes used to denote $\sec \phi$ ($=1/\cos \phi$).

inverse segregation (*Met.*). A type of segregation in which the content of impurities, inclusions, and alloying elements in metals tends to decrease from the surface to the centre. See also **segregation, normal segregation.**

inverse-speed motor (*Elec. Eng.*). See **series-characteristic motor.**

inverse time-lag (*Elec. Eng.*). A time-lag which is approximately proportional to the inverse of the current causing its operation. Also called INVERSE TIME-ELEMENT, INVERSE TIME-LIMIT.

inversion. (1) (*Cyt.*) The reversal in position of a portion of a chromosome.—(2) (*Bot.*) The turning inside-out during development of a colony in some algae that form coenobia.

inversion (*Chem.*). The formation of a laevo-rotatory solution of fructose and glucose by the hydrolysis of a dextrorotatory solution of sucrose (cane-sugar).

inversion (*Meteor.*). Inversion of the usual temperature gradient in the atmosphere, the temperature increasing with height. Inversions are of frequent occurrence near the ground on clear nights and in anticyclones, often causing dense smoke fogs over cities.

inversion (*Radio, Teleph.*). The inversion of the order of speech-frequencies by effectively replacing each frequency by its difference from 3000 cycles per second before transmission, restoration being effected at the receiving end. Used, with or without carrier wobble, as a secrecy system on short-wave radio-telephony, since the resultant output is only intelligible after the second inversion.

inversion of relief (*Geol.*). A condition whereby synclinal ridges are separated by anticlinal depressions.

invert (*Civ. Eng., Plumb., etc.*). The lowest part of the inner surface of the cross-section of a non-vertical drain or sewer.

invert sugar (*Chem.*). The product obtained by the hydrolysis of cane-sugar with acids; it is a mixture of equal parts of *d*-fructose and *d*-glucose. Most fruits contain invert sugar, and honey averages over 70%.

in'vertase (*Chem.*). An enzyme which hydrolyses **cane-sugar**; it is present in all yeasts except *S. capsularis* and *S. octosporus*, both wine yeasts. The process is known as inversion. Also called SACCHARASE, SUCRASE.

inverted (*Bot.*). (1) See **anatropous.**—(2) See **inverse.**

inverted amplification factor (*Thermionics*). The ratio of the differential change in grid voltage, per unit differential change in anode voltage, necessary to maintain a constant grid current in a thermionic triode.

inverted arc lamp (*Illum.*). A d.c. arc lamp having the positive carbon above the negative carbon so that the greater part of the light, which comes from the negative crater, shall be directed upwards—as required for indirect lighting.

inverted arch (*Civ. Eng.*). An arch having the crown below the line of the springings, e.g. the floor of a tunnel, in order to distribute the pressure of the walls over a greater area. Also called an INFLECTED ARCH.

inverted-brush contact (*Elec. Eng.*). A laminated switch-contact in which the laminations are carried on the fixed, instead of on the moving, contact.

inverted commas (*Typog.*). Quotation marks. If *double quotes* (“ ”) are used to indicate a quotation, then *single quotes* (‘ ’) are used for any quotation occurring within the passage quoted; or the reverse procedure may be adopted.

inverted engine (*Aero.*). An incline engine having its cylinders below the crankshaft. Adopted in certain types of aircraft to improve the forward view of the pilot.

inverted-L antenna (*Radio*). An antenna comprising a vertical uplead joined to one end of a horizontal conductor.

inverted loop (*Aero.*). A manœuvre of an aeroplane consisting of a complete revolution about a lateral axis, with the normally upper surface of the machine on the outside of the path of the loop. Must be commenced while flying inverted.

inverted machine (*Elec. Eng.*). Any electric machine in which the usual arrangement of the stator and rotor windings is inverted; e.g. an induction motor in which power is supplied to the rotor, the stator winding being short-circuited.

inverted rectifier (*Elec. Eng.*). A mercury-arc or other form of rectifier when it is arranged to convert from d.c. to a.c. Also called an INVERTER.

inverted repulsion motor (*Elec. Eng.*). A repulsion motor in which the supply is taken to the armature through the brushes, the stator winding being short-circuited.

inverted rotary convertor (*Elec. Eng.*). A rotary convertor used to convert from d.c. to a.c.

inverted syphon (*Civ. Eng.*). See **syphon** (2).

inverted thermionic valve (*Thermionics*). A triode in which the control electrode is on the opposite side of the anode to the cathode, or on the opposite side of the cathode to the anode. The latter arrangement is also called a LUNAR GRID VALVE.

inverted-V antenna (*Radio*). A directional antenna comprising two wires, each several quarter wavelengths long and of equal length, arranged in the form of a V with the apex uppermost, joined at the top and connected to ground at one end through a suitable terminating resistance, the other end being connected to the transmitter or receiver. The direction of maximum radiation or reception is horizontal and in the plane of the wires.

inverter, invertor (*Elec. Eng.*). See **inverted rectifier.**

inverter, invertor (*Radio*). An arrangement of modulators and filters for inverting speech or music.

investing bone (*Zool.*). See **membrane bone.**

investment (*Zool.*). The outer layers of an organ or part, or of an animal.

invol'ucel (*Bot.*). The group of bracts sometimes present at the base of a partial umbel.

involu'cral bract (*Bot.*). One of the leafy members forming an involucre.

in'volucre (*Bot.*). (1) A short tube around the archegonia and the calyptra in *Bryophyta*.—(2) A crowded group of bracts around the base of a capitulum or other dense inflorescence.

involu'crum (*Med.*). Sheath of new bone formed round bone which has died as the result of infection of the bone.

involucrum (*Zool.*). In *Orthoptera*, the metanotum: in some *Hydrozoa*, a cup-like structure into which nematocysts may be retracted.

involuntary (*Zool.*). Outside the control of the will; as the movements of the intestines in peristalsis, the beat of the heart, the contraction of plain muscle.

involuntary muscle (*Zool.*). See **unstriated muscle.**

in'volute (*Bot.*). Having the margins rolled inwards.

involute and evolute (*Geom.*). The *evolute* of a given curve is the locus of its centre of curvature. The *involute* of a curve is another curve of which it is the evolute. A curve has an infinite number of involutes but only one evolute.

involute (*Zool.*). Tightly coiled; said of Gastropod shells.

involute connexion (*Elec. Eng.*). A special form of curved end connexion for the winding of an electric machine.

involute gear teeth (*Eng.*). Wheel teeth whose flank profile consists of an involute curve given by the locus of the end of a string uncoiled from a base circle; the commonest form of tooth.

involution (*Zool.*). In *Protozoa*, the condition of forms which are structurally deformed owing to an unfavourable environment, but which are capable of recovery if restored to a suitable environment.

involution period (*Bot.*). The resting period of a spore, seed, or other plant organ which remains inactive for a time.

involutional melancholia (*Psychiatry*). A type of melancholia which occurs at the involutional period and when the glands and internal secretions are beginning to fail. In women this disorder is often associated with the climacteric. It is characterised by a state of anxiety and agitation, accompanied by delusions of a depressive hypochondriacal nature, and a feeling of unreality and absorption with death.

Io (*Chem.*). The symbol for *ionium*.

i'odates (*Chem.*). Salts of iodic acid.

iod'azide (*Chem.*). N_3I. An iodine azide.

iodic acid (*Chem.*). HIO_3. Formed by the direct oxidation of iodine with nitric acid. White crystalline solid, which partly melts at 110° C., forming a liquid and a solid. Soluble in water. Forms iodates.

iodic anhydride (*Chem.*). I_2O_5. Also called IODINE PENTOXIDE. Forms iodic acid when dissolved in water.

i'odides (*Chem.*). Salts of hydriodic acid. Most metallic iodides liberate free iodine and leave behind the metal or metallic oxide when heated. See **hydriodic acid.**

iodine (*Chem.*). Symbol, I. A non-metallic element in the seventh group of the periodic system, one of the halogens. At. no. 53, at. wt. 126·92, valencies 1, 3, 5, 7. It forms blackish scales with a violet lustre and a characteristic smell; m.p. 113·5° C., b.p. 184·35° C., sp. gr. 4·94 at 20° C. It is widely but sparingly distributed as iodides, and is a constituent of the thyroid gland.

The important commercial sources are crude Chile saltpetre (caliche) and certain seaweeds; it is used as an antiseptic and in organic synthesis.

iodine monochloride (*Chem.*). ICl. There are two forms, α and β, dependent on the method of cooling. The first occurs when the substance is strongly cooled, red needles, m.p. 27·2° C.; the β-form, when slowly cooled, brown-red crystals, m.p. 13·9° C.

iodine oxides (*Chem.*). Iodine has four oxides with the empirical formulae, I_2O_4, I_4O_9, I_2O_5, IO_4. They differ in marked degree from those of the other halogens. The oxide I_2O_5 has acidic properties; stable, and with water yields iodic acid, HIO_3.

iodine pentafluoride (*Chem.*). IF_5. Colourless liquid, formed with incandescence by the direct combination of fluorine and iodine, m.p. −8°, b p. 97° C.

iodine pentoxide (*Chem.*). See **iodic anhydride.**

iodine trichloride (*Chem.*). ICl_3. Brown rhombic tablets, a powerful disinfectant.

iodine value (*Chem.*). The number of grams of iodine absorbed by 100 grams of a fat or oil It gives an indication of the amount of unsaturated acids present in fats and oils.

i'odism (*Med.*). The condition resulting from overdosage of, or sensitivity to, iodine; characterised by running at the eyes and the nose, salivation, and skin eruptions.

iodo-bismuthous acid (*Chem.*). $HBiI_4{\cdot}4H_2O$ A monobasic acid formed when bismuth triodide unites directly with hydrogen iodide.

io'doform (*Chem.*). CHI_3, yellow hexagonal plates, of peculiar odour, m.p. 119° C., volatile in steam, an important antiseptic. It is prepared by warming alcohol with iodine and alkali; or by an electrolytic method, in which a current is passed through a solution containing KI, Na_2CO_3, and alcohol, the temperature being about 65° C.

i'olite (*Min.*). See **cordierite.**

i'on (*Chem.*). A charged atom, molecule, or radical whose migration effects the transport of electricity through an electrolyte or, to a certain extent, through a gas.

ion'ic beam (*Thermionics*). A term frequently applied to a beam of electrons, as in a cathode ray tube, but more properly to a beam of positively charged molecular particles.

ionic current (*Thermionics*). A current carried by positively charged ions in a gas at low pressure. Especially applied to the small current which flows from the filament to the grid of a thermionic tube when the grid is made very negative and the vacuum is not perfect.

ionic focusing (*Cathode Ray Tubes*). The same as *gas focusing.*

ionic mobility (*Chem.*). The velocity of an ion under unit potential gradient, i.e. in a field of 1 volt per centimetre.

ionic modulation (*Radio*). A system used for modulating waves of very short wavelength (of the order of a few centimetres); the waves are propagated through an ionised gas, whose degree of ionisation is varied in accordance with the impressed modulation, thereby varying the absorption of the transmitted waves.

ionic product (*Chem.*). The product of the activities (see **activity, 2**) of the ions into which a pure liquid dissociates.

ionic strength (*Chem.*). Half the sum of the terms obtained by multiplying the *activity* (2) of each ion in a solution by the square of its valency; it is a measure of the intensity of the electrical field existing in a solution.

ionic theory (*Chem.*). The theory that substances whose solutions conduct an electric current undergo electrolytic dissociation on dissolution. This assumption explains both the laws of electrolysis and the abnormal colligative properties, such as osmotic pressure, of electrolyte solutions.

ionic valve (*Thermionics*). (1) An obsolete term for a thermionic valve.—(2) A form of cold cathode rectifier tube comprising two electrodes in the form of a point and a spiral of wire respectively, enclosed in an atmosphere of gas at low pressure. Also called LODGE VALVE.

ionisation. The production of ions from an electrically neutral substance.

ionisation (*Cables*). A term erroneously used to indicate any variation of power factor with the stress or applied voltage. Correctly used to indicate the production of free ions in the gaseous voids in a cable.

ionisation (*Chem.*). See **electrolytic dissociation.**

ionisation by collision (*Phys.*). See **collision (ionisation by).**

ionisation constant (*Chem.*). The ratio of the product of the activities (see **activity, 2**) of the ions produced from a given substance to the activity of the undissociated molecules of that substance.

ionisation current (*Thermionics*). The current passed by an ionisation gauge.

ionisation gauge (*Thermionics*). A small thermionic triode whose envelope is connected to a chamber in which it is desired to measure the amount of residual gas. Current is passed from the anode to the cathode, the grid being made negative, and the amount of the grid current is measured, giving an indication of the degree of vacuum.

ionisation manometer (*Thermionics*). An ionisation gauge in which the grid current meter has been calibrated to read gas pressure directly.

ionisation temperature (*Astron.*). A critical temperature, different for different elements, at which the constituent electrons of an atom will become dissociated from the nucleus; hence a factor in deducing stellar temperatures from observed spectral lines indicating any known stage of ionisation.

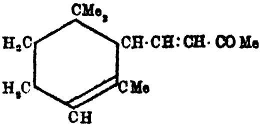
ionised (*Chem., Phys.*). (1) Electrolytically dissociated.—(2) Converted into an ion by the loss of an electron.

ionised gas detector (*Radio*). An early form of detector in which a discharge through an ionised gas is triggered by the arrival of a signal.

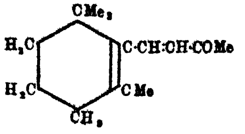
io'nium (*Chem*). A radioactive isotope of thorium, with a half-life of 8×10^4 years. Symbol, Io.

ionones, ī'-on-ōnz (*Chem.*). Isomers of *irone* (q.v.), compounds related to the terpenes, possessing an odour of violets; they can be synthesised from citral by condensation with acetone, forming pseudo-ionones, ring formation in which can be effected by boiling with sulphuric acid. There are two isomers, viz.:

α-Ionone



β-Ionone



ionosphere, ī-on′-ō— (*Radio, etc.*). The region above the earth's surface in which ionisation takes place, with diurnal and annual variations which are regularly associated with ultra-violet radiation from the sun, and sporadic variations arising from hydrogen bursts from sunspots. Layers or regions possessing defined characteristics are known as the *B-*, *C-*, *D-*, *E-*, and *F-layers* (qq.v.).

ionospher′ic ray (wave) (*Radio*). See **indirect ray.**

ionot′ropy (*Chem.*). Ionic tautomerism, caused by an alteration in the position of the charge on an ion.

iontophore′sis, ī-on′— (*Med.*). The therapeutic introduction, by the passage of an electric current, of various ions into the tissues of the body.

I.P.T. thermometers (*Chem.*). Thermometers conforming to the standards laid down by the Institute of Petroleum Technologists.

I.Q. (*Psychol.*). Abbrev. for *intelligence quotient* (q.v.).

Ir (*Chem.*). The symbol for *iridium.*

I.R. (*Chem.*). An abbrev. for *insoluble residue.*

I.R. drop (*Elec. Eng.*). The voltage drop due to a current flowing through a resistance.

I^2R loss (*Elec. Eng.*). The loss caused by the flow of a current *I* through a resistance *R*.

irestone (*Mining*). A hard basic crystalline rock. Trap rock or greenstone.

i′rid-, i′rido- (Greek *iris*, gen. *iridos*, rainbow). A prefix used in the construction of compound terms (e.g. *iridochoroiditis*, q.v.), particularly with reference to the *iris* (q.v.) of the eye.

iridal′gia (*Med.*). Pain in the iris of the eye.

iridec′tomy (*Surg.*). Excision of part of the iris of the eye.

iridenclei′sis (*Med.*). The incarceration of part of the iris in a wound in the cornea.

iridere′mia (*Med.*). Aniridia. Apparent complete absence of the iris of the eye (a narrow rim always persists).

irides′cence (*Phys.*). The production of fine colours on a surface; due to the interference of light reflected from the front and back of a very thin film.

irides′cent clouds (*Meteor.*). High clouds of the cirro-cumulus type which show colours, generally delicate pink and green, in irregular patches. It is thought that the effect is caused by the diffraction of sunlight by supercooled water droplets.

irid′ium (*Met.*). A brittle, steel-grey metallic element. Symbol Ir, at. wt. 193·1, at. no. 77, sp. gr. at 20° C. 22·4, m.p. 2454° C., specific electrical resistivity 6 microhms per cm. cub. Alloyed with platinum or osmium to form hard, corrosion-resisting alloys, used for pen-points, watch and compass bearings, crucibles, standards of length.

iridium lamp (*Illum.*). An early form of electric filament lamp employing iridium wire as the filament.

iridochor′oidi′tis (*Med.*). Inflammation of the iris and of the choroid of the eye.

iridocolobo′ma (*Med.*). Congenital absence of part of the iris, a gap or fissure being present in it.

iridocycli′tis (*Med.*). Inflammation of the iris and of the ciliary body of the eye.

ir′idocyte (*Zool.*). A reflecting cell containing guanin, found in the integument of Fish and of certain Cephalopods, to which it gives an iridescent appearance.

iridodial′ysis (*Med.*). Separation of the iris from its attachment to the ciliary body of the eye.

iridodone′sis (*Med.*). Tremulousness of the iris.

iridokerati′tis (*Med.*). Inflammation of the iris and of the cornea.

iridople′gia (*Med.*). Paralysis of the sphincter, or circular muscle, of the iris.

iridos′mine (*Min.*). Osmiridium.

iridot′omy (*Surg.*). Surgical cutting of the iris.

i′ris (*Anat., Zool.*). (1) In the Vertebrate eye, that part of the choroid, lying in front of the lens, which takes the form of a circular curtain with a central opening.—(2) In Insects, a dense layer of pigment enveloping the margin of the lens and the proximal ends of the visual cells of certain types of ocelli.—*adj.* **iridial.**

iris (*Min.*). A form of quartz showing chromatic reflections of light from fractures, often produced artificially by suddenly cooling a heated crystal. Also called RAINBOW QUARTZ.

iris diaphragm (*Photog.*). A continuously variable hole, forming an adjustable stop for a lens; usually integral with the lens mounting.

iris-in, iris-out (*Photog.*). Terms indicating the opening or closing of an extra iris diaphragm, which is placed at some distance behind the lens in a camera, so that the exposed area of the emulsion opens up and closes from the centre.

irisa′tion (*Meteor.*). Same as *iridescence.*

Irish moss (*Chem.*). Kelp (*Chondrus crispus*) found on the coasts of Ireland and New England. It contains fucose.

iri′tis (*Med.*). Inflammation of the iris.

iron (*Met.*). A metallic element in the eighth group of the periodic system. It exists in three forms; see **alpha iron, gamma iron, delta iron.** Symbol Fe, at. wt. 55·84, at. no. 26, sp. gr. at 20° C. 7·87, m.p. 1535° C., specific electrical resistivity 9·8 microhms per cm. cub. As basis metal in steel and cast-iron, it is the most widely used of all metals. See **iron ores.**

iron alum (*Min.*). See **halotrichite.**

iron arc (*Optics*). An arc between iron electrodes, used for obtaining light containing standardised lines, for spectrometer and spectrograph calibrations.

ironclad electromagnet (*Elec. Eng.*). An electromagnet in which the return path for the flux is formed by an iron covering surrounding the winding.

ironclad switchgear (*Elec. Eng.*). See **metalclad switchgear.**

iron glance (*Min.*). From the German *Eisenglanz*, a name often applied to specular iron-ore (haematite).

iron loss (*Elec. Eng.*). Energy loss caused in electric machines and apparatus by alternating flux in the iron of the magnetic circuit. See **eddy-current loss, hysteresis loss**; and cf. *parasitic loss.*

iron meteorites (*Geol.*). A popular name for those meteorites which consist essentially of nickel-iron, in the form of kamacite, taenite, plessite, etc.

iron monoxide (*Chem.*). See **ferrous monoxide.**

iron-nickel accumulator (*Chem.*). See **Edison accumulator.**

iron ores (*Geol.*). Rocks or deposits containing iron-rich compounds in workable amounts; they may be primary or secondary; they may occur as irregular masses, as lodes or veins, or interbedded with sedimentary strata. See **chalybite, chamosite, goethite, haematite, limonite, magnetite.**

iron pan (*Min.*). A hard layer often found in sands and gravels; caused by the precipitation of iron salts from percolating waters. It is formed a short distance below the soil surface.

iron pattern (*Foundry*). A pattern made of cast-iron; used when a large number of castings is required from it, and long life is necessary. See **double contraction.**

iron paving (*Civ. Eng.*). A type of road surfacing formed of cast-iron slabs studded on their upper surface to reduce skidding.

iron pentacarbonyl (*Chem.*). $Fe(CO)_5$. Formed at ordinary temperatures when carbon monoxide is passed over finely divided iron. A liquid which readily decomposes.

iron protoxide (*Chem.*). See **protoxide of iron.**

iron py'rite (*Min.*). 'Fool's gold.' Sulphide of iron, crystallising in the cubic system. It is brassy-yellow in colour and of very common occurrence. Also called MUNDIC.

iron salts (*Chem.*). See under **ferrous** and **ferric.**

ironstone (*Min.*). Carbonate of iron, clay, and carbonaceous matter, found in nodules, layers, or beds in the coal measures.

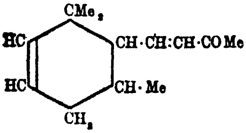
ironstone china (*Pot.*). A body compounded of china stone and clay, flint and ironstone slag.

iron tetracarbonyl (*Chem.*). $Fe(CO)_4$. Formed when carbon monoxide is passed over heated finely divided iron. It is gaseous.

iron tubing (*Eng*). Wrought-iron lap-welded, or seamless, steel tubing; used for boiler tubes.

ironwork (*Build.*). A term applied to essentially ornamental work in iron, such as that used for gates, hinges, knockers, etc.

irone' (*Chem.*). $C_{13}H_{20}O$, a methyl ketone of the terpene group, the odoriferous principle of the iris root and of the violet. Its formula is



irregular (*Biol.*). Asymmetric.—(*Bot*) (1) Not arranged in an even line or circle.—(2) Not divisible into halves by an indefinite number of longitudinal planes.

irregular-coursed (*Masonry*). Said of rubble walling built up in courses of different heights.

irregular nebulae (*Astron.*). A classification applied to a large number of nebulae of varied shapes, not similar or well defined like the spiral or planetary nebulae. The best-known example is the Great Nebula in Orion. Also called DIFFUSE NEBULAE.

irregular variables (*Astron.*). See **variable stars.**

irreversible colloid (*Chem.*). See **lyophobic colloid.**

irreversible conduction current (*Diel.*). A current of constant value which flows when voltage is applied but does not return when the dielectric condenser is short-circuited.

irreversible reaction (*Chem.*). A reaction which takes place in one direction only, and therefore proceeds to completion.

irreversible steering (*Automobiles*). A steering gear in which it is impossible for road shocks on the wheels to cause motion at the steering wheel; a condition rarely attained.

irrigation (*Civ. Eng.*). The storage of flood waters by means of dams, so that water shall be available for distribution over the surrounding country during the dry season.

irrigation (*Sewage*). The method of sewage disposal by *land treatment* (q.v.).

irritability (*Biol.*). One of the characteristic properties of living matter, namely, the ability to receive and respond to external stimuli.

irritant (*Biol.*). Any external stimulus which produces an active response in a living organism.

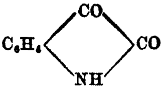
ir'rorate (*Bot.*). As if covered with dew.

irrotational field (*Elec. Eng.*). A field in which the *circulation* (q.v.) is everywhere zero.

Irwin hot-wire oscillograph (*Elec. Eng.*). See **hot-wire oscillograph.**

isal'lobar (*Meteor.*). The contour line on a weather chart, signifying the location of equal changes in the barometer over a specified period, in contrast with the absolute reduced barometric readings.

i'satin (*Chem.*).



the lactam of *o*-amino-benzoylformic acid, obtained by oxidising indigo or indoxyl with nitric acid; it can be synthesised by numerous methods, and is an important intermediate for the manufacture of indigo. Isatin crystallises in reddish monoclinic prisms.

ischaemia, ischemia, is-kĕ'mi-a (*Med.*). Permanent or temporary deficiency of blood in a part of the body.—*adj.* **ischaemic.**

ischiop'odite (*Zool.*). The proximal joint of the endopodite of the walking-legs or maxillipeds of certain *Crustacea.*

ischiorec'tal (*Anat.*). Pertaining to the ischium of the pelvic bone and to the rectum.

ischiorectal abscess (*Med.*). An abscess forming in the tissues between the ischium and the rectum.

is'chium (*Zool.*). A posterior bone of the pelvic girdle in Vertebrates.—*adjs.* **ischial, ischiadic.**

i'serine (*Min.*). Probably a ferruginous rutile, though formerly considered to be a variety of ilmenite. Found at Iserwiese (Bohemia).

isid'ium (*Bot.*). A branched outgrowth, recalling coral in form, arising from the thallus of a lichen.

i'singlass (*Chem.*). Fish glue. A white solid amorphous mass, prepared from fish bladders; chief constituent, gelatin. It has strong adhesive properties. Used in various food preparations, and in the fining of beers, wines, etc.

isinglass gold-size (*Dec.*). Refined isinglass dissolved in hot water, mixed with methylated spirits; used in gilding on glass.

island (*Highways*). See Supplement.

island universe (*Astron.*). The name applied to a spiral nebula by those holding the cosmological theory that these nebulae are not connected with the galactic system, each constituting a separate stellar system, comparable in size and unity with our own.

iso- (*Chem.*). A prefix indicating: (1) The presence of a branched carbon chain in the molecule; (2) An isomeric compound.

i'so- (Greek *isos*, equal). A prefix used in the construction of compound terms; e.g. *isodactylous*, having all the digits of equal size.

iso-agglutination (*Physiol.*, *Zool.*). (1) The adhesion of spermatozoa to one another by the action of some substance produced by the ova of the same species.—(2) The adhesion of erythrocytes to one another within the same blood-group. Cf. *hetero-agglutination.*

i'sobar (*Chem.*). A curve relating quantities measured at the same pressure.—(*Meteor.*) A line drawn on a map through places having the same atmospheric pressure at a given time.

i'sobares (*Phys.*). Atoms having different chemical properties but the same atomic weight. Thus titanium and chromium each have an isotope of atomic weight 50. Isobares have the same nuclear mass but different nuclear charges and therefore different numbers of extra-nuclear electrons. See **isotopes.**

isobaromet'ric (or isobaric) charts (*Meteor.*). Maps on which isobars are drawn. See **isobar.**

i'sobases (*Geol.*). Lines drawn through places where equal depression of the land mass took place in Glacial times, as a result of the weight of the ice load.

i'sobilat'eral (*Bot.*). Divisible into symmetrical halves by two distinct planes.

isobor'neol (*Chem.*). A secondary alcohol of the terpene series, m.p. 212° C., very volatile. It is a stereo-isomer of borneol, $C_{10}H_{17}OH$, and on oxidation yields camphor.

isobrach'ial (*Bot.*). Said of a chromosome which is bent into two equal arms.

isobutyl alcohol (*Chem.*). $(CH_3)_2:CH\cdot CH_2OH$, b.p. 107° C., partly miscible with water; formed during the fermentation of sugar.

isocer'cal (*Zool.*). Said of a type of secondarily symmetrical tail-fin (in Fish) in which the areas of the fin above and below the vertebral column are equal.

isochela, —kē'la (*Zool.*). A chela having the two opposable joints of approximately equal size.

i'sochore (*Chem.*). A curve relating quantities measured under conditions in which the volume remains constant.

isochromat'ic (*Photog.*). Practically the same as *orthochromatic* (q.v.).

isoch'ronism (*Phys.*). Regular periodicity, as the swinging of a pendulum.—(*Horol.*) For a clock pendulum, isochronism implies that the time of vibration should be the same whatever the amplitude (see **circular error**), and for the balance that the time of vibration should be the same whatever the arc of vibration. In practice, the balance approaches nearer to true isochronism than does the pendulum.—*adj.* **isoch'ronous.**

isocli'nal fold (*Geol.*). A fold partially overturned, so that both limbs dip in the same direction. See **folding.**

isoco'ria (*Anat.*). Equality in the size of the pupils of the eye.

isocy'anides (*Chem.*). *Iso*nitriles or carbylamines. Compounds of the formula R·N:C. They are colourless liquids, only slightly soluble in water with a feebly alkaline reaction, having a nauseous odour, obtained by the action of chloroform and alcoholic potash upon primary amines. They are very stable towards alkali, form additive compounds with halogens, HCl, H_2S, etc., and can be hydrolysed into formic acid and a primary amine, containing one carbon atom less than the original compound.

isocyclic compounds (*Chem.*). *Carbocyclic compounds* (q.v.).

isodact'ylous (*Zool.*). Having all the digits of a limb the same size.

isodiamet'ric, isodiamet'rical (*Bot.*). Of the same length vertically and horizontally.

i'sodimor'phous (*Chem.*). Existing in two isomorphous crystalline forms.

i'sodisperse' (*Chem.*). Dispersible in solutions having the same *p*H-value.

isod'omon (*Masonry*). An ancient form of masonry in which the facing consisted of squared stones laid in courses of equal height, and the filling of coursed stones of smaller size.

i'sodont (*Zool.*). Having all the teeth similar in size and form.

isodul'cite (*Chem.*). See **rhamnose.**

isodynamic lines (*Magn.*). Lines on a magnetic map which pass through points having equal strengths of the earth's field.

isoelec'tric point, ī'sō-el— (*Chem.*). The *p*H-value at which the charge on a colloid is zero. It may also be considered as the *p*H-value at which the ionisation of an ampholyte is at a minimum. It has a definite value for each amino acid and protein.

isogametan'gic (*Bot.*). Having gametangia all of the same size and form.

isogam'ete (*Bot., Zool.*). One of a pair of uniting gametes of similar size and form.—*adjs.* **isogamous, isogamic.**

isog'amy (*Bot., Zool.*). The union of a pair of gametes of similar size and form.

isogenet'ic (*Zool.*). Having a similar origin.

isogen'ic (*Bot.*). Propagating entirely by means of apogamy.

isogenomat'ic (*Cyt., Gen.*). Said of chromosome complements which are composed of similar genoms.

isogon'ic line, i'sogon. An imaginary line drawn through points of equal magnetic declination at any time.

isoha'line (*Ocean.*). A line drawn on a map through points of equal salinity in the sea.

i'sohel (*Meteor.*). A line drawn on a map through places having equal amounts of sunshine.

isohy'dric (*Chem.*). Having the same *p*H-value, or concentration of hydrogen ions.

isohy'et (*Meteor.*). A line drawn on a map through places having equal amounts of rainfall.

isokon'tan (*Bot.*). Bearing two (or more) flagella of equal length.

isolated phase switchgear (*Elec. Eng.*). Switchgear in which all the apparatus associated with each phase is segregated in separate cubicles or on separate floors of the switch-house.

isolating link (*Elec. Eng.*). A link suitable for disconnecting a circuit when it is dead.

isolating switch (*Elec. Eng.*). See **isolator.**

isolation transect (*Bot.*). A belt of land to which grazing animals are admitted under observation, so that the effect of grazing on the vegetation may be studied.

isolator (*Elec. Eng.*). A switch suitable for disconnecting a circuit under no-load conditions or when only magnetising or charging currents are flowing. Also called ISOLATING SWITCH.

isolecithal, ī-so-les'— (*Zool.*). Said of ova which have yolk distributed evenly through the protoplasm.

i'sologues (*Chem.*). Compounds having a similar molecular structure but containing different atoms of the same valency.

isomas'tigote (*Zool.*). Having two or four flagella of equal length.

i'somer (*Chem.*). Any compound having the same percentage composition and the same molecular weight as another, but of different constitution.

isom'erism (*Chem.*). The existence of more than one substance having a given molecular composition and molecular weight. This phenomenon is frequently met among organic compounds and among complex inorganic salts.

isomerous (*Bot.*). Equal in number to the members of another whorl.

isomet'ric contraction (*Zool.*). The type of contraction involved when a muscle is held so that it cannot change its length.

isometric projection (*Drawing*). A method of drawing a pictorial view of a solid object by representing it as placed so that three mutually perpendicular axes in it are equally inclined to the plane of projection.

isometric system (*Crystal.*). The cubic system.

isomor'phic alternation of generations (*Bot.*). See **homologous alternation of generations.**

isomor'phism (*Biol.*). Apparent likeness between individuals belonging to different species or races.—(*Crystal.*) The name given to the phenomenon whereby two or more minerals, which are closely similar in their chemical constitution, crystallise in the same class of the same system of symmetry, and develop very similar forms.—*adjs.* **isomorphic, isomorphous.**

isomorphous mixture (*Chem.*). See **mixed crystal.**

i'soneph (*Meteor.*). A line drawn on a map through places having equal amounts of cloudiness.

isoni'triles (*Chem.*). *Isocyanides* (q.v.).

isopach'yte (*Geol.*). A line drawn on the map through places where a particular stratum has the same thickness.

i'sopaque (*Photog.*). The line or contour giving equality of opacity; applied to spectrograms to determine colour-sensitivity of photographic materials.

isope'din (*Zool.*). The thin layer of bone forming the inner layer of some Fish scales.

i'sophase (*Gen.*). The condition when one hereditary factor influences the development of several characters.

iso'pic (*Geol.*). Said of two formations deposited contemporaneously and of the same facies. Cf. *heteropic.*

Isop'oda (*Zool.*). An order of *Peracarida,* in which the carapace is absent, the eyes are sessile or borne on immovable stalks, and the uropods are usually lamellar; the body is depressed and the legs used for walking; they show great variety of form, size, and habit; some are terrestrial, plant-feeders or ant-guests, others are marine, free-living and feeding on seaweeds or ectoparasitic on fish. Woodlice, etc.

isopo'dous (*Zool.*). Having the legs all alike.

i'sopogo'nous (*Zool.*). Said of feathers which have the two vanes alike in size and form.

i'soprene (*Chem.*). $CH_2{\cdot}C(CH_3){\cdot}CH{:}CH_2$, a diolefine, a colourless liquid, b.p. 37° C., obtained by the destructive distillation of rubber, from amyl alcohol, from propylene, synthetically from methane in the presence of catalysts, or by several other methods. It is a compound of particular importance for the synthesis of rubber.

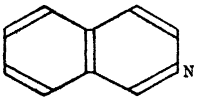
iso**pro'pyl group** (*Chem.*). The monovalent radical $(CH_3)_2CH-$.

iso**propyl alcohol** (*Chem.*). $(CH_3)_2CHOH$, a colourless liquid, miscible with water, b.p. 81° C.

Isop'tera (*Zool.*). An order of social *Exopterygota* living in large communities which occupy nests excavated in the soil or built up from mud and wood; five different polymorphic forms or castes occur in each species; the mouth-parts are adapted for biting and both pairs of wings, if present, are membranous and can be shed by means of a basal suture; soft-bodied forms with short anal cerci. White Ants, Termites.

i'sopyknos'copy (*Chem.*). The determination of the end-point of a volumetric titration from the specific gravity of the titrated solution.

iso**quin'oline** (*Chem.*). The formula is



It is an isomer of quinoline and a condensation product of a benzene ring with a pyridine ring. It forms colourless crystals, m.p. 23° C., b.p. 240° C.

isorea'gent (*Bot.*). A variety or microspecies.

isoseismal line, —siz'mal. A line drawn on a map through places recording the same intensity of earthquake shocks. See **earthquake.**

Isospon'dyli (*Zool.*). An order of *Neopterygii,* characterised by the possession of abdominal pelvic fins, an air-bladder communicating with the gullet by a pneumatic duct, a well-developed mesocoracoid and soft fin-rays. Herring, Salmon, Trout, Sardine, Pilchard, Anchovy, Wide-mouth, Smooth-head, and Lady Fish.

i'sospores (*Zool.*). In *Radiolaria,* agametes produced in schizogony.

isospo'rous (*Bot.*). Having asexually produced spores of one kind only.

isos'tasy (*Geol.*). A condition, which has been presumed to exist in the earth's crust, whereby equal earth masses underlie equal areas down to an assumed level of compensation.

isostem'onous (*Bot.*). Having as many stamens as petals.

isoster'ic (*Chem.*). Consisting of molecules possessing similar electronic structures.

isoten'iscope (*Chem.*). An instrument for the static measurement of vapour pressure by observing the change of level of a liquid in a U-tube.

i'sotherm (*Meteor.*). A line drawn on a map through places having equal temperatures.

isothermal (*Chem.*). (1) Occurring at constant temperature.—(2) A curve relating quantities measured at constant temperature.

isothermal change (*Phys.*). A change in the volume and pressure of a substance which takes place at constant temperature. For gases, Boyle's law applies to isothermal changes.

isothermal charts (*Meteor.*). Maps on which isotherms are drawn.

isothermal efficiency (*Eng.*). (Of a compressor) the ratio of the work required to compress a gas isothermally to the work actually done by the compressor piston or impeller.

isothermal lines (or **curves**) (*Phys.*). Curves obtained by plotting pressure against volume for a gas kept at constant temperature. For a gas sufficiently above its critical temperature for Boyle's law to be obeyed, such curves are rectangular hyperbolas.

isothrausmat'ic (*Geol.*). Said of orbicular igneous rocks in which the composition of the cores of the orbs is identical with that of the groundmass in which they are embedded. Cf. *homeothrausmatic.*

isoton'ic (*Chem.*). Having the same osmotic pressure, e g. as that of blood, or of the sap of cells which are being tested for their osmotic properties.

isotonic contraction (*Zool*). The type of contraction involved when a muscle, in shortening, does external work.

i'sotopes (*Chem., Phys.*). Substances having identical chemical properties but different atomic weights. Thus, zinc is composed of a mixture of substances having integral atomic weights 64, 66, 67, 68, and 70, in such proportions as to give the mean value 65·38 for the atomic weight of zinc. Isotopes have the same number of extra-nuclear electrons and the same nuclear charge but they have different nuclear masses. See **isobares.**

isotop'ic symbols (*Chem.*). Numerals attached to the symbol for a chemical element, with the following meanings—*upper left,* mass number of atom; *lower left,* nuclear charge of atom; *lower right,* number of atoms in molecule—e.g. ${}^{2}_{1}H_2$, ${}^{24}_{12}Mg$.

isotrop'ic (*Phys.*). Said of a substance which possesses the same properties in all directions.—*n.* **isotropy.**

isotro'pous (*Zool.*). (Of ova) lacking any predetermined axes.—*n.* **isotropy.**

isth'mus (*Zool.*). A neck connecting two expanded portions of an organ; as the constriction connecting the mid-brain and the hind-brain of Vertebrates.

Italian asbestos (*Min.*). A name often given to tremolite asbestos to distinguish it from Canadian or chrysotile asbestos. It is extensively quarried in Piedmont and Lombardy.

Italian blind (*Build.*). An outside roller-blind similar to the hook-out blind but having the side arms attached to the blind and capable of sliding up and down on side rods. Also called a CANALETTE BLIND.

Italian cloth (*Textiles*). (1) A fabric composed of a cotton warp and a fine Botany weft, used for linings.—(2) A grey cotton cloth which has been mercerised, dyed, and schreinered. The weave is 5-end sateen.

Italian pink (*Paint.*). See **Dutch pink.**

Italian roof (*Build.*). A *hipped roof* (q.v.).

italic, italics (*Typog.*). A sloping style of type, thus *Italic.* It should be indicated in manuscript by one line under the word or words.

Italit (*Build.*). A proprietary corrugated asbestos-cement roofing material.

itch, depluming (*Vet.*). Infection of the plumage of birds by scabies mites of the genus *Cnemidocoptes.*

it'er (*Zool.*). A canal or duct, as the reduced ventricle of the mid-brain in higher Vertebrates.

iterative impedance (*Elec. Comm.*). The termination impedance of a network which makes the input impedance of the network equal to the said termination.

Ith'aca Group (*Geol.*). A subdivision of the Senecan Series as exposed in the gorge of Fall Creek, Ithaca, N.Y.

ivory (*Zool.*). The dentine of teeth, especially the type of dentine composing the tusks of elephants, which in transverse sections shows striae proceeding in the arc of a circle and forming, by their decussations, small curvilinear lozenge-shape spaces.

ivory black (*Chem.*). A name applied to the product obtained by digesting bone black or carbon with hydrochloric acid to remove calcium phosphates.—(*Dec.*) A colouring pigment obtained from charred scraps of ivory ground in oil.

ivorytype (*Photog.*). See **eburneum process.**

I.W. (*Chem.*). An abbrev. for *isotopic weight.*

ix'iolite (*Min.*). See **tapiolite.**

Izod test (*Met.*). A notched-bar or impact test in which a notched specimen held in a vice is struck on the end by a striker carried on a pendulum; the energy absorbed in fracture is obtained from the height to which the pendulum rises.

j. The mathematical operator $j^2 = -1$, used in electrical engineering. j means the graphical rotation of a vector, representing a sinusoidal alternating current or voltage, 90° positively (anti-clockwise). The reactances of inductances and capacitors, $j\omega L$ and $1/j\omega C$, include j to denote that the currents in these lag and lead respectively by 90°. Consistency in algebraic manipulations of quantities in the form $a+jb$, representing vectors, is achieved by extracting terms which contain j and those which do not, remembering that $j^2 = -1$, $j^3 = -j$, etc., an important facility in calculating alternating quantities in electrical engineering. The deduction that $j = \sqrt{-1}$ has no meaning. See ***i*** and **vector quantity.**

jω (*Maths.*). The Heaviside operator, p, which is retained through mathematical processes.

J (*Chem.*). In names of dyestuffs, a symbol for yellow.

J (*Chem.*). A symbol for *gram-equivalent weight.*

J (*Eng.*). The symbol used to denote the polar moment of inertia of a shaft.

J (*Heat*). The symbol for Joule's equivalent, i.e. the *mechanical equivalent of heat* (q.v.).

J-acid (*Chem.*). 2,5-Aminonaphthol-7-monosulphonic acid, an intermediate for dyestuffs, prepared by melting 2-naphthylamine-5,7-disulphonic acid with caustic soda.

Jablochkoff' candle (*Illum.*). An early form of arc lamp, in which the carbons were placed side by side and separated by plaster of Paris.

ja'cinth or **hy'acinth** (*Min.*). The aurora-red variety of transparent zircon, used as a gemstone. A cinnamon-coloured variety of grossularite from Ceylon is also called *hyacinth.*

jack (*Eng.*). A portable lifting machine for raising heavy weights through a short distance, consisting either of a screw raised by a nut rotated by hand gear and a long lever, or a small hydraulic ram. See **hydraulic jack.**

jack (*Lace*). A frame containing horizontal bars that support wires fixed vertically, against which bobbins containing yarn can revolve freely.

jack (*Teleph.*). The unit of the vertical face of a telephone switchboard for the insertion of plugs. The tip, ring, and sleeve of a plug make temporary contact with corresponding springs in the jack when the plug is inserted.

See **answering—**
branching—
break—
line—
outgoing—
slipper—
test—

jacks (*Textiles*). (1) Levers that, in conjunction with a tappet or dobby motion, raise and lower the heald shafts in a loom.—(2) In lace machines, elements (such as interceptor wires, etc.) which control threads.

jack arch (*Build.*). A *flat arch* (q.v.).

jack frame (*Cotton Spinning*). The last of a series of four fly frames, which is used only to prepare rovings for the spinning of very fine counts.

jackhammer (*Mining*). A hand-held compressed-air hammer drill for rock-drilling.

jack-in-the-box (*Cotton Spinning*). A term sometimes used to indicate the differential motion that controls the winding speed of a fly frame.

jack off (*Lace*). To wind a length of yarn from a jack of flanged bobbins, for transfer to brass bobbins.

jack plane (*Carp.*). A bench plane about 16 in. long, used for bringing the work down to approximate size, prior to finishing with a trying or smoothing plane.

jack-rafter (*Carp.*). A short rafter connecting a hip-rafter and the eaves, or a valley-rafter and the ridge.

jack shaft (*Elec. Eng.*). An intermediate shaft used in locomotives having collective drive; the jack shaft is geared to the motor shaft and carries cranks which drive the coupling rods on the driving wheels.

jack-timber (*Carp.*). A timber used in a narrowing situation, such as a rafter in a hip roof, where it has to be shorter than its fellows. Also called a CRIPPLE-TIMBER.

jacket (*Eng.*). An outer casing or cover constructed round a cylinder or pipe, the annular space being filled with a fluid for either cooling, heating, or maintaining the cylinder contents at constant temperature; e.g. the water *jackets* of an I.C. engine.

jacket (*Print.*). The wrapper, or dust cover, in which a book is enclosed. Book-jackets are usually artistically designed, and executed in colour, to enhance the appeal of the volume.

jacking delivery motion (*Cotton Spinning*). A term sometimes applied to the mechanism which provides for the delivery of a small quantity of additional roving by the front rollers, after stoppage at the end of the run of the mule carriage, to compensate for extra twist then inserted.

jacking motion (*Cotton Spinning*). The mechanism employed to stop the front rollers in a mule spinning frame, before the carriage completes its outward run.

jacking-up (*Eng.*). The process of lifting an object by means of a jack.

Jacksonian epilepsy (*Med.*). A convulsion of a limited group of muscles spreading gradually from one group to the other, usually without loss of consciousness; the result of a lesion (e.g. tumour) of the brain.

ja'cobsite (*Min.*). An oxide of magnesium, iron, and manganese, which crystallises in the cubic system (usually in the form of distorted octahedra).

Jacobson's cartilage (*Zool.*). In some Vertebrates, a cartilage of the nasal region supporting Jacobson's organs.

Jacobson's commissure (*Zool.*). In lower Vertebrates, a connexion between the fifth and ninth cranial nerves.

Jacobson's glands (*Zool.*). In some Vertebrates, nasal glands the secretion of which moistens the olfactory epithelium.

Jacobson's organ (*Zool.*). In some Vertebrates, an accessory olfactory organ developed in connexion with the roof of the mouth.

jac'onet or **jacconette'** (*Textiles*). A plain, light-bleached cotton cloth, with smooth finish; for Indian markets, etc. Also, a thin material of rubber and linen used for medical dressings when water- or damp-proofing is required.

jacot tool, jak'ō (*Horol.*). A tool used by watchmakers for polishing and burnishing pivots.

jacquard, ja-kard (*Weaving*). A machine introduced in 1801 by the French inventor Joseph Marie Jacquard to be used, in conjunction with a loom, to operate the shedding and control the figuring when more than 20 lifts of warp are necessary. Machines vary in size from 100 needles and hooks up to 1600. See **cards.**

jactitation (*Med.*). Restless tossing of a patient severely ill: a twitching or convulsion of a muscle or of a limb.

jacupiran'gite (*Geol.*). A name applied by Derby in 1891 to a type of nepheline-gabbro consisting of titanaugite, biotite, iron ores, and nepheline, the last being subordinate to the mafic minerals.

jade (*Min.*). A general term loosely used to include various mineral substances of tough texture and of a green colour. It properly embraces nephrite and jadeite, but green varieties of sillimanite, pectolite, serpentine, vesuvianite, and garnet are sometimes included.

jadeite, jā'dīt (*Min.*). A metasilicate of sodium and aluminium which crystallises in the monoclinic system. It is green in colour and has long been prized in the Orient. The finest material comes from Mogaung, Upper Burma.

Jäderin wires, yā'der-in (*Surv.*). Apparatus devised by Prof. Jäderin of Stockholm for base-line measurement. It consists of separate steel and brass wires, extended under constant tension over reference tripods in the line of the base. The coefficients of expansion and lengths at a certain temperature of the two wires having been found, the temperatures of the wires themselves may be deduced from the difference of the measurement of the same distance by the two wires; and these temperatures being known, the length of the base may be very accurately obtained.

jag-bolt (*Eng.*). See **rag-bolt.**

jail fever (*Med.*) See **typhus fever.**

jalousies, zhal'oo-sēz (*Build.*). Hanging or sliding wooden sun-shutters giving external protection to a window, and allowing for ventilation through louvres or holes cut in the shutters themselves. Also called VENETIAN SHUTTERS.

jamaicin (*Chem.*). See **berberine.**

jamb (*Build.*). The side of an aperture.

jambs (*Acous.*). The vertical plane surfaces for locating the draw-stops at the sides of the manuals on an organ console.

jamb linings (*Join.*). The panelling at the sides of a window recess, running from the floor to the level of the window head. Cf. *elbow linings.*

jamb post (*Carp.*). An upright member on one side of a doorway opening.

jamb stone (*Build.*). A stone forming one of the upright sides of an aperture in a wall.

jamesonite, jām'son-īt (*Min.*). See **feather ore.**

Ja'min interferometer (*Light*). A form of interferometer in which two interfering beams of light pursue parallel paths a few centimetres apart. The instrument is used to measure the refractive index of a gas, by observing the fringe shift when one of the light beams traverses a tube filled with the gas, while the other traverses a vacuum.

Jamin's chain, jaminian chain (*Bot.*). A series of short threads of water separated by bubbles of air, in the vessels of plants.

jamming (*Radio*). Interference, intentional or otherwise, with the transmission from a station, caused by another station working on the same wavelength.

Jandus arc lamp (*Illum.*). A form of enclosed-flame arc lamp, which has an arrangement for circulating the enclosed gases in order to avoid deposits on the globe.

jan'iceps (*Med.*). A foetal monstrosity in which two heads are fused so that the faces look in opposite directions.

Japan camphor (*Chem.*). Camphor.

Japan wax (*Chem.*). A natural wax obtained from sumach, m.p. 50° C. It has a high content of palmitin.

Japanese paper (*Paper*). Japanese hand-made paper prepared from mulberry bark. The surface is similar to that of vellum.

Japanese river fever (*Med.*). See **shimamushi fever.**

Japanese tissue (*Photog.*). An unsized paper for photographic work.

Japanese vellum (*Paper*). An expensive hand-made paper, prepared from the inner bark of the mulberry tree. Thicker than *Japanese paper.*

japanners' gold-size (*Dec.*). See **gold-size.**

japanning (*Dec.*). The process of covering metal, slate, papier-mâché, etc., with thick copal-oil varnish, which is then stoved at a temperature of about 200° F. The term is also applied to the process of making *patent leather* (q.v.).

jar (*Civ. Eng.*). A special coupling-piece between adjacent boring rods, allowing for relative movement as the rods fall. This permits the drill-bit at the lower end to strike the ground freely, otherwise the weight of the rods, in the case of a deep boring, would be sufficient in itself to break them as they were dropped.

jar-ramming machine (*Moulding*). See **jolt-ramming machine.**

jar (*Elec. Eng.*). A unit of capacitance once used in the British Navy; equal to 1/900 micro-farad. See **Leyden jar.**

jargon aphasia (*Med.*). Rapid unintelligible utterance, due to a lesion in the brain.

jargons, jargoons (*Min.*). A name given in the gem trade to the zircons (chiefly of golden-yellow colour) from Ceylon. They resemble diamonds in lustre but are less valuable. See also **jacinth.**

jar'osite (*Min.*). A hydrated silicate of iron and potassium crystallising in the trigonal system.

jarrah (*Timber*). A dense wood from Australia. It is of a deep-red colour, and is used for making piles, heavy framing, and wood paving-blocks.

jasp-opal (*Min.*). See **opal jasper.**

jaspé, jas'pā (*Textiles*). A plain-woven cotton cloth with a shaded effect, usually embroidered or printed; used for bedspreads, curtains, etc. The warp threads are in pairs, the threads forming a pair or tape being of different colours.

jas'pelline (*Textiles*). A light covert cloth made from Botany warp and fine woollen weft; used for coatings.

jasper (*Min.*). An impure opaque silica, commonly red owing to the presence of iron oxides in the silica.

jasper (*Pot.*). A hard body containing barytes and barium carbonate, capable of being coloured throughout or by means of slip, and of being polished on the lapidary's wheel; usually decorated with relief ornament in a different colour.

jatrorrhi'zine, jateorhizine (*Chem.*). An alkaloid of the *iso*quinoline group, obtained from the Calumba root, *Jateorhiza columba.* It has not been obtained in the free state. Salts, however, are known; e.g. the iodide, $C_{20}H_{20}O_5NI+H_2O$, which crystallises in reddish-yellow needles, m.p. 208°-210° C.

jaundice (*Med.*). Icterus. Yellow coloration of the skin and other tissues of the body, by excess of bile pigment present in the blood and the lymph.—ACHOLURIC JAUNDICE, see **spherocytosis.**—INFECTIOUS JAUNDICE, see **spirochaetosis icterohaemorrhagica.**

Javel water or **eau de Javelle,** zha-vel' (*Chem.*). A mixture of potassium chloride and hypochlorite in solution. Sometimes used for bleaching, and (*Photog.*) for clearing and reducing negatives, also for removing the last traces of hypo from emulsions.

jaw (*Eng.*). (1) One of a pair of members between which an object is held, crushed, or cut, as the *jaws* of a vice or chuck.—(2) One of a pair of members attached to an object, to locate it by embracing another object.

jaws (*Zool.*). In gnathostomatous Vertebrates, the skeletal framework of the mouth enclosed by flesh or horny sheaths, assisting in the opening and closing of the mouth, and usually furnished with teeth or horny plates to facilitate seizure of the prey or mastication: in Invertebrates, any similar structures placed at the anterior end of the alimentary tract.

jaw breaker (*Mining*). A rock-breaker with a vertical fixed jaw and an inclined swinging jaw.

jaw-foot (*Zool.*). See **maxilliped.**

jean (*Textiles*). A heavy cotton-twill material; used for overalls, boot-linings, corsets, etc. Usually of 2-and-1 warp face twill.

jeanette' (*Textiles*). A material of similar type to jean, but generally of lighter weight, and with a 2-and-1 weft face twill.

jedding axe (*Masonry*). An axe having one flat face and one pointed peen.

Jeffcott tacheometer (*Surv.*). A well-known form of *direct-reading tacheometer* (q.v.).

jejunec'tomy (*Surg.*). Excision of part of the jejunum.

jejuni'tis (*Med.*). Inflammation of the jejunum.

jeju'nocolos'tomy (*Surg.*). The formation, by operation, of a communication between the jejunum and the colon.

jeju'nojejunos'tomy (*Surg.*). The formation, by anastomosis, of a communication between two parts of the jejunum, thus short-circuiting the part in between.

jejunos'tomy (*Surg.*). The operative formation of an opening into the jejunum.

jejunot'omy (*Surg.*). Incision of the jejunum.

jeju'num (*Zool.*). In Mammals, that part of the small intestine which intervenes between the duodenum and the ileum.

jelly (*Cinema.*). A gelatine filter which is placed in front of moderately powered lamps to alter the spectral distribution of their light-emission.

jemmy (*Tools*). A small crowbar.

jenny (*Cinema.*). A portable electric generator; used for supplying suitable electric power in motion-picture production.

jerk-pump (*I.C. Engs.*). A timed fuel-injection pump in which a cam-driven plunger overruns a spill port, thus causing the abrupt pressure-rise necessary to initiate injection through the atomiser.

jerkin head (*Build.*). The end of a pitched roof which is hipped, but not down to the level of the feet of the main rafters, thus leaving a half-gable. Also called SHREAD HEAD.

jervine (*Chem.*). $C_{26}H_{37}O_3N+2H_2O$, an alkaloid of unknown constitution, isolated from white hellebore, long prisms, m.p. 238°-242° C. The alkaloid depresses the circulation.

jet. A fluid stream issuing from an orifice or nozzle.

jet (*I.C. Engs., etc.*). A small nozzle for spraying or for metering a fluid, as the *jets* fitted to a carburettor.

jet (or injection) condenser (*Eng.*). A steam condenser in which condensation of the exhaust steam is effected by the direct introduction of jets of cooling water into the steam space.

jet-wave rectifier (*Elec. Eng.*). A form of commutator rectifier in which a jet of mercury impinges on two stationary commutator segments. The requisite deflection of the jet from one segment to the other is effected by electromagnetic means, the jet carrying an alternating current and passing between the poles of a d.c. magnet.

jet (*Min.*). A hard coal-black variety of lignite, showing under the microscope the structure of coniferous wood.

jet shales (*Geol.*). Shales containing 'jet-rock,' found in the Upper Lias of the Whitby district and belonging to the Jurassic System.

jetting-out (*Build.*). The projection of, e.g., a corbel from the face of a wall.

jettison gear (*Aero.*). Apparatus for the rapid discharge of fuel in an emergency. Principally needed on aircraft with long air-endurance, which have to carry heavy loads of fuel during the early stages of a flight.

jetty (*Build.*). See **jutty.**—(*Hyd. Eng.*) See **groynes.**

Jew Stone (*Geol.*). A local division of limestones found in the rocks of the Rhaetic stage of the Jurassic System in Somerset. The rock shows the boring action of organisms.

jewel (*Horol.*). Natural ruby or sapphire, or synthetic stone, used for pivot bearings, also for the pallets and impulse pin. Owing to the high polish that can be obtained with such stones, combined with a hardness of surface, they provide wearing surfaces which have a long life and which cause little friction.

jewel setting (*Horol.*). The means of holding the jewel in the plate or cock.

jewelled (*Horol.*). Fitted with jewels. In watches (except in the lowest grades) the balance staff is always jewelled with two through holes and two end-stones. The pallet staff is also jewelled, but only the higher grades of watches have end-stones fitted. In watches with the club-tooth escapement, the pallets and impulse pin are invariably jewels. A '15-jewel' watch has the following jewels: balance staff 4, pallet staff 2, escape wheel 2, fourth wheel 2, third 2, pallets 2, impulse pin 1. Watches may have as many as 23 jewels. For platform escapements the holes are generally jewelled. In precision clocks, all the holes may be jewelled, and often the acting faces of the pallets are formed of inset jewels.

jib (*Eng.*). The boom of a crane or derrick. See **jib crane.**

jib barrow (*Eng.*). A wheelbarrow consisting of a platform without sides; used in foundries and workshops.

jib crane (*Eng.*). An inclined arm or jib attached to the foot of a rotatable vertical post and supported by a tie-rod connecting the upper ends of the two. The load rope or chain runs from a winch on the post, and over a pulley at the end of the jib.

jib door (*Join.*). A door which carries and continues the general decoration of the wall.

jib holeman (*Mining*). A man whose work it is to make recesses for the cutting disc at the end of coal-cutting machine faces.

jig (*Eng.*). An appliance used in a machine shop for accurately guiding and locating tools during the operations involved in producing interchangeable parts.

jig (*Mining*). See **Hancock—** **harz—**

jig or jigger (*Mining*). (1) A coupling or link for connecting tubs or waggons.—(2) Another name for *incline man.*

jig-back (*Civ. Eng.*). The type of *aerial ropeway* (q.v.) operated with a pair of carriers that travel in reverse directions, and are loaded or brought to rest alternately at the opposite stations, but which do not pass round the terminals. Also called the TO-AND-FRO AERIAL ROPEWAY.

jigger (*Eng.*). A hydraulic lift or elevator in which a short-stroke hydraulic ram operates the lift through a system of ropes and pulleys in order to increase the travel.

jigger (*Mining*). See **jig.**

jigger (*Pot.*). A template for forming a vessel on a potter's wheel.

jigger (*Radio*). An auto-transformer used for coupling the intermediate circuit of a spark transmitter to the antenna circuit. (Obsolete.)

jim-crow (*Eng.*). (1) A rail-bending device, operated by hand or by hydraulic power.—(2) A crowbar fitted with a claw.—(3) A swivelling tool-head used on a planing machine, cutting during each stroke of the table.

jimmy (*Tools*). A small crowbar.

jink (*Mining*). A coupling between two mine-tubs or trains in a set or journey.

jink-carrier (*Mining*). A lad employed to carry the loose couplings or jinks from one train of mine-tubs to another.

jinnier (*Mining*). See **incline man.**

jobbing founts (*Typog.*). Founts of type used for display purposes.

jobbing machines (*Print.*). The class of machines, usually platens, used for printing commercial or jobbing work.

jobbing work (*Typog.*). Small printed matter such as handbills, billheads, cards, etc.

jobs (*Textiles*). The term used for defective or damaged cotton fabrics; usually sold by weight.

Job's-tears (*Min.*). Rounded grains of chrysolite (olivine) found associated with garnet in certain localities.

jockey (or **monkey**) **pot** (*Glass*). A pot of small size that is set on top of another pot, for the purpose of melting special glasses not needed in great quantity. Several such pots may be set in the space of one full-sized pot.

jockey relay (*Teleg.*). A double moving-coil relay in which two independently suspended coils have different degrees of damping, so that when the signal-current is passed through both, antennae fixed to the fast-moving coil operate between antennae fixed to the slow-moving coil. The antennae therefore repeat signals which are the variations in the signal-current, independent of signal-current drift.

jockey wall (*Cinema.*). The same as *wild wall* (q.v.).

joggle (*Build.*). A shoulder formed on one structural member to support and take the thrust from another member.

joggle (*Carp.*). See **stub tenon.**

joggle (*Eng.*). (1) A small projection on a piece of metal fitting into a corresponding recess in another piece, to prevent lateral movement.—(2) A lap joint in which one plate is slightly cranked so as to allow the inner edges of the two plates to form a continuous surface.

joggle (*Masonry*). A piece or pin binding together adjacent stones in a course; similar to a *dowel* (q.v.) or *cramp* (q.v.).

joggle (*Ship Constr.*). A sharp distortion in a plate, angle, or other section, made purposely to permit overriding of contacting members. Usually made cold in a joggling machine, but occasionally made hot. The advantage is economic in that it reduces the amount of steel packing.

joggle beam (*Carp.*). A built beam whose parts are joggled into one another.

joggle joint (*Masonry*). A connexion between adjacent ashlars in which *joggles* (q.v.) are employed.

joggle-piece, joggle-post (*Carp.*). A *king-post* (q.v.).

joggle-truss (*Carp.*). A roof-truss formed with a king-post.

joggle work (*Masonry*). Coursed masonry in which slipping between the stones is prevented by the insertion of *joggles* (q.v.).

John o' Groats Sandstone (*Geol.*). A local group of red and yellow sandstones, found in the Middle Old Red Sandstones in the Orcadian region of northern Scotland.

Johne's disease (*Vet.*). A contagious infection of the small intestine of ruminants, due to *Mycobacterium paratuberculosis.*

Johnson noise (*Elec. Comm.*). Random noise-currents resulting from potential differences arising from the thermal agitation of electrons which are free to move in conductors. This noise is apparent with sufficient amplification, and therefore sets a natural limit to the lowest power-levels which can be used in electrical communication. See also **fluctuation noise.**

Johnston's organ (*Zool.*). In Insects, a sensory structure situated within the second antennal joint and believed to be auditory in function.

joiner's chisel (*Join.*). A *paring chisel* (q.v.).

joiner's cramp. See **cramp.**

joiner's gauge. A *marking gauge* (q.v.).

joinery. (1) The craft of working timber to form the finishings of a building, as distinct from *carpentry*.—(2) The material worked in this way.—*n.* **joiner.**

joint. A connexion made between two pieces.

joint (*Bind.*). One of the lateral projections formed on each side of a volume in the process of backing; along it the cover hinges. A linen strip pasted down the fold of the endpaper is called a *cloth joint.*

joint, joining (*Bot.*). A node.

joint (*Cables*). An arrangement for joining one cable to another.

joint (*Foundry*). The parting plane in the sand round a rammed mould, to enable the pattern to be withdrawn. It is covered with *parting sand* (q.v.) before the cope or top half is rammed.

joints, jointing (*Geol.*). Vertical, inclined, or horizontal divisional planes, found in almost all rocks; produced by tension or torsion. See **columnar structure, rift and grain.**

joint chair (*Rail.*). A type of chair used at the joint between successive lengths of rail and providing support for the ends of both lengths.

joint fastening (*Rail.*). A fish-plate or other means of fastening together the adjacent ends of successive lengths of rail.

joint fellon (*Vet.*). See **fellon.**

joint hinge (*Join.*). A *strap hinge* (q.v.).

joint-ill (*Vet.*). Pyaemia involving the joints of suckling animals. See also **pyosepticaemia.**

joint-mouse (*Med.*). A hard body, often a piece of cartilage, loose in the joint cavity; found especially in the joints of those suffering from osteo-arthritis.

joint runner (*Civ. Eng.*). An incombustible material used as packing in the bottom of the socket of a pipe, at a joint made with lead, in order to prevent the latter from running when molten. See **spigot-and-socket joint.**

jointed (*Bot.*). Said of an elongated plant member which is constricted at intervals and ultimately separates into a number of portions by breaking across the constrictions.

jointer (*Build.*). A tool used by bricklayers to form the mortar joint between the courses of bricks in pointing.

jointer plane (*Join.*). A *jointing plane* (q.v.).

jointing (*Build.*). The operation of making and/or finishing the joints between bricks, stones, timbers, pipes, etc.

jointing (*Eng.*). Material used for making a pressure-tight joint between two surfaces; e.g. asbestos sheet, corrugated steel rings, vulcanised rubber, etc. See **gasket, insertion joint.**

jointing (*Geol.*). See **joints.**

jointing plane (*Join.*). A bench plane, similar to the jack plane but larger (28 in. to 30 in. long), used for truing the edges of timbers which are to be accurately fitted together. Also called JOINTER PLANE, SHOOTING PLANE.

jointing rule (*Build.*). A straightedge about 6 ft. long, used as a guide when *pencilling* (q.v.).

jointless flooring (*Build.*). See **magnesite flooring.**

joist (*Build., Struct.*). A horizontal beam of timber or steel used with others as a support for a floor and/or ceiling.

joist, rolled-steel (*Eng.*). See **H-beam.**

jolley (*Pot.*). A machine for moulding hollow-ware.

Jolly's apparatus (*Chem.*). Apparatus for the volumetric analysis of air.

jolt- (or **jar-**) **ramming machine** (*Moulding*). A moulding machine (see **machine moulding**) in which the box, pattern, and sand are repeatedly lifted by a table operated by air pressure, and allowed to drop by gravity, the resulting jolt or jar packing or ramming the sand in an efficient manner. Also called JOLT-RAM MACHINE.

jolt-squeeze machine (*Moulding*). A moulding machine (see **machine moulding**) used for deep patterns; in it jolting is used to pack the sand on to the pattern followed by squeezing from the top to complete the ramming.

Joly screen (*Photog.*). A colour mosaic consisting of ruled lines.

Joly's steam calorimeter (*Heat*). An instrument used for measuring the specific heat of a body, by weighing the amount of steam condensed on it when suspended in a steam chamber.

Jona effect (*Cables*). See **stranding effect.**

jor'danon, Jordan's species (*Bot.*). A true breeding race of a species, but not sufficiently distinct to be given specific rank.

joria (*Textiles*). A fine type of East Indian wool, produced in the district of Joria.

Jos-pe (*Photog.*). An imbibition method of three-colour printing; gelatine matrices are formed with hardening developers, before they take up their respective dyes.

joule, jool (*Phys.*). A unit of energy equal to 10^7 ergs, derived from the practical system of electrical units. It may be defined as the energy dissipated in one second by a current of one ampere flowing across a potential difference of one volt. (Named after F. P. Joule, 1818-89; name pronounced jowl)

Joule effect (*Elec. Eng.*). The heating effect caused by an electric current flowing through a resistance.

Joule-Thomson (Joule-Kelvin) effect (*Heat*). The slight fall in temperature which occurs when a gas is allowed to expand without doing external work. The effect is due to energy absorbed in overcoming the cohesion of the molecules of the gas. The liquefaction of gases by the Lindé process depends on the Joule-Thomson effect.

Joule's equivalent (*Heat*). See **mechanical equivalent of heat.**

Joule's law (*Chem.*). (1) The intrinsic energy of a given mass of gas is a function of temperature alone; it is independent of the pressure and volume of the gas.—(2) The molecular heat of a solid compound is equal to the sum of the atomic heats of its component elements in the solid state.

Joule's law (*Elec. Eng.*). A law, enunciated by Joule, which states that the heat produced by a current I passing through a conductor of resistance R for a time t is proportional to I^2Rt.

journal (*Eng.*). That part of a shaft which is in contact with, and supported by, a bearing.

journey man (or rider) (*Mining*). A dukey-rider, i.e. a man working on a *dukey* (q.v.).

Joy's valve-gear (*Eng.*). A steam-engine valve-gear of the radial type used on some locomotives; in it motion is taken entirely from a point on the connecting-rod.

joystick (*Aero.*). Colloquialism for *control column.*

ju'gal (*Zool.*). A paired membrane bone of the zygoma of the Vertebrate skull, lying between the squamosal and the maxilla.

juggle (*Timber*). A log sawn to length, and either split or left in the round.

jug'ular (*Zool.*). Pertaining to the throat or neck region; e.g. a *jugular* vein.

ju'gulum (*Zool.*). In Insects, the jugum: in Birds, the region of the breast which merges into the neck.

ju'gum (*Bot.*). A pair of opposite leaves.

jugum (*Zool.*). In some *Lepidoptera*, a finger-shaped process arising from the posterior margin of the fore-wing; it serves to unite the two wings during flight.—*pl.* **juga.**

juice (*Cinema.*). Colloquialism for *electric current.* Hence *juicer* and *juice-gang* for the electricians in a motion-picture studio.

jula'ceous (*Bot.*). Cylindrical and smooth; resembling a catkin.

Julian calendar (*Astron.*). The system of reckoning years and months for civil purposes, based on a tropical year of 365·25 days; instituted by Julius Caesar in 45 B.C. and still the basis of our calendar, although modified and improved by the Gregorian reform.

Julian date (*Astron.*). The number of any given day, in a system of reckoning by successive days, independently of various calendars and chronological epochs; instituted by J. Julius Scaliger in 1582, it has no connexion whatever with the Julian calendar.

jump join (*Forging*). A butt joint made by *jumping up* (q.v.) the ends of the two pieces before welding them together.

jumper (*Civ. Eng.*). A pointed steel rod which is repeatedly dropped on the same spot from a suitable height (being turned slightly between blows), and which by pulverising the earth forms a borehole.

jumper (*Elec. Eng.*). (1) A short section of overhead transmission line conductor serving to form an electrical connexion between two sections of line.—(2) A section of conductor making connexion between the coaches of a multiple-unit electric train.

jumper (*Horol.*). A click in the form of a wedge which causes a star wheel to jump forward one space.

jumper (*Masonry*). A *through stone* (q.v.).

jumper (*Mining*) The borer, steel, or bit for a compressed-air rock drill.

jumper (*Teleph.*). A wire or pair of wires which are used for the arbitrary connexion between groups of circuits, e.g. the incoming subscriber's lines and the internal circuits in an exchange, the jumpers here being flexible pairs between the rows of terminals on opposite sides of a main frame.

jumper bar (*Mining*). A weighted steel bar with a cutting edge, raised and dropped by hand.

jumper-cable (*Elec. Eng.*). A cable for making electrical connexion between two sections of conductor-rail in an electric traction system.

jumper field (*Teleph.*). The cross-connexion or translation field in a director. Any space devoted to jumpers, i.e. temporary connexions, especially within a distribution frame.

jumper-top blast pipe (*Eng.*). A locomotive *blast pipe* (q.v.) in which the back pressure, and hence the draught, are automatically limited by the lifting of an annular valve, which increases the nozzle area.

jumping-figure watch (*Horol.*). A watch in which the time is indicated by figures on discs jumping into position in windows in the watch dial.

jumping-up (*Forging*). The operation of thickening the end of a metal rod by heating and hammering it in an endwise direction. Also called UPSETTING.

junction (*Rail.*). The place where two tracks connect.

junction-box (*Elec. Eng.*). A box, forming part of a distribution system, which contains switches, links, or fuses for connecting feeders and distributing mains.

junction circuit (*Teleph.*). A circuit between telephone exchanges, which is used by operators for connecting subscribers who have lines terminating in different exchanges.

junction point (*Surv.*). The common point between a circular curve and one of its transition curves.

Jungermanniales, yoong′ er-man-i-ā′-lēz (*Bot.*).

One of the main subdivisions of the *Hepaticae*. The plant body is either a thallus or a cylindrical branched leafy stem. The thallus is of simple construction, without air pores, and the antheridia and archegonia develop on or (rarely) in it. The capsule usually opens by four valves.

Jungner accumulator, yoong'ner (*Elec. Eng.*). A form of nickel-iron accumulator having an alkaline electrolyte.

junk ring (*Eng.*). A metal ring attached to a steam-engine piston for confining soft packing materials; or for similarly holding a cast-iron piston-ring in position

junket (*Chem.*) A product obtained from milk by the action of rennin.

junking (*Mining*). The process of cutting a passage through a pillar of coal.

Jupiter (*Astron.*). The largest planet in the solar system, the fifth in order of distance from the sun, having a mass about 318 times that of the earth, a sidereal period of 11·86 years, and nine satellites.

Juras'sic System (*Geol.*). The middle division of the Mesozoic era, named after the Jura Mts., where rocks of this age are found.

See **Corallian**
Cornbrash
Great Oölite Series
Inferior Oölite Series
Kimeridge Clay
Oxford Clay
Portlandian
Purbeckian.

jury strut (*Aero.*). A strut giving temporary support to a structure. Usually necessary in a biplane structure to support the wings during folding.

just scale, just temperament (*Acous.*). The same as *natural scale.*

justification (*Typog.*). The even spacing of words to a given measure of line.

jut window (*Build.*). A *bay-window* or *bow-window* (qq v.).

jute (*Textiles*). A bast fibre obtained from the Asian plants *Corchorus olitorius* and *C. capsularis*, and from the American plant *Abutilon theophrasti* (Indian Mallow). Used in the manufacture of cordage, carpets, canvas, hessian, etc.

jutting-out (*Build.*). Said of cornices, windows, etc. which project beyond the general wall-surface.

jutty (*Build.*). A projecting part of a building. Also called a JETTY.

jutty (*Mining*). In Derby and Notts, a small tub or truck used for gathering coal in thin seams.

juvenile (*Geol.*). Said of water and other volatile materials which are known to be emanations from a mass of molten rock matter or magma.

juvenile form (*Bot.*). A young plant which has leaves and other features different from those of a mature plant of the same species.

juvenile leaf (*Bot.*). The form of leaf found on a sporeling or seedling, when it differs markedly from the leaf of the adult plant.

juvenile stage (*Bot.*). A special stage in the life-history of some algae, from which the ordinary plant develops as a vegetative outgrowth.

juxtaposition twins (*Min.*). Two (or more) crystals united regularly, in accordance with a 'twin law,' on a plane (the 'composition plane') which is a possible crystal face of the mineral. Cf. *interpenetration twins.*

k (*Phys.*). A symbol for (1) the *Boltzmann constant* (q.v.); (2) the *radius of gyration* (q.v.).

k (*Chem.*). A symbol for the velocity constant of a chemical reaction.

κ- (*Chem.*). A symbol for: (1) *cata-*, i.e. containing a condensed double aromatic nucleus substituted in the 1.7 positions; (2) substitution on the tenth carbon atom.

K (*Chem.*). The symbol for *potassium.*

K (*Chem.*). A symbol for chemical equilibrium constant; K_s, solubility product.

[K] (*Light*). A very strong Fraunhofer line in the extreme violet. See **[H]**.

K-acid (*Chem.*). 1,8-Aminonaphthol-4,6-disulphonic acid, an intermediate for dyestuffs.

K-filter (*Elec. Comm.*). The same as *constant-k filter* (q.v.).

K-series (*Phys.*). The shortest wavelengths in the characteristic X-ray spectra of the elements. The *K-series* consist chiefly of two lines, K_α and K_β, which may be recognised in the spectra of elements from atomic number 10 to 90, there being a linear relation between the square root of the frequency of the radiation and the atomic number See **Moseley's law**, also **K, L, M . . . shells.**

K-term (*Astron.*). The name given to a term, extensively studied by the Japanese astronomer Kimura, which occurs in the mathematical expression of the variation of latitude.

Kahler's disease (*Med.*). Multiple myeloma. A disease in which tumours arising from cells of the bone-marrow appear in various parts of the skeleton.

Kahn's test (*Med.*). A precipitation test for syphilis, diluted antigen being added to inactivated blood serum.

kainite (*Min.*). Hydrous sulphate of magnesium, with potassium chloride, which crystallises in the monoclinic system. It usually occurs in the upper portions of salt deposits, e.g. at Stassfurt (Germany).

Kainozoic (*Geol.*). See **Cainozoic.**

kala-azar (*Med.*). Black fever. A disease due to infection with the protozoon *Leishmania donovani*; characterised by enlargement of the liver and spleen, anaemia, wasting, and fever.

Kalanite (*Cables*). A proprietary hard insulating material, not affected by oil, used for spreaders in cable joints.

Kaleoilres tape (*Cables*). A proprietary oil-resisting compounded linen tape; used in cable joints.

kalinite (*Min.*). Hydrous sulphate of potassium and aluminium, which probably crystallises in the monoclinic system. It has the same composition as potash alum. They both occur as an efflorescence upon argillaceous minerals, and in connexion with volcanoes.

kalioph'ilite (*Min.*). Silicate of potassium and aluminium, which crystallises in the hexagonal system. It commonly contains small amounts of nepheline. Also called PHACELLITE or FACELLITE.

kalliro'tron (*Radio*). An aperiodic combination of two triode valves for obtaining negative resistance.

kal'litype (*Photog.*). A process involving photoreduction of ferric to ferrous salts, which in turn can reduce silver salts.

kalym'mocytes (*Zool.*). In *Urochorda*, cells of the follicle which pass into the egg after maturation.

kam'acite (*Min.*). A variety of nickeliferous iron, found in meteorites.

kam'pylite, campylite (*Min.*). A variety of mimetite, composed of lead chloride and lead arsenate, crystallising, in the form of barrel-shaped crystals, in the hexagonal system.

Kanawha Series (*Geol.*). A group of productive coal measures occurring in the Pennsylvanian of the Appalachian region, and completely developed in Virginia. Sometimes known as the UPPER POTTSVILLE SERIES.

kandahar (*Textiles*). An East Indian wool of good quality, used in the manufacture of native Indian carpets.

kankar (*Geol.*). See **kunkar.**

ka'olin (*Geol.*). See **china clay.**

kaolinisation (*Geol.*). The processes whereby feldspars and other alumino-silicates are altered to kaolin, the active agents being, apparently, magmatic water and carbon dioxide.

ka'olinite (*Min.*). A finely crystalline form of hydrated aluminium silicate, $(OH)_4Al_2Si_2O_5$, occurring as minute monoclinic flaky crystals with a perfect basal cleavage, resulting chiefly from the alteration of feldspars under conditions of hydrothermal or pneumatolytic metamorphism. The kaolin group of minerals includes also the recently recognised isomers *dickite* and *nacrite.* (See Ross and Kerr, *Amer. Min.* 1930, vol. 15, p 34.)

Kaplan water turbine (*Eng.*). A propeller-type *water turbine* (q.v.) in which the pitch of the blades can be varied in accordance with the load, resulting in high efficiency over a large load-range.

Kapp coefficient (*Elec. Eng.*). A coefficient occasionally used in electric-machine design and embodying the form factor, distribution factor, etc. so that, when multiplied by the number of turns in series, the flux and 10^{-8}, it gives the r.m.s. value of the e.m.f.

Kapp line (*Elec. Eng.*). A unit of magnetic flux occasionally used in electric-machine design; equal to 6000 lines (maxwells).

Kapp phase advancer, Kapp vibrator (*Elec. Eng.*). A form of phase advancer for use with slip-ring induction motors. It consists of a small armature connected in each phase of the rotor circuit and allowed to oscillate freely in a d.c. field so that it has a leading e.m.f. induced in it.

karat. See **carat.**

karri (*Timber*). A dense wood from Australia, similar to jarrah. It is of a deep-red colour, and is used for making piles, heavy framing, and wood paving-blocks.

kary-, karyo- (Greek *karyon*, nucleus). A prefix used in the construction of compound terms; e.g. *karyoplasm*, nucleoplasm. See also under **caryo-.**

karyas'ter (*Cyt.*). A group of chromosomes arranged like the spokes of a wheel.

karyen'chyma (*Zool.*). See **karyolymph.**

karyogamy (*Biol.*). The union of two nuclei, especially gametic nuclei.

karyokine'sis (*Cyt.*). See **mitosis.**

kar'yolymph (*Bot.*). A colourless watery fluid, occupying most of the space inside the nuclear membrane; nuclear sap.

karyolysis (*Cyt.*). Dissolution of the nucleus by disintegration of the chromatin: gradual disappearance of the nucleus in a dead cell.

kar'yomere (*Cyt.*). A swollen condition sometimes seen in chromosomes towards the end of a nuclear division.

karyomi'crosome (*Cyt.*). A nuclear granule.

kar'yomite (*Cyt.*). See **chromosome.**

kar'yon (*Cyt.*). See **nucleus.**

kar'yophans (*Zool.*). In some *Ciliophora*, nuclear granules composing the spironeme and axoneme of the stalk.

kar'yoplasm (*Cyt.*). See **nucleoplasm.**

karyoplasmat'ic ratio (*Cyt*). The ratio between the volume of a nucleus and that of the cytoplasm in the same cell.

karyorrhex'is (*Cyt.*). Breaking up of the chromatin of the nucleus into darkly staining granules (in necrosis of the cell).

kar'yosome (*Cyt.*). A nucleus: a chromosome: an aggregation of chromatin in a resting nucleus: a type of nucleolus well shown by many of the lower plants, which stains with basic dyes and furnishes material for the chromosomes during mitosis. Cf. *plasmosome.*

karyothe'ca (*Cyt.*). See **nuclear membrane.**

kar'yotin (*Cyt.*). The substance which makes up the nuclear reticulum. See **chromatin.**

kashgar (*Textiles*). A white silky wool produced in Chinese Turkestan; exported principally to Russia.

kaspine leather (*Leather*). A white washable leather; used for gloves, etc.

kata- (Greek *kata*, down). A prefix used in the construction of compound terms; e.g. *katagenesis*. See also terms at **cata-.**

kata-positive (*Photog.*). The description of a positive on an opaque surface, such as paper, in contrast to a transparency on glass or film.

kata-thermometer (*Mining*). An instrument to measure the cooling power of air on the human body.

katabat'ic (*Meteor*). Said of a wind which is caused by the downward motion of air due to convection, as when cold air flows down into a valley from high ground.

katabi'ons (*Biol*). Organisms in which katabolic processes predominate over anabolic processes, as animals.

katab'olism (*Biol.*). The sum-total of the disruptive metabolic processes in an organism, organ, or cell. Cf. *anabolism.*

katad'romous, *or* —drō'mus (*Bot.*). Said of the venation in the royal fern, where the first nerves in each leaf segment come off on the basal side of the midrib.

katadromous (*Zool.*). (Of Fish) migrating to water of greater density than that of the normal habitat to spawn, as the Fresh-water Eel which migrates from fresh to salt water to spawn. Cf. *anadromous.*

katagen'esis (*Zool.*). Retrogressive evolution.

katakinet'ic (*Biol*). Tending to the discharge of energy. Cf. *anakinetic.*

katakinet'omeres (*Biol.*). Energy-poor, stable protoplasm molecules. Cf. *anakinetomeres.*

kataklastic structures (*Geol.*). Structures produced in a rock by the action of severe mechanical stress, during dynamic metamorphism. The constituent minerals generally show deformation and granulation.

katamor'phism (*Geol.*). The breaking-down processes of metamorphism, as contrasted with the building-up processes of anamorphism.

kat'aphase (*Cyt.*). The stages of mitosis from the formation of the chromosomes up to the division of the cell.

kat'aplexy (*Zool.*). The state of imitation of death, adopted by some animals when alarmed.

kat'astate (*Zool.*). A product of katabolism.

Katayama disease (*Med.*). A disease due to invasion of the body by the blood fluke *Schistosoma Japonicum*, characterised by urticaria, painful enlargement of liver and spleen, bronchitis, diarrhoea, loss of appetite, and fever lasting a few days to several weeks.

katharom'eter (*Chem.*). An instrument for the analysis of gases by means of measurements of thermal conductivity.

kauri gum, kow'ri (*Chem.*). A gum found in New Zealand, used for varnishes and linoleum cements. It is the resinous exudation of the *kauri pine* (*Agathis australis*), a tree whose timber is of value for general joinery and decorative purposes.

KC.P.S., kcps, kc/s (*Elec. Comm.*). Abbrevs. for *kilo-cycles per second.*

Keber's organ, kā'ber (*Zool.*). In some *Pelecypoda*, a glandular organ connected with the epithelial lining of the pericardial cavity.

kedge anchor (*Ships*). A small anchor used for steadying and warping purposes.

keel (*Aero.*). The longitudinal member along the under side of the hull of a rigid airship, or the under side of the envelope of a semi-rigid airship. It distributes the effect of the concentrated loads along the airship structure. See also **keelson.**

keel (*Bot.*). (1) See **carina.**—(2) A longitudinal narrow outgrowth from the under side of a leaf or leaf-like structure.—(3) Any prominent ridge.

Keele Series (*Geol.*). A local group of red and purple sandstones and marls, which constitutes the highest division of the Coal Measures in the North Staffs coalfield. They are barren red measures, deposited under semi-desert conditions.

keelson (*Aero.*). A longitudinal structural member inside the bottom of the hull of a flying-boat. It forms part of the main framework, connecting up the transverse members and bulkheads.—(*Ship Constr.*). (1) A term descriptive of the longitudinal strength members of a ship, which form the shell-plating stiffeners. A *flat keel* is the lower horizontal member of the ship's backbone; a *centre keelson* is the vertical member thereof; a *bar keel* is similar to the latter, external to the hull; *side keelsons* are vertical members, off the ship's centre line.—(2) The wrought-iron saddles or standards which support cylindrical boilers of the Scotch marine type. Sometimes called BOILER CRADLES.

Keene's cement (*Plast.*). A quick-setting hard plaster, made by soaking plaster of Paris in a solution of alum or borax and cream of tartar.

keeper (*Build.*). (1) The part of a Norfolk latch limiting the travel of the fall bar.—(2) The socket fitted on a door jamb to house the bolt of the lock in the shut position.

keeper (*Elec. Eng.*). See **armature.**

keeper, keep (*Eng.*). The lower part of the bearing in a railway-truck axle-box, which limits the downward movement of the box due to track irregularities.

keeving (*Mining*). See **tossing.**

Keewat'in Group (*Geol.*). A series of basic pillow lavas associated with sedimentary iron ores (worked in the 'Iron Ranges'); forms part of the Pre-Cambrian succession in the Canadian Shield. See also **Loganian System.**

kef'ir (*Chem.*). A fermentation product of milk in which the lactose has undergone both alcoholic and lactic fermentation simultaneously.

Keith and Flack's node (*Zool.*). A plexiform mass of special connective tissue, situated near the entrance of the superior vena cava, under the endocardium of the right auricle in the Mammalian heart; here the heart contractions originate.

kelat' (*Textiles*). A wool from Baluchistan, used for carpet making.

Kellaways Rock (*Geol.*). A calcareous sandstone, richly fossiliferous, which forms a basement bed to the Oxford Clay, resting directly on the Cornbrash, or separated therefrom by a variable thickness of clay, the *Kellaways Clay.*

Keller furnace (*Elec. Eng.*). A form of electric furnace for iron smelting, in which part of the heat is produced by the passage of the current through the charge and part by arcs between the electrodes and the charge.

Kelling's test (*Chem.*). A test for the detection of lactic acid in gastric juice, based upon the colouring effect produced by the addition of a few drops of a very dilute neutral ferric chloride solution.

ke'loid (*Med.*). A dense new growth of skin occurring in skin that has been injured.

kelp (*Bot.*). A general name for large seaweeds.

kelvin (*Elec. Eng.*). A name proposed for the kilowatt-hour but not in very common use.

Kelvin balance (*Elec. Eng.*). See **ampere-balance.**

Kelvin compass (*Ships*). A form of ship's compass having a very light card and a number of short parallel needles held by silk cords, as well as other special features. Also called THOMSON COMPASS.

Kelvin double bridge (*Elec. Eng.*). See **double bridge.**

Kelvin effect (*Elec. Eng.*). See **Thomson effect.**

Kelvin electrometer (*Elec. Eng.*). See **quadrant electrometer.**

Kelvin sounder (*Ocean.*). An apparatus which consists of a weight attached to a wire and carries a glass tube of small calibre open at one end and coated inside with a composition sensitive to sea water. This indicates the pressure and therefore the depth of water reached. Cf. *echo sounding.*

Kelvin's absolute scale of temperature (*Heat*). A temperature scale derived from thermodynamical considerations. This scale is such that, if reversible cycles are performed over equal ranges of temperature at various parts of the scale, equal amounts of work are done at each cycle. This scale agrees fairly well with the gas scale of temperature, particularly the hydrogen scale.

Kelvin's law (*Elec. Eng.*). A principle regarding the transmission of electrical energy. It states that the most economical size of conductor to use for a line is that for which the annual cost of the losses is equal to the annual interest and depreciation on that part of the capital cost of the conductor which is proportional to its cross-sectional area.

Kemble Beds (*Geol.*). A local division of the Great Oölite of Gloucester and the adjacent counties.

kemp (*Textiles*). A thick fibre, without scales, occurring in badly bred wools; it will not dye, but kempy wool is used for obtaining dress effects, the kemps showing white on a coloured foundation.

Kennack Gneiss (*Geol.*). Banded red and black gneisses which form part of the Lizard Complex of Cornwall; they result from the admixture of acid (granitic) and basic (basaltic) magma, intruded during a period of stress.

kennel lameness (*Vet.*). Chronic arthritis of dogs.

Kennelly-Heaviside layer (*Radio*). See **Heaviside layer.**

kenotron (*Thermionics*). A high-voltage diode rectifier.

kent cap (*Paper*). A standard size of brown paper, 18 × 21 in.

kental'lenite (*Geol.*). A coarse-grained, basic igneous rock, named from the type locality, Kentallen, Argyllshire; it consists essentially of olivine, augite, and biotite, with subordinate quantities of plagioclase and orthoclase in approximately equal amounts.

kentledge (*Civ. Eng., etc.*). Scrap iron, rails, heavy stones, etc., used as loading on a structure (e.g. upon the top section in sinking a cylinder caisson), or as a counterbalance for a crane.

kent'rogon (*Zool.*). A stage in the life-history of certain parasitic *Cirripedia* (e.g. *Sacculina*) which succeeds the Cypris stage and precedes the entry of the parasite into the body of the host.

ken'yte (*Geol.*). A fine-grained igneous rock, occurring as lava flows on Mt. Kenya, E. Africa, and in the Antarctic; essentially an olivine-bearing phonolite with phenocrysts of anorthoclase.

Ke'okuk Limestone (*Geol.*). A marine limestone with a rich fauna, notably of crinoids, occurring at the top of the Lower Mississippian of the Mississippi valley.

kep (*Build.*). A Scottish term denoting a door stop.

keps (*Mining*). Bearing-up stops for supporting a cage or load at the beginning or end of hoisting in a shaft.

kephalin (*Chem.*). See **cephalin.**

Kepler's laws (*Astron*). The three laws enunciated by Kepler which initiated the modern mathematical treatment of the planetary motions. Respectively, they state that: (1) Every planet moves in an ellipse having the sun in one focus; (2) the radius vector sweeps out equal areas in equal times; (3) the squares of the periodic times are proportional to the cubes of the mean distances.

kera-, kerat-, kerato- (Greek *keras*, horn). **A prefix** used in the construction of compound terms; e g. *keratogenous.* In medical terms, the prefix denotes the cornea. See also terms at **cera-, cerat(o)-.**

keraph'yllous (*Zool.*). (In ungulate Mammals) said of a layer intervening between the horny part of a hoof and the living tissue.

ker'asin (*Chem.*). See **cerebrosides.**

keratal'gia (*Med.*). Pain in the cornea of the eye.

keratecta'sia (*Med.*). Local bulging of part of the cornea.

keratec'tomy (*Surg.*). Excision of part of the cornea.

ker'atin (*Zool.*). An insoluble scleroprotein formed by the transformation of the eleidin granules in the superficial cells of the stratum granulosum of the Vertebrate integument; it constitutes the horny part of hoofs, nails, and hair, and contains a high percentage of sulphur, part of which is readily split off in the form of H_2S by hydrolysis.

keratinisa'tion (*Zool.*). Horn-formation: production of keratin.

kerati'tis (*Med.*). Inflammation of the cornea.

kerat'ocele (*Med.*). Protrusion of the innermost layer (Descemet's membrane) of the cornea through a corneal ulcer.

keratoco'nus (*Med.*). Conical cornea. Cone-shaped deformity of the cornea owing to (probably congenital) weakness and thinness of the centre.

keratoder'mia blennorrha'gica (*Med.*). Red patches on the skin which become hard, dry, yellow, and raised above the skin, occurring in gonorrhoea.

keratogenous,—toj'en-us (*Zool.*). Horn-producing: keratin-producing.

keratoglo'bus (*Med.*). Hemispherical protrusion of the whole cornea; e.g. in glaucoma in infants.

keratohy'alin (*Zool.*). In the skin of higher Vertebrates, a hyaline substance present as flakes or droplets in the stratum lucidum.

kerato'ma (*Med.*). A tumour of the skin in which overgrowth of the horny layer predominates.

keratomala'cia (*Med.*). A disease in which the cornea first becomes dry and lustreless and then softens; associated with deficiency of vitamin A in the diet.

ker'atophyre (*Geol.*). A fine-grained igneous rock of intermediate composition. It is essentially a soda-trachyte, containing albite-oligoclase or anorthoclase in a cryptocrystalline groundmass. The pyroxenes, when present, are often altered to chlorite or epidote.

keratoplas'ty (*Surg.*). The grafting of a new cornea on to an eye the cornea of which has become opaque.

Kerato'sa (*Zool.*). An order of *Demospongiae* in which the skeleton is composed of spongin fibres; includes the Bath Sponges.

ker'atoscleri'tis (*Med.*). Inflammation of the cornea and of the sclera of the eye.

kerato'sis (*Med.*). Overgrowth of the horny layer of the skin.

keratot'omy (*Surg.*). Incision of the cornea.

kerb (*Civ. Eng.*). A border stone edging a raised footpath or street refuge. Also spelt CURB and KIRB.

kerf (*Build.*). A heap of mixed clays and ashes left exposed to the action of the weather, sometimes for long periods, in order to produce a mixture suitable for brick-making.

kerf (*Carp.*). The cut made by a saw.

kerfed beam (*Build.*). A beam having, across the under side, a number of kerfs which permit the beam to bend.

ker'mes (*Zool.*). A dyestuff prepared from the dried females of *Kermes ilicis*, a Coccid insect.

ker'mesite (*Min.*). Oxysulphide of antimony, which crystallises either in the orthorhombic or the monoclinic system. It is a secondary mineral occurring as the alteration product of stibnite. Also called PYROSTIBNITE.

kern (*Typog.*). The portion of some type letters which projects beyond the body and rests on the body of the preceding or following letter; e.g. the tail of an italic *f*.

kernel (*Bot.*). (1) The seed inside the stony endocarp of a drupe.—(2) An old term for the nutritive tissue and asci inside a perithecium; other terms for this are CENTRUM, NUCLEUS.

Kernig's sign (*Med.*). A sign of meningitis. When the patient is lying on his back with the thigh bent at right-angles to the body, the leg cannot be bent straight at the knee.

kernite (*Min.*). Hydrated oxide of sodium and boron, crystallising in the monoclinic system. It is usually associated with ulexite and is a source of borates. Also called RASORITE.

kerosene (*Fuels*). A petroleum fraction with a boiling range of 150°-300° C., sp. gr. 0·78-0·82, flash-point not lower than 73° F.; used in lamps and stoves. Another type of *kerosene* (with higher volatility), known as *vaporising oil*, is used in some internal-combustion engines. Also called PARAFFIN OIL, LAMP OIL.

kerotype (*Photog.*). A printing process using an emulsion on a waxed support, the wax facilitating the transfer of the emulsion to another support.

Kerr cell, kar (*Television*). A device comprising an optically transparent medium, which may be solid or liquid, and which can be subjected to electrostatic stress by the application of a P.D. to suitably arranged electrodes. It has the property of rotating the plane of polarisation of plane-polarised light through an angle dependent on the applied P.D.

Kerr effect (*Television*). The rotation of the plane of polarisation of light, on transmission through electrically stressed media.

ker'santite (*Geol.*). A mica-lamprophyre, named from the type locality Kersanton, near Brest; it consists essentially of biotite and plagioclase feldspar. Cf. *minette*.

kersey (*Textiles*). A milled fabric, woollen or worsted, made from coarse crossbred wool. Usually of 2-and-2 twill weave.

ke'tenes (*Chem.*). Compounds of the general formula $R_2C{:}C{:}O$. The ketene series may be considered homologues of carbon monoxide. The first member of the series is ketene, $CH_2{:}CO$, which is readily obtainable by passing acetone vapours through a red-hot glass tube filled with broken tile. Acetone is then decomposed into ketene and methane. Ketenes form acids or acid derivatives on adding water, alcohols, ammonia, amines, etc. to one of their double bonds. They are liable to autoxidation; they react with other unsaturated compounds, forming four-membered rings. They are very unstable and polymerise easily.

ke'to form (*Chem.*). That form of a substance exhibiting keto-enol tautomerism which has the properties of a ketone.

keto-enolic tautomerism (*Chem.*). The formation by certain compounds of two series of derivatives, based upon their ketonic or enolic constitution. The enol-form is produced from the keto-form by the migration of a hydrogen atom, which forms a hydroxyl group with the ketone oxygen, accompanied by a change in the position of the double bond. Thus:

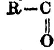
$$\underset{\text{keto-form}}{-CH_2-CO-} \rightleftarrows \underset{\text{enol-form}}{-CH{=}C(OH)-}$$

ketogen'ic (*Med.*). Capable of producing ketone bodies; e.g. *ketogenic diet*.

ketohex'oses (*Chem.*). $HO{\cdot}CH_2{\cdot}(CHOH)_3{\cdot}CO{\cdot}CH_2OH$, a group of carbohydrates, isomers of *aldohexoses* (q.v.). The formula contains three asymmetric carbon atoms, and numerous stereoisomers are possible. The most important ones are fructose, tagatose, and sorbose. They reduce an alkaline copper solution. Ketohexoses can be oxidised to acids containing fewer carbon atoms in the molecule.

ketonae'mia, ketone'mia (*Med.*). The presence of ketone bodies in the blood. See **ketosis.**

ke'tones (*Chem.*). Compounds containing a carbonyl group, $-CO-$, in the molecule attached to two hydrocarbon radicals. The general formula is



$$R-\underset{\underset{\displaystyle O}{\|}}{C}-R'$$

. Ketones are formed by the oxidation of secondary alcohols, by the dry distillation of the calcium or barium salt of an organic acid, by the catalytic condensation of acids or esters, by synthesis with Grignard reagents, and by the action of CO on sodium alkyls. Ketones are very reactive substances, forming additive compounds, e.g. with sodium bisulphite, etc. Important derivatives are the oximes, obtained by the action of hydroxylamine. Hydrogen reduces ketones to secondary alcohols. The simplest ketone is *acetone* (q.v.).

ketonu'ria (*Med.*). The presence of ketone bodies in the urine. See **ketosis.**

ke'toses (*Chem.*). A general term for monosaccharoses with a ketonic constitution. They always form mixtures of acids on oxidation, containing a smaller number of carbon atoms than the original ketose.

keto'sis (*Med.*). The excessive formation in the body (due to incomplete oxidation of fats) of ketone or acetone bodies (aceto-acetic acid and β-oxybutyric acid), accompanied by **ketonaemia** and **ketonuria**; occurs, e.g., in diabetes.

ke'toximes (*Chem.*). The reaction products of ketones with hydroxylamine, containing the oximino group $:N{\cdot}OH$ attached to the carbon atom.

kettle (*Met.*). An open-top vessel used in carrying out metallurgical operations on low-melting-point metals; e.g. in drossing and desilverising lead.

kettle-shaped (*Furn.*). Cupboards, chests, etc. with fronts having a double-ogee curve.

kettlestitch (*Bind.*). The stitch which is made at the head and tail of each section of a book to interlock the sections.

Kettleness Beds (*Geol.*). A little-used name for part of the Lias of Yorkshire, consisting chiefly of sandy shales and lying between the Staithes Beds and the Cleveland iron-ore.

Keuper Marl, koi'per (*Geol.*). A fine-grained siltstone, locally 3000 to 4000 ft. in thickness, forming the higher part of the Triassic System in N.W. Europe. Probably deposited under conditions similar to those applicable to the loess. It consists chiefly of red marls, with dolomite crystals and important salt deposits on different horizons. See also **Tea-green Marl.**

Keuper Series (*Geol.*). The upper series of rocks assigned to the Triassic System in N.W. Europe, lying above the Muschelkalk; it consists of sandstones and marls, deposited in England and Germany under desert conditions, though in the Alps these are represented by marine strata.

kevel (*Build.*). A hammer, edged at one end and pointed at the other, used for breaking and rough-hewing stone.

Kew Certificates (*Horol.*). Certificates of performance of watches and chronometers issued by the National Physical Laboratory, Teddington. (This work was originally undertaken at Kew, hence the name.) For an 'absolutely perfect' watch, 100 marks are awarded, made up as follows: 40 for a complete absence of variation of daily rate; 40 for absolute freedom from change of rate with change of position; and 20 for perfect compensation for effects of temperature.

Kew-pattern barometer (*Meteor.*). The Adie barometer. Specially graduated so that error arising from changes in the free level in the cistern is obviated.

Kew-pattern magnetometer (*Elec. Eng.*). A delicate type of reflecting magnetometer having a photographic recording arrangement for keeping record of changes in the earth's field.

Keweenaw'an Series (*Geol.*). Conglomerates, arkoses, red sandstones and shales of desert origin, associated with great thicknesses of basic lavas and intrusives. This is the youngest of the Pre-Cambrian formations in the Canadian Shield, and is comparable with the Torridonian of Scotland. The igneous rocks carry copper, silver, nickel, cobalt, and platinum.

key (*Bind.*). The name applied to a small tool used for securing the bands while a book is being sewn.

key (*Civ. Eng.*). One of the pair of wedge-shaped hardwood blocks used as *striking wedges* (q.v.).

key (*Eng.*). A piece inserted between a shaft and a hub to prevent relative rotation. It fits in a key-way, parallel with the shaft axis, in one or both members, the commonest form being the parallel key, of rectangular section.

See **dovetail—**
gib-headed—
round—
saddle—
sunk—
taper—
tangential—
woodruff—
feather
splines.

key (*Horol.*). The winder that fits on the square, or screws on to the barrel arbor. In the case of a fusee watch or a chronometer, the key fits on the square on the fusee arbor.

key (*Join.*). A portable tool which, when applied to a lock, enables the bolt to be shot.

key (*Photog.*). By analogy with music, the psychological fitness of brightnesses in a picture as a whole, or in relation to another.

key (*Plast.*). In any surface to be plastered, the roughening, lathing, or other preliminary process undertaken in order to give a grip to the coat of plaster and so enable it to adhere more satisfactorily.

key (*Teleg.*). The hand-operated device that opens and closes contacts which modulate currents with coded telegraph signals.

key (*Teleph., etc.*). A hand-operated device for changing circuits.

See **bug—**
lever—
listening—
locking—
non-locking—
plunger—
pneumatic—
ringing—

key boss (*Eng.*). A local thickening up of a boss or hub at the point at which a key-way is cut, to compensate for loss of strength due to the cut.

key chuck (*Eng.*). A jaw chuck whose jaws are adjusted by screws turned by a key or spanner. See **self-centring chuck.**

key-course (*Civ. Eng.*). The course of stones in an arch corresponding to the keystone.

key drawing (*Cinema.*). In animated cartoon production, *key drawings* indicate situations at special instants, such as at beats in the bar of music, after which the in-between drawings are made to fit with the timing.—(*Print.*) In lithography and line-colour block making, an outline drawing which serves as a guide in the making of the separate colour plates.

key drop (*Build.*). A guard plate covering a keyhole and falling into position by its own weight.

keyhole (*Cinema.*). A shaped mat for standing cameras on, in a motion-picture studio.

keyhole saw (*Carp.*). See **compass saw.**

key-industry animals (*Zool.*). In an animal community, the small rapidly reproducing animals at the base of any food-chain, which turn plant protein into animal protein.

key plan. A small-scale plan showing the relative disposition of a number of items in a scheme.

key plate (*Build.*). An *escutcheon* (q.v.).

key print (*Photog.*). The black-and-white print, additional to the primary colour prints, which is used to swamp colour fringes arising from parallax or mis-registration. The key print also controls the saturation.

key-seating (*Eng.*). A key-way, or the surface on to which a key is bedded.

key-seating machine (*Eng.*). A machine tool for milling key-ways in shafts, etc., by means of an end mill, the work being supported on a table at right-angles to the axis of the spindle. Feed is obtained by an automatic traverse of either the tool or the table.

keysender (*Auto. Teleph.*). A strip of plunger keys for transmitting marginal currents representing, in a code, dialled impulse trains; the operation of step-by-step switching apparatus is thereby speeded up. See **A-position keysending, B-position keysending.**

keystone (*Civ. Eng.*). The central voussoir at the crown of an arch.

keystone effect (*Cathode Ray Tubes*). An effect which occurs in tubes in which the screen (or mosaic in the case of an Iconoscope) is set at an angle to the cathode ray beam, a given angular deflection of the beam subtending different lengths of line in different parts of the screen. A square picture is thus reproduced as a *keystone* shape, unless special preventive measures are taken.—(*Cinema.*) When the line of projection in a cinema is not normal to the screen, the rectangular frame appears on the screen as an approximate keystone. This is obviated to some extent by tilting the screen towards normality, and shaping the picture on the screen with a black surround of the desired rectangular shape.

key strip, digit (*Auto. Teleph.*). See **digit key strip.**

key-way (*Eng.*). A longitudinal slot cut in a shaft or hub to receive a *key* (q.v.).

key-way tool (*Eng.*). A slotting machine tool used for the vertical cutting of key-ways, equal in width to that of the key-way. See **slotting machine.**

keyed pointing (*Build.*). Pointing which is finished with lines or grooves struck on the flat joint. See **flat pointing.**

keyed structure (*Geol.*). A term sometimes applied to the sutured mosaic of quartz grains closely interlocking in some metamorphic quartzites.

keying (*Eng.*). The process of fitting a key to the key-ways in a shaft and boss.

keying (*Radio, etc.*). The operation of starting or stopping a high-frequency current, for purposes of telegraphic signalling.

keying (*Typog.*). In mechanical type-setting, operating the keyboard either to produce a perforated spool of paper from which individual types are cast (e.g. Monotype), or to release matrices from which a single line of type is cast (e.g. Intertype, Linotype, etc.).

keyless ringing (*Teleph.*). The normal ringing in a manual exchange, whereby ringing current is applied automatically to a subscriber's line on insertion of a junction plug into a jack in the multiple; it is cut off when the subscriber loops his line and operates a relay.

keyless watch (*Horol.*). A watch that can be wound without the use of a key.

keyless work (*Horol.*). The mechanism which permits the winding of the spring, or setting of the hands of a watch.

khaki (*Textiles*). A dull, yellowish-brown colour, known as drab-mixture, used for field uniforms in the British Army.

kham'sin (*Meteor.*). A hot dry wind from the south, which blows over Egypt in front of depressions moving eastward along the Mediterranean.

khorasan' (*Textiles*). A high-class Persian wool from the province of Khorasan, suitable for combing.

Khorassar mortar (*Build.*). A mixture of one-third powdered brick and tiles and two-thirds fine sifted lime with water, used in constructing buildings requiring solidity. Also called TURKISH MORTAR.

Kiamitia Shales (*Geol.*). See **Kiowa Shales.**

kibble (*Mining*). A large bucket used in shaft-sinking.

kibbler (*Mining*). See **putter.**

kick (*Build.*). See **frog.**

kicking plate (*Join.*). A plate fixed on the face of the bottom rail of a door, to prevent the damage caused by persons kicking the door to open it.

kid (*Hyd. Eng.*). A bundle of brushes serving as a *groyne* (q.v.).

kid (*Leather*). A soft leather made from the skins of young goats (kids) or calves.

Kidderminster carpet. A compound fabric made from cotton or wool, and consisting of two or three plain cloths interwoven together, the pattern being produced by the interchanging of the cloths. Also called INGRAIN CARPET, SCOTCH CARPET.

kidney ore (*Min.*). A form of the mineral haematite, the sesquioxide of iron, which occurs in reniform masses, hence the name (Latin *ren*, kidney).

kidney piece (*Horol.*). A cam, shaped like a kidney, used in perpetual calendar work to give the equation of time.

kidney stone (*Min.*). A name given to *nephrite* (q.v.), which was once supposed to be efficacious in diseases of the kidney (Greek *nephros*, kidney).

kidney stones (*Med.*). Hard deposits formed in the kidney or bladder. The composition varies, and kidney stones have been found to consist of uric acid and urates, calcium oxalate, calcium and magnesium phosphate, silica and alumina, cystine, xanthine, fibrin, cholesterol and fatty acids.

kidney-worm disease (*Vet.*). Infection of the kidney of carnivora, equines, swine, and cattle by nematode worms of the genus *Dioctophyme.*

kier, kēr (*Textiles*). The boiler in which yarn and cloth are treated previous to bleaching or dyeing; it may be of the open or closed type.

kieselguhr, kē'zel-goor (*Min.*). See **diatomite.**

kieserite, kēz'— (*Min.*). Hydrous sulphate of magnesium which crystallises in the monoclinic system; found in large amounts in the salt deposits of Germany.

kieve, kēv (*Mining*). See **dolly tub.**

kill (*Cinema.*). Colloquialism for *extinguish lights.*

killas (*Geol.*). A Cornish mining term for the altered argillaceous and hornfelsic rocks found in contact with granite and often modified by emanations from it.

killed steel (*Met.*). Steel that has been *killed,* i.e. fully deoxidised before casting, by the addition of manganese, silicon, and sometimes aluminium. There is practically no evolution of gas from the reaction between carbon and iron-oxide during solidification. Sound ingots are obtained. See also **rimming steel.**

killing (*Paint*). The process of treating knots in resinous woods prior to painting, so as to prevent the resin or turpentine from exuding and ruining the paint.

kiln, kil *or* kiln (*Pot.*). A brick-built annular or tunnel furnace, in which pottery is fired. See **biscuit oven, glost oven, enamel kiln.**

kilo-. Prefix denoting 1000; used in the metric system.

kilo-cycles per second (*Elec. Comm.*). The unit of frequency in which there are 1000 complete cycles of oscillation per second. Abbrevs. **KC.P.S., kcps, kc/s.**

kilogram calorie (*Heat*). See **calorie.**

kilovar (*Elec. Eng.*). A unit of reactive volt-amperes equal to 1000 vars. Symbol, **kVAR.**

kilovolt-ampere (*Elec. Eng.*). A commonly used unit for expressing the rating of a.c. electrical machinery and for other purposes; it is equal to 1000 volt-amperes.

kilowatt (*Elec. Eng.*). A unit of power equal to 1000 watts and approximately equal to 1·34 horse-power.

kilowatt-hour (*Elec. Eng.*). The commonly used unit of electrical energy, equal to 1000 watt-hours. Often called simply a *unit,* and given the symbol **kWh** or **kwhr.** See **Board of Trade Unit.**

kilowatt-hour meter (*Elec. Eng.*). See **energy meter.**

kimberlite (*Geol.*). A type of mica-peridotite, occurring in volcanic pipes in South Africa, usually highly altered and containing xenoliths of many types of ultramafic rocks, and diamonds.

Kimeridge (or **Kimmeridge) Clay** (*Geol.*). A constant thick bed of black marine clay, stretching across England from the Dorset coast, through the Fens, to the Yorkshire coast near Scarborough; referred to the Upper Jurassic, and lying between the Corallian and the Portlandian Stage.

Kimeridge Coal (*Geol.*). A bed of bituminous shale, occurring in the Kimeridge Clay division of the Upper Jurassic; exposed on the Dorset coast, and capable of yielding oil on destructive distillation.

Kimeridgian (*Geol.*). A stage name of the Upper Jurassic System, applicable to rocks of the same age as the Kimeridge Clay, though not necessarily of the same lithology.

kinaesthet'ic (*Zool.*). Pertaining to the perception of muscular effort.

ki'nases (*Chem.*). Substances of biological origin, such as intestinal juice, which convert zymogens, proenzymes, or proferments into the true or active enzymes, and thus act as activators.

Kin'derhook Beds (*Geol.*). Marine strata which form the local basal member of the Lower Mississippian and are overlapped southwards by the Burlington Limestones, as in Arkansas.

Kinderscout Grit (*Geol.*). A coarse sandstone, one of the Millstone Grits in the Namurian Stage of the Upper Carboniferous rocks of Derbyshire.

kinema. A variant of *cinema* (q.v.); nearly obsolete.

kinematics. See **mechanics.**

Kinescope (*Television*). A cathode ray tube specially designed for the reproduction of television images.

kineso'dic (*Zool.*). Conveying motor impulses.

kinet-, kinet'o- (Greek *kinein*, to move). A prefix used in the construction of compound terms; e.g. *kinetoblast* (q.v.).

kinetic body (*Cyt.*). A tiny granular body lying where a chromosome is attached to the spindle.

kinetic constriction, ki'netochore, —kōr (*Cyt.*). The portion of a chromosome where the attachment is made to a spindle fibre.

kinetic energy (*Phys.*). The energy possessed by a moving body in virtue of its motion. For a body of mass m, moving with velocity v, the kinetic energy is $\frac{1}{2}mv^2$ units of work. For a body rotating with angular velocity ω about an axis for which its moment of inertia is I, the rotational kinetic energy is $\frac{1}{2}I\omega^2$.

kinetic friction (*Mech.*). See **friction.**

kinetic head (*Hyd.*). See **velocity head.**

kinetic theory of gases (*Phys.*). See **gases (kinetic theory of).**

kinet'oblast (*Zool.*). In certain types of active pelagic larvae, the outer locomotor layer of ciliated cells.

kinetochore (*Bot.*). See **kinetic constriction.**

kinetogen'esis (*Zool.*). A theory of the mechanism of evolution which postulates that animal structures have been directly or indirectly produced by animal movements.

kinet'omeres (*Biol.*). Molecules of protoplasm which may be energy-rich and reactive or energy-poor and stable. See **anakinetomeres, katakinetomeres.**

kinetonu'cleus (*Zool.*). In blood-living *Mastigophora*, a nucleus-like body situated between the nucleus and the blepharoplast, and believed to represent the parabasal body of other forms. Cf. *trophonucleus*.

king-bolt (*Build.*). A *king-rod* (q.v.).

king-closer (*Build.*). A three-quarter brick used to maintain the bond of the surface.

king-piece (*Carp.*). See **king-post.**

king-pile (*Civ. Eng.*). A pile driven down the centre of a wide trench so as to enable two short struts (butting on opposite sides of the pile) to be used, instead of one long one, for keeping the poling boards on opposite sides of the trench in position.

king-pin (*Automobiles*). The pin by which a stub axle is articulated to an axle-beam or steering head; it is inclined to the vertical to provide caster action. Also called SWIVEL-PIN.

king-post (*Carp.*). A vertical timber tie connecting the ridge and the tie-beam of a roof, shaped at its lower end to afford bearing to two struts supporting the middle points of the rafters. Also called a KING-PIECE, BROACH-POST, JOGGLE-PIECE, JOGGLE-POST, MIDDLE-POST.

king-posts (*Mining*). The vertical members of a stamp-battery frame which carry the cam-shaft.

king-post truss (*Carp.*). A timber roof-truss in which there is only one vertical member—the central king-post.

king-rod (*Build.*). A vertical steel rod connecting the ridge and tie-beam of a couple-close roof, to prevent sagging of the tie-beam when it is required to support ceiling loads.

king-tower (*Build.*). In a derrick tower gantry, that one of the three timber towers through which the weight of the derrick itself is transmitted directly to the foundation below. Also called the CRANE TOWER.

Kingston valve (*Eng.*). A sea-valve fitted to a ship's side for the purpose of admitting water to circulating pumps, or flooding or blowing out ballast tanks.

ki'noplasm (*Cyt.*). Protoplasm which appears to be composed of fibrils and which in cell-division composes the spindle fibres, attraction sphere, and astral rays.

kinsh (*Quarrying*). A crowbar.

Ki'owa Shales (*Geol.*). A shore facies of the lower Washita Series, lying above the Cheyenne Sandstone in Kansas. Also known as KIAMITIA SHALES.

kip (*Eng., etc.*). A unit of force equivalent to 1000 lb.

kip (*Leather*). The untanned hides of yearling cattle, or of adult cattle of any small breed; used for boot uppers.

Kipp's apparatus (*Chem.*). A generator for hydrogen sulphide, arranged so as to give a stream of the gas when required, by turning on a tap. May be used also as a laboratory supply of other gases

kirb (*Civ. Eng.*). See **kerb.**

Kirchhoff's law, kirhh'hōf (*Phys.*). A result due to Kirchhoff's researches on radiation by which he established that the ratio of the coefficient of absorption to the coefficient of emission is the same for all substances, and depends only on the temperature and frequency of the rays.

Kirchhoff's laws (*Elec. Eng.*). Two fundamental laws connected with the electric circuit. The first states that the sum of the potential differences in any closed loop of a circuit equals the sum of the electromotive forces in the loop, and the second states that the sum of the currents meeting at any point in a network must be zero.

Kirkby Moor Flags (*Geol.*). The highest beds in the rocks assigned to the Silurian System in Westmorland, consisting of about 2000 ft. of greenish and grey sandstones and flags.

kirkifier (*Radio*). A form of linear rectifier comprising a triode valve whose grid is maintained at a small positive potential with respect to the filament, the anode being used as the rectifying electrode.

Kirklington (or Kirklinton) Sandstone (*Geol.*). A local sandstone belonging to the Keuper series of rocks, in the Triassic System of Cumberland.

kish (*Met.*). Solid graphite which has separated from, and floats on the top of, a molten bath of cast-iron or pig-iron which is high in carbon.

kitchen midden (*Geol.*). The dump of waste material, largely shells and bones associated with ashes, marking the site of a kitchen in a settlement of early man.

kitchen range, kitchener. A coal-burning fire heating an oven for cooking purposes and a back boiler for domestic hot-water supply.

kite (*Aero.*). Any aerodyne anchored or towed by a line, not mechanically or power-driven. Derives its lift from the aerodynamic forces of the relative wind.—(*Meteor.*) Box-kites have been used for carrying meteorographs to high altitudes in order to record the weather conditions there. Altitudes exceeding 20,000 ft. have been reached by using several kites in tandem.

kite balloon (*Aero.*). A captive balloon shaped and balanced so as to be stable in the wind at any desired height.

kite winder (*Build.*). A *winder* (q.v.) used at the angle of a change of direction in a stair, and having consequently the shape of a kite in plan.

kitten skins (*Furs*). Small skins from young animals.

Kjeldahl flask, kel'dahl (*Chem.*). A glass flask with a round bottom and a long wide neck. Used in Kjeldahl's method for the estimation of nitrogen.

Kjeldahl's method (*Chem.*). A method for the quantitative estimation of nitrogen in organic compounds, based on the conversion of the organic nitrogen into ammonium sulphate, and subsequent distillation of ammonia after the solution has been made alkaline. The ammonia which distils over can be titrated.

Kjellin furnace, kel'ēn (*Elec. Eng.*). A form of electric-induction furnace having an iron core; used for melting ferrous metals.

Klangfilm (*Cinema.*). The German system of sound-film recording and reproduction.

kleinpflaster, klīn-pfl— (*Civ. Eng*). The method of laying road surfacing setts to form segments or arches on plan, as a result of which wheels cross joints obliquely.

Klemm's leather. Crown leather.

kleptomania (*Psycho-path*). A state characterised by the urge to steal objects, often unwanted ones. Occurs mainly among psychopathic types and child delinquents, often as a result of some unconscious sexual conflict coupled with a bad home environment.

klieg eyes, klĕg (*Cinema.*). The effect of strain on the eyes caused by the brilliance of flood-lights in film production.

Klieg light (*Cinema.*). A type of incandescent flood-lighting lamp for studio use.

klinker brick (*Build.*). A very hard type of brick much used in Holland and Germany, principally for paving purposes. See **adamantine clinkers, Dutch clinkers, terro-metallic clinkers.**

kli'nogeotrop'ic (*Bot.*). Said of an organ which takes up a stable position lying at an angle to the vertical.

kli'nostat (*Bot.*). An instrument on which a plant may be slowly rotated, and by means of which its reactions to gravity and other stimuli may be investigated.

klinotrop'ic (*Bot.*). Placed at a slant to the direction of a given stimulus.

klippen (*Geol.*). A structural term (*plural*) applicable in areas of complex tectonics to thrust masses of strata that map out like outliers; in effect, outliers capping hill-tops and lying on thrust-planes.—*sing.* **klippe.**

klirrfaktor (*Elec. Comm.*). The same as *non-linear distortion factor.*

K, L, M . . . shells (*Phys.*). Imaginary spheres surrounding the nucleus of an atom, on the surfaces of which groups of electrons may be considered to revolve. Starting with the innermost shell and moving outwards, the shells are called *K*, *L*, *M*, etc. The *K*-shell can contain no more than 2 electrons, the *L*-shell 8, the *M*-shell 18. The electrons in these inner shells are concerned in the production of X-rays. See **K-series, L-series, Bohr theory.**

kly'donogram (*Elec. Eng.*). The record obtained on the photographic plate of a klydonograph.

kly'donograph (*Elec. Eng.*). An instrument in which, a photographic plate having been placed between two electrodes, a voltage across the electrodes produces a figure on the plate. Often used for recording surge or impulse voltages.

kly'stron (*Radio*). An ultra-short-wave thermionic oscillator which uses a pair of rhumbatrons, as buncher and catcher respectively, to generate oscillation power by velocity-modulating a space-current of electrons.

knack'eries (*Vet.*). Places for the slaughter and disposal of animals which are not intended for human food.

knap (*Build.*). To break flints or road-stones by sharp blows from a hammer.

Knapen system (*Build.*). A method of treating damp walls. Holes, inclining upwards from the outside, are drilled into the wall for half its thickness; each hole is lined with a porous tube, whose dampness sets up a circulation of air into and out of the hole, tending to produce a drying effect.

knapper (*Build., Mining*). (1) A worker who knaps.—(2) A *knapping hammer* (q.v.).

knapping hammer (*Build.*). A hammer used for breaking and shaping stones and flints.—(*Mining*) A special hammer or a machine to break rock and produce a minimum of fine material.

knaur, nawr (*Bot*). A swollen outgrowth of some size, from the trunk of a tree.

knee (*Eng., Plumb.*). An elbow pipe (see **elbow**).

knee (*Furn.*). The point of outward curve in a cabriole leg, often decorated.

knee (*Join.*). A sudden rise in a handrail when it is convex upwards. Cf. *ramp.*

knee (*Zool*). In land Vertebrates, the joint between the femur and the crus.

knee brace (*Struct.*). A stiffening member fixed across the inside of an angle in a framework, particularly at the angle between roof and wall in a building frame.

knee-jerk (*Med.*). A normal reflex extension of the leg at the knee-joint, obtained by tapping the tendon below the patella.

knee rafter (*Carp.*). A rafter having its lower end bent downwards.

knee roof (*Carp.*). A *mansard roof* (q.v.).

kneeler (*Masonry*). (1) The return of the dripstone at the spring of an arch.—(2) Any of the steps of a corbie-step gable (obsolete).

knib (*Typog.*). The projecting portion of a setting-rule, by which the compositor lifts it out of the composing-stick.

knickerbocker (*Textiles*). A yarn with spots of different colours obtained by flecking the colouring material in carding.

knife-switch (*Elec. Eng.*). An electric-circuit switch in which the moving element consists of a flat blade which engages with fixed contacts. See **tandem knife-switch.**

knife tool (*Eng.*). A lathe tool having a straight lateral cutting edge, used for turning right up to a shoulder or corner.

knitted plush (*Hosiery*). A fabric with a looped (terry) or pile finish made from lustre yarn (usually rayon) on a circular spring needle machine.

knitted structure (*Geol.*). A structure found in serpentine, consisting of two sets of interlacing scales lying parallel to the original cleavage planes of a non-aluminous augite, from which it was derived.

knitting frame (or **loom**) (*Hosiery*). A type of knitting machine in which the needles are either of the 'bearded' or the 'latch' (self-acting) kind.

knob. A handle, usually rounded, on a lock, door, drawer, etc.

knob (*Bot.*). A root tuber in some orchids.

knob, draw (*Acous.*). See **draw knob.**

knob-twister (*Cinema.*). A casual reference to monitor man or recordist in motion-picture production.

knobbing (*Masonry*). The operation of breaking projecting pieces off stones in the quarry.

knock (*Eng., etc.*). See **knocking.**

knock-knee (*Med.*). See **genu valgum.**

knock-rating (*Eng*). The measurement of the *anti-knock value* (q.v.) of a volatile liquid fuel in terms of the percentage of octane in an octane-heptane mixture of equivalent knock-proneness. See **octane number.**

knocker-out (*Eng.*). The horns of a planing machine against which the tappets strike to reverse the motion of the table.

knocking, knock (*Eng.*). A periodic noise made by a worn bearing in a reciprocating engine, due to reversal of the load on the shaft or pin.—(*I.C. Engs.*) The characteristic metallic noise, often called 'pinking,' resulting from *detonation* (q.v.) in a petrol-engine.

knockings (*Masonry*). The stone pieces, smaller than spalls, knocked off in the process of chiselling or hammering.

knocking-down iron (*Bind.*). A piece of iron, fixed to the lying press, on which joints are beaten out and lacings flattened.

knop yarn (*Textiles*). A fancy yarn with *knops*, or lumps, at intervals. Made with one or two foundation threads, and a group of threads delivered at a faster rate. Temporary stoppage of the delivery of the foundation threads allows the other to form a *knop*. In addition, a binder thread is incorporated to hold the *knop* in position.

knot (*Bot.*). (1) A node in a grass stem.—(2) A hard and often resinous inclusion in timber, formed from the base of a branch which became buried in secondary wood as the trunk thickened.

knot (*Naut.*). (1) A division of a log-line, marked by pieces of cloth or knotted string at equal distances; equal to 47·33 ft. when used with a 28-second glass, and 50 75 ft if used with a 30-second glass.—(2) The speed of one nautical mile in an hour, used for expressing a ship's rate of travel.

knotter (*Paper*). An appliance for the removal of knots or unbeaten particles from the paper pulp

knotting (*Paint.*). The material used for covering over knots in wood, prior to painting.

Knowles cell (*Elec. Eng.*). A cell for the production of hydrogen and oxygen by the electrolysis of an alkaline solution.

knuckle (*Join.*). The parts of a hinge receiving the pin.

knuckle joint (*Eng*). A hinged joint between two rods, in which the ends are formed into an eye and a fork respectively and united by a pin.

knuckle pin (*Eng.*). A *wrist pin* (q v).

knuckling (*Vet*). Abnormal flexion of the fetlock joint of foals or calves.

knurled head (*Eng.*). See **milled head.**

knurling tools (*Eng.*). Small, hard steel rollers, serrated or cross-hatched on their peripheries, mounted on a pin carried by a holder. They are pressed against circular work in the lathe, to knurl or roughen a surface required to give a grip to the fingers, as the head of a 'milled' screw.

Kodak (*Photog.*). Trade-name of a range of photographic goods, including cameras.

Kohlrausch's law, kōl'rowsh (*Chem.*). When ionisation is complete, the conductivity of an electrolyte is equal to the sum of the conductivities of the ions into which the substance dissociates.

koilonychia, —ik'i-a (*Med.*). Spoon-shaped depression of the finger-nails.

Koipat'o Group (*Geol.*). Continental arkosic sands, more than 6000 ft. thick, constituting the basal member of the Triassic succession in the Cordilleran geosynclinal region in Nevada. See also **Star Peak Group.**

Kolliker's pit (*Zool.*). In *Cephalochorda*, the olfactory pit situated on the left side of the body at the anterior end.

Kone (*Acous.*). Trade-name of a loud-speaking sound reproducer, consisting of two large paper cones, one supported by the other, and driven by a balanced-armature movement at its apex.

konom'eter (*Mining*). An apparatus for measuring the dust in mine air.

Koot'enai Series (*Geol.*). Part of the Comanchean, of continental facies, including coal-seams, occurring in western Canada. Cf. the *Morrison Series* of Colorado.

Koplik's spots (*Med.*). Bluish-white specks on the inner side of the cheek, occurring in measles two to three days before the rash appears.

Kopp's law (*Chem.*). The specific heat of a solid element is the same whether it is free or combined in a solid compound.

körnchenkugeln, kėrn'hhen-koog-ln (*Zool.*). Phagocytic cells distended with tissue debris, especially muscle fragments, occurring in the blood of pupal Insects.

Kor'sakoff's syndrome, Korsakoff's psychosis (*Med.*). Mental confusion associated with multiple neuritis, usually due to chronic alcoholism.

Kowalev'sky's bodies (*Zool.*). In some *Myriapoda*, small glandular masses in which some of the arteries terminate.

Kr (*Chem.*). The symbol for *krypton.*

K.R.-law (*Teleg.*). See **C.R.-law.**

Kraemer-Sarnow test (*Build., Civ. Eng.*). A test for the determination of the melting-point of a bitumen for use in building or roadmaking. The melting-point is obtained as the temperature at which superincumbent mercury falls through a standard sample of the bitumen, heated under standard conditions.

kraft (*Paper*). Brown paper made from high-class sulphate wood pulp. Used extensively as a dielectric.

Kramer control (*Elec. Eng.*). A form of speed and power factor control for large induction motors in which the slip energy is supplied to a rotary convertor, the resulting d c. power being used to drive a motor either mounted on the main motor shaft or driving an alternator and returning power to the supply.

Krarup loading, cable, circuit (*Elec. Comm.*). See **continuous loading.**

krauro'sis (*Med*). Atrophy of the vulva, associated with narrowing of the vaginal orifice.

Krause's corpuscles, krowz (*Zool.*). In Vertebrates, a type of sensory nerve-ending found in the skin, in which the nerve breaks up into numerous branches, which surround a core of large cells in a connective-tissue capsule.

Krause's membrane (*Zool*). A transverse septum occurring in the middle of each of the clear areas of a striated muscle fibril.

Kremnitz white (*Paint.*). See **Vienna white.**

krem'nophyte (*Bot.*). A plant which grows against a steep wall.

Krems white (*Paint.*). See **Vienna white.**

Kretschmer's types (*Psychiatry*). Kretschmer, a German psychiatrist, found a correlation between physique and endogenous psychoses. According to their physique, he classified people into three groups: *asthenic*, *athletic*, and *pyknic* (qq.v.), with a fourth group, *dysplastic*, formed from a mixture of the others.

kril (*Zool.*). See under **Euphausiacea.**

krokid'olite (*Min.*). See **crocidolite.**

kro'mogram (*Photog.*). The set of three transparent positives which, when viewed simultaneously in a kromoskop, reproduces a coloured scene.

kro'moskop (*Photog.*). The apparatus for viewing kromograms.

Kru'kenberg's tumour (*Med.*). A solid tumour appearing in each ovary and believed to be always secondary to cancer of the stomach.

Kryptol (*Chem.*). A mixture of graphite, carborundum, and clay.

krypton (*Chem.*). Symbol, Kr. A zero-valent element, one of the rare gases. At. no. 36, at. wt. 83·7. It is a colourless and odourless monatomic gas; m.p. −169° C., b.p. −151·7° C., density 3·708 gms. per litre at N.T.P. It constitutes about one-millionth by volume of the atmosphere, from which it is obtained by liquefaction. It is used in certain gas-filled electric lamps.

Kultschitzky's cells (*Zool.*). In some Vertebrates, cells containing a large number of strongly basiphil granules, found in the epithelium lining the stomach, intestines, and pancreatic duct; believed to be of pathological origin.

Kümmell's disease, kim′el (*Med.*). Delayed collapse or crumbling of one or more spinal vertebrae after injury to the spine.

Kundt's rule, koont (*Light*). The refractive index of a medium on the shorter wavelength side of an absorption band is abnormally low, and on the other side abnormally high. This gives rise to *anomalous dispersion* (q.v.).

Kundt's tube (*Acous.*). A tube in which stationary waves are established, these being indicated by lycopodium powder, which congregates in a heap, or even a disc, at the nodes.

kunkar or **kankar** (*Geol.*). A vernacular Indian term for stone, now restricted to concretionary masses of calcium carbonate occurring in alluvium. Applied also to the red and variegated clay-like deposits of laterite in Ceylon.

kunzite, koonts′it (*Min.*). See **spodumene.**

kupfernickel, koop′fer— (*Min.*). See **niccolite.**

Kupffer's cells (*Zool.*). Large isolated phagocytic cells occurring on the walls of the liver sinuses in some Vertebrates.

Kutter's formula (*Hyd.*). See **Ganguillet and Kutter's formula.**

kVAR (*Elec. Eng.*). See **kilovar.**

kWh, kwhr (*Elec. Eng.*). See **kilowatt-hour.**

kyanising (*Build.*). The process of impregnating timber with a solution of corrosive sublimate as a preservative.

ky′anite or **cy′anite** (*Min.*). A silicate of aluminium which crystallises in the triclinic system. It usually occurs as long-bladed crystals, blue in colour, in metamorphic rocks. See also **disthene.**

ky′lite (*Geol.*). A medium- to coarse-grained gabbroic rock, intermediate in mineral composition between typical teschenite and picrite, containing less feldspar than the latter, but more than the former. Named from the Kyles of Bute.

ky′phoscolio′sis (*Med.*). A deformity of the spine in which dorsal convexity is increased, the spine being also bent laterally.

kypho′sis (*Med.*). A deformity of the spine in which the dorsal convexity is increased.

L, Λ

l. (*Chem.*). An abbrev. for *litre*.

l (*Chem.*). A symbol for: (1) Latent heat per gram; (2) mean free path of molecules; (3) (with subscript) equivalent ionic conductance, 'mobility.'

l- (*Chem.*). An abbrev. for *laevo-rotatory*.

L- (*Chem.*). A symbol for latent heat per mol.

L-acid (*Chem.*). Laurent acid, 1-naphthylamine-5-sulphonic acid, an intermediate for dyestuffs.

L-head (*I.C. Engs.*). A petrol-engine cylinder head carrying the inlet and exhaust valves in a pocket at one side; resembles an inverted L.

L-rest (*Eng., etc.*). A lathe rest used in hand turning, shaped like an inverted L.

L-series (*Phys.*). Groups of lines in the X-ray spectra of the elements next in order of wavelength to the *K-series* (q.v.), and having their origin in electron transitions to the K-shell. See **K, L, M . . . shells.**

L-type network (*Elec. Comm.*). A network with a single series arm and a single shunt arm.

Λ (*Chem.*). A symbol for equivalent conductance; Λ_0, at infinite dilution.

La (*Chem.*). The symbol for *lanthanum*.

Labarraque's solution, la-ba-rak' (*Photog.*). *Javel water* (q.v.).

label, label'lum (*Bot.*). The posterior petal of the flower of an orchid; since the flower is usually resupinate, the labellum appears to be anterior.

label (*Build.*). A projecting moulding above a door or window opening.

label-corbel table (*Build.*). A *dripstone* (q.v.) supported by a corbel.

label'lum (*Zool.*). A spoon-shaped lobe at the apex of the glossa in Bees.—*pl.* **labella.** In certain *Diptera*, a pair of fleshy lobes into which the proboscis (*labium*) is expanded distally.

la'bia (*Zool.*). Any structures resembling lips; as the lips of the vulva in *Primates*. See also the *sing.* form **labium.**—*adj.* **labial.**

labia majo'ra (*Zool.*). In Mammals, two prominent folds forming the outer lips of the vulva.

labia mino'ra (*Zool.*). In Mammals, the small inner lips of the vulva; nymphae.

labial palp (*Zool.*). In *Insecta*, the palpus of the second maxilla: in some *Pelecypoda*, a ciliated grooved muscular flap bordering the mouth.

la'biate (*Bot.*). Said of a corolla with one or more petals prolonged to form a lip.

labidoph'orous (*Zool.*). Possessing chelae or other forcipulate organs.

la'bile (*Chem.*). Unstable, liable to change.

labio- (Latin *labium*, lip). A prefix used in the construction of compound terms; e.g. *labiodental*, pertaining to the lips and teeth.

la'bioglos'sopharynge'al (*Anat.*). Pertaining to the lips, tongue, and pharynx.

labiosti'pes (*Zool.*). The prementum of *Insecta*.

la'bium (*Zool.*). In *Insecta*, the lower lip, formed by the fusion of the second maxillae: in the shells of *Gastropoda*, the inner or columellar lip of the margin of the aperture. See also the *pl.* form **labia.**

lab'oratory. A place where specific scientific research or testing is done, e.g. a chemistry *laboratory*, a works *laboratory*.

laboratory (*Cinema.*). The department in a film studio organisation where the exposed films are processed and printed.

labradores'cence (*Min.*). A brilliant change of colour caused in some stones, e.g. labradorite, by the presence of minute enclosed crystalline plates, or aligned rod-like inclusions.

lab'radorite (*Min.*). A plagioclase feldspar containing approximately equal amounts of the albite and anorthite molecules; occurs in basic igneous rocks; characterised by a beautiful play of colours in some specimens, due to schiller structure. Named from Labrador, whence fine specimens were sent over to Europe by Moravian settlers.

La Brea Sandstone (*Geol.*). A sandstone which succeeds the oil-bearing sands of Miocene age in Trinidad; it contains the well-known Pitch Lake, 104 acres in extent.

la'brum (*Zool.*). In *Insecta*, the plate-like upper lip; in the shells of *Gastropoda*, the outer lip or right side of the margin of the aperture.—*adj.* **labral.**

lab'yrinth (*Acous.*). A folded acoustic path which serves as an attenuating line; hence an acoustic termination for the rear sides of diaphragms.

labyrinth (*Zool.*). Any convolute tubular structure; especially, the bony tubular cavity of the internal ear in Vertebrates, or the membranous tube lying within it.

labyrinthec'tomy (*Surg.*). Surgical removal of the labyrinth of the ear.

labyrin'thiform (*Bot., etc.*). Marked by sinuous lines, maze-like.

labyrinthi'tis (*Med.*). Inflammation of the labyrinth of the ear.

labyrinth'odont (*Zool.*). Having the dentine of the teeth folded in a complex manner.

lac. A resinous substance, an excretion product of certain Coccid insects (*Gascardia, Tachardia,* etc.) in certain jungle trees; used in the manufacture of shellac. Chief source, India. See **shellac,** for which the name is frequently loosely used.

laccate (*Bot.*). Having a shining surface, as if varnished.

lac'colith (*Geol.*). A form of intrusion with domed top and flat base, the magma having been instrumental in causing the up-arching of the 'roof.' Cf. *phacolith*.

lace. See **lace (machine-made)** below.

lace fabrics (*Hosiery*). See **openwork.**

lace machine. One of several types of machine in which bobbins, combs, and carriages form the chief part in converting two series of threads into an ornamental fabric.

lace, machine-made (*Textiles*). An ornamental fabric such as net, fancy lace, embroidery, and curtain lace, in which the bobbin and warp threads are interwoven, looped, plaited, or twisted together, according to design.

laced valley (*Build.*). A valley formed in a tiled roof by interlacing tile-and-a-half tiles across a valley board.

lac'erate, lacin'iate, las— (*Bot.*). Irregularly cut, as if slashed or torn.

laceration (*Med.*). The action of tearing: an irregular wound from crushing or tearing.

lachrymal, lak'— (*Zool.*). See **lacrimal.**

lach'rymators (*Chem.*). See **tear gases.**

lacing (*Eng.*). The joining of the ends of leather driving-belts by leather or wire lacing; largely superseded by the use of *belt fasteners* (q.v.).

lacing cord (*Lace*). A pliable twine used for lacing together the jacquard cards in a lace machine.

lacing course (*Masonry*). A brickwork bond-course built into rubble or flint walls.

lacing-in (*Bind.*). The operation of attaching the boards to a book by lacing the ends of the bands through holes made in the boards to receive them.

lacin'ia (*Bot.*). Incision in a leaf, petal, etc.: slender lobe projecting from the margin of a thallus.—(*Zool.*) In *Insecta*, the inner distal lobe of the maxilla.—*pl.* **laciniae.**

lacin'iate (*Bot.*). See **lacerate.**

La Cour convertor (*Elec. Eng.*). See **motor convertor.**

lac'quer (*Chem.*). A solution of film-forming substances in volatile solvents; e.g. a spirit lacquer or varnish consists of shellac or other gums dissolved in methylated spirit. The most important lacquers are the *cellulose lacquers* (q.v.). Lacquers are applied as varnish to finished surfaces, either to give temporary or permanent protection from tarnishing by the atmosphere, or for effect.

lacquering (*Cinema.*). The process of covering the entire emulsion side of a release print with a thin coat of nitro-cellulose lacquer, for edge lubrication and protection of the image during use.

lac'rimal (*Zool.*). Pertaining to, or situated near, the tear gland: in some Vertebrates, a paired lateral membrane bone of the orbital region of the skull, in close proximity to the tear gland.

lacrimal duct (*Zool.*). In most of the higher Vertebrates, a duct leading from the inner angle of the eye into the cavity of the nose; it serves to drain off the secretion of the lacrimal gland from the surface of the eye.

lacrimal gland (*Zool.*). In most of the higher Vertebrates, a gland situated at the outer angle of the eye; it secretes a watery secretion which washes the surface of the eye and keeps it free from dust.

lactalbu'mins (*Chem.*). Albumins occurring in milk; like other albumins, they are crystalline substances, soluble in water, are not precipitated by NaCl, but coagulate at 70°-75° C.

lactam formation (*Chem.*). The formation of cyclic acid amides from γ- and δ-amino acids by the elimination of water through the combination of a hydrogen atom of the amino group with the hydroxyl group of the carboxyl. Amino acids with longer chains also form lactams, which can be considered as intramolecular anhydrides. Lactams are tautomers of lactims (see **lactim formation**), and a number of compounds can react according to both formulae; e.g. isatin.

lactase (*Chem.*). An enzyme, present in the digestive juices of some animals, which facilitates the conversion of lactose into glucose.

lactates (*Chem.*). The salts and esters of lactic acid.

lactation (*Zool.*). Milk-production; the formation of milk by the mammary glands.

lacte'als (*Zool.*). In Vertebrates, lymphatics, in the region of the alimentary canal, in which the lymph has a milky appearance, due to minute fat globules in suspension.

lacte'ous (*Bot.*). Milky.

lactic (*Zool., etc.*). Pertaining to milk.

lactic acids (*Chem.*). $CH_3 \cdot CH(OH) \cdot COOH$ and $CH_2(OH) \cdot CH_2 \cdot COOH$, hydroxy-propionic acids. There are two isomers, viz. α-hydroxy-propionic acid, and β-hydroxy-propionic acid; only the former, known as *lactic acid* or *fermentation lactic acid*, is of importance.—LACTIC ACID, a synonym for racemic α-hydroxy-propionic acid, $CH_3 \cdot CH(OH) \cdot COOH$, hygroscopic crystals, m.p. 18° C., b.p. 83° C. at 1 mm., sp. gr. 1·248. It is produced commercially by the lactic fermentation of sugars with *Bacillus acidi lactici* or by heating cane-sugar with caustic potash solution of a certain concentration.

lactif'erous (*Bot.*). Containing latex.—(*Zool.*) Milk-producing: milk-carrying.

lactiferous cell (or **element**) (*Bot.*). A cell or vessel which contains or conducts latex.

lactif'ic (*Bot., Zool.*). Producing latex or milk.

lactim formation (*Chem.*). The formation of cyclic acid amides from γ- and δ-amino acids by the elimination of water through the combination of both amino hydrogen atoms with the oxygen atom of the carbonyl group. Lactims are tautomers of lactams (see **lactam formation**).

lac'tobi'ose (*Chem.*). Milk-sugar or *lactose* (q.v.).

Lactoid (*Plastics*). A thermoplastic of the casein type. See **Erinoid.**

lactones (*Chem.*). Intramolecular anhydrides of hydroxy-carboxylic acids, particularly of γ-hydroxy acids. These acids are so unstable in the free state that, when a mineral acid is added, the lactone is formed.

lactose (*Chem.*). $C_{12}H_{22}O_{11}+H_2O$, rhombic prisms which become anhydrous at 140° C., m p. 205° C. with decomposition; when hydrolysed it forms *d*-galactose and *d*-glucose. It reduces Fehling's solution and shows *mutarotation* (q.v.). It occurs in milk and is not so sweet as cane-sugar.

lactosu'ria (*Med.*). The presence of lactose in the urine.

lacu'na (*Bot.*). (1) Any depression in a surface of a plant.—(2) Any cavity in a plant.—(3) A cavity formed in rapidly elongating stems by breakdown of the protoxylem.—(4) A large intercellular space.—(*Zool*) A small cavity or space; as one of the cell-containing cavities in bone.—*adjs.* **lacunar, lacunose.**

lacu'nar (*Build.*). A coffer or panel formed in a ceiling.

lacu'nose (*Bot.*). Having a pitted surface.

lacus'trine (*Ecol.*). Pertaining to a lake or lakes: living in, or on the shore of, a lake.

lacustrine deposits (*Geol.*). Sediments accumulated in a lake, consisting of marginal deposits of shingle, passing rapidly into clay and limestone in deeper water. May exhibit a well-marked seasonal banding, as in varve clays, while a light colour seems characteristic. The occurrence of fresh-water snails and algae is a certain indication of lacustrine origin of such rocks as the Oligocene Bembridge Limestones, etc.

ladder (*Build.*). A framework consisting of two parallel, or roughly parallel, posts connected by bars at regular intervals along their length, thus providing a series of steps which enable the ladder to be used as an aid to climbing to different levels.

ladder (*Civ. Eng.*). The continuous line of mud-buckets, carried on an oblique endless chain, in a bucket-ladder excavator or dredger.

ladder (*Hosiery*). A defect caused by the breaking of a knitted stitch, which causes the thread to *ladder* in a vertical direction; more liable to occur in smooth yarns.

ladder back (*Furn.*). A back (of a chair or settee) with horizontal bars.

ladder dredger (or **excavator**) (*Civ. Eng.*). See **bucket-ladder dredger.**

ladder network (*Elec. Comm.*). A transmission network constructed from a number of equal symmetrical filter elements.

ladder rack (*Civ. Eng.*). A form of rack railway in which the rack, being formed of two long parallel bars connected by a series of short bars, is similar to a ladder laid along the ground between the rails.

ladder scaffold (*Build.*). A light scaffold sometimes used for painting and other exterior work; it consists of ladders suitably braced together and fixed in vertical positions around the building.

ladies (*Build.*). Slates 16×8 in.

ladle (*Met.*). A vessel lined with refractory material; used for conveying molten metal from the furnace to the mould or from one furnace to another.

Laënnec's cirrhosis, la-en-ek' (*Med.*). Multilobular cirrhosis of the liver, in which degeneration of liver cells is associated with areas of fibrosis enclosing many lobules of the liver.

lae′otro′pic (*Zool.*). Tending to the left; as a *laeotropic* spiral, *laeotropic* division.

laevigate, properly **levigate,** lev′— (*Bot.*). Having a smooth, polished surface.

laevo-rotatory (*Light*). Rotating the plane of polarisation of a polarised ray of light to the left.

laevulose, lev′— (*Chem.*). Fruit-sugar or *l-fructose* (q.v.).

laevulosu′ria (*Med.*). The presence of laevulose in the urine.

lag (*Eng.*). See **ignition—** **injection—**

lag (*Mining*). To protect a shaft or level from falling rock by lining it with timber (*lagging*).

lag (*Weaving*). A perforated wooden strip forming part of the pattern chain for a dobby. This pattern chain is formed by lags which are connected together, and in which wooden or metal pegs have been inserted to make the pattern.

lags (*Build., Civ. Eng.*). *Lagging* (q.v.).

lage′na (*Zool.*). In higher Vertebrates, a pocket lined by sensory epithelium and developed from the posterior side of the sacculus, which becomes transformed in Mammals into the scala media or canal of the cochlea.

lagen′iform (*Bot.*). Having the form of a Florence flask.

lager beer (*Brew.*). A light beer, low in alcohol, and with a rather high percentage of extract.

lagging (*Bot.*). Slow movement towards the poles of the spindle by one or more chromosomes in a dividing nucleus, with the result that these chromosomes do not become incorporated into a daughter nucleus.

lagging (*Build., Civ. Eng.*). The wooden boards nailed across the framework of a centre, to form the immediate supporting surface for the arch.

lagging (*Eng.*). (1) The process of covering a vessel or pipe with a non-conducting material, to prevent either the loss or ingress of heat.—(2) The non-conducting material itself, such as a plaster mixture of asbestos and magnesia, moulded sections of magnesia plaster, powdered cork, *Alfol* (q.v.), etc.

lagging (*Mining*). See **lag.**

lagging-back (*Weaving*). The operation of turning back the pattern chain of a dobby in order to rectify the fault which would otherwise occur when the loom stopped on account of a weft breakage.

lagging current (*Elec. Eng.*). An alternating current which reaches its maximum value at a later instant in the cycle than the voltage which is producing it. See **phase-angle** and **angle of lag.**

lagging load (*Elec. Eng.*). A reactive load on an a.c. circuit in which the current lags behind the voltage. Also called INDUCTIVE LOAD.

lagging of tides (*Astron.*). The interval between the theoretical moment of maximum tide, which is that of the moon's crossing of the meridian at that place, and the actual moment, which is later by an amount depending on several factors, amongst them the irregular contour of ocean boundaries.

lagging phase (*Elec. Eng.*). A term used in connexion with measuring equipment on 3-phase circuits to denote a phase whose voltage is lagging behind that of one of the other phases by approximately 120°. Also used, particularly in connexion with the 2-wattmeter method of 3-phase power measurement, to denote the phase in which the current at unity power factor lags behind the voltage applied to the meter in which that current is flowing.

lagoonal deposition (*Geol.*). The accumulation of sediment in a shallow arm of the sea, which is cut off from the outer ocean by a barrier which prevents free communication. The strata formed under such conditions constitute a *lagoon phase.* Examples in the stratigraphical column occur in the Lower Carboniferous and in the Rhaetic Series.

lagophthal′mus, lagophthal′mos (*Med.*). Imperfect closure of the eyelids when the eyes are shut.

lagop′odous (*Zool.*). Having feet covered by hairs or feathers.

lagre (*Glass*). A store. Probably a corruption of German *lager.*

laid-dry (*Build.*). Said of bricks which have been laid without mortar.

laid-in moulding (*Join.*). A moulding cut out of a separate strip of wood of the required section, and sunk in a special groove in the surface which it is intended to decorate.

laid-on moulding (*Join.*). A *planted moulding* (q.v.).

laid paper (*Paper*). Writing and printing paper with a ribbed watermark derived from the mould or dandy in which the wires are laid side by side.

Lainer's reducer (*Photog.*). An iodide solution for reducing contrast or density in photographic images.

laitance (*Build.*). (1) The milky scum from grout or mortar, squeezed out when tesserae or tiles are pressed into place.—(2) The milky scum formed on over-trowelled cement concrete or rendering.

lake (*Geol.*). A body of water lying on the surface of a continent, and unconnected (except indirectly by rivers) with the ocean. Lakes may be *fresh-water lakes,* provided with an outlet to the sea; or *salt lakes,* occurring in the lowest parts of basins of inland drainage, with no connexion with the sea. Lakes act as natural settling tanks, in which silt carried down by rivers is deposited as clay, containing the shells of molluscs, etc. The lakes of former geological periods may thus be recognised by the nature of the sediments deposited in them and the fossils they contain. Lakes occur plentifully in glaciated areas, occupying hollows scooped out by the ice, and depressions lying behind barriers of morainic material.

Lake copper (*Met.*). Copper produced from the Lake Superior ores in which the metal occurs native and is of high purity. Before modern methods of refining were developed, this was the purest copper produced.

lakes (*Chem.*). Pigments formed by the interaction of dyestuffs and 'bases' or 'carriers.' The formation of insoluble lakes in fibres which are being dyed is known as 'mordanting,' the hydroxides of aluminium, chromium, and iron generally being employed as 'mordants.'

Lalande cell, la-lahn^{g}d′ (*Elec. Eng.*). A primary cell having electrodes of zinc and iron, an electrolyte of caustic soda, and a copper oxide depolariser.

lalling, lallation (*Med.*). Babbling speech of infants: lack of precision in the articulatory mechanism of the mouth.

lam (*Weaving*). The wooden bar below a heald which is pulled down by the tappet lever, and which in turn lowers the heald connected to it.

Lamarckism (*Zool.*). A theory of the mechanism of evolution propounded by Lamarck; it postulates that new characters acquired by an organism during its lifetime, as an outcome of use or disuse, are inherited.

lamb dysentery (*Vet.*). See **dysentery (lamb).**

lambskin (*Textiles*). A fustian type of cotton fabric, having a raised surface and deep nap.

lamb's wool (*Textiles*). See under **fleece wool.**

lambert (*Illum.*). A unit of brightness; it is the brightness of a perfectly diffusing surface emitting or reflecting one lumen per sq. cm., and is equal to $\frac{1}{\pi}$ candles per sq. cm.

Lambert's law (*Light*). The illumination of a surface on which the light falls normally from a point source is inversely proportional to the square of the distance of the surface from the source. If the normal to the surface makes an angle with the direction of the rays, the illumination is proportional to the cosine of that angle.

lamell-, lamelli- (Latin *lamella*, thin plate). A prefix used in the construction of compound terms; e.g. *lamellibranchiate,* having plate-like gills.

lamel'la (*Bot.*). (1) A plate of cells.—(2) The gill of an agaric.—(*Zool.*) A structure resembling a thin plate.—*adjs.* **lamellar, lamellate.**

lamellar magnetisation (*Elec. Eng.*). Magnetisation of a sheet or plate distributed in such a way that the whole of the front of the sheet forms one pole and the whole of the back forms the other.

lam'ellate (*Bot.*). Made up of thin plates.

lamel'libranch (*Zool.*). Having plate-like gills, as members of the group *Pelecypoda.*

Lamellibran'chia (*Zool.*). See **Pelecypoda.**

lamel'licorn (*Zool.*). Having lamellate antennae.

lamelliros'tral (*Zool.*). (Of Birds) having lamelliform ridges on the inner edge of the beak.

lam'ellose (*Bot.*). Stratified.

lam'ina (*Bot.*). (1) The flattened blade of a leaf.—(2) Any flattened part of a thallus.—*pl.* **laminae.**

lamina (*Elec. Eng*). Thin sheet-steel.

lamina (*Geol.*). See **lamination.**

lamina (*Zool.*). A thin layer: a flat plate-like structure.—*adjs.* **laminar, laminiform.**

lamina cribro'sa (*Zool*). (1) See **cribriform plate.**—(2) The area of the sclerotic coat of the eye which is pierced by the bundles of the optic nerve.

lamina fusca (*Zool.*). In the Vertebrate eye, the layer of pigmented connective tissue lining the sclerotic coat.

lamina reticula'ris (*Zool.*). A net-like cuticular structure extending over the outer epithelium cells of Corti's organ in the Mammalian ear.

lamina supra-choroi'dea (*Zool.*). In the Vertebrate eye, the outermost layer of the choroid coat, consisting of delicate connective tissue containing elastic fibres and pigment cells.

laminar flow (*Hyd.*). See **viscous flow.**

lamina'ria tent (*Med.*). A conical plug made of a certain kind of seaweed, for use in dilating the opening of the cervix uteri.

laminated arch (*Carp.*). An arch formed of successive thicknesses of planking, which are bent into shape and secured together.

laminated brush (*Elec. Eng.*). A brush for an electric machine, made up of a number of layers insulated from one another, so that the resistance is greater across the brush than along its length (i.e. in the direction of normal current-flow).

laminated-brush switch (*Elec. Eng.*). A switch in which one or both of the contacts are laminated. See **laminated contact.**

laminated bulb (*Bot.*). See **tunicate bulb.**

laminated clay (*Geol.*). A type of clay exhibiting lamination (i.e. very fine stratification); characteristic of accumulation under lacustrine conditions. See also **varve clays.**

laminated conductor (*Elec. Eng.*). A conductor commonly used for armature windings of large machines or for heavy-current bus-bars; it is made up of a number of thin strips, in order to reduce eddy currents in the conductor or to make it more flexible.

laminated contact (*Elec. Eng.*). A switch contact made up of a number of laminations arranged so that each lamination can be pressed into contact with the opposite surface, thereby giving a large area of contact and also a wiping action. Also called BRUSH CONTACT.

laminated core (*Elec. Eng.*). A core built up of laminations; this is the usual type of core for an electric machine or transformer.

laminated glass. See **safety glass.**

laminated magnet (*Elec. Eng.*). (1) A permanent magnet built up of magnetised strips, in order to obtain a high intensity of magnetisation.—(2) An electromagnet for a.c. circuits, having a laminated core to reduce eddy currents.

laminated plastics (*Plastics*). Sheets of paper, linen, canvas, or silk impregnated with a phenolic, urea, or vinyl resin, and dried in a continuous operation. The sheets are pressed on heated platens in hydraulic presses during cure. Tubes are made by rolling on hot steel mandrels. Laminated plastics are light and strong, machinable, impervious to water and oil, and resistant to wear, acids, and alkalis; they have a high dielectric constant. They are used for silent gears, electrical insulation, decoration, and in the plating industry.

laminated pole (*Elec. Eng.*). A pole for the field windings of an electric machine, having the core built up of laminations in order to reduce eddy currents caused by flux pulsations in the air-gap.

laminated pole-shoe (*Elec. Eng.*). A field magnet pole for an electric machine having the pole-shoe built up of laminations in order to reduce eddy currents in it caused by flux pulsations in the air-gap.

laminated record (*Acous.*). A gramophone record in which the surface material differs from that in the inside, or core, in being finer grained and therefore freer from surface noise. The superior material is carried on a fine sheet of paper, being pressed on to the hot core in the press.

laminated spring (*Eng.*). A flat or curved spring consisting of thin plates or leaves superimposed, acting independently, and forming a beam or cantilever of uniform strength. See **carriage spring.**

laminated yoke (*Elec. Eng.*). A yoke for an electric machine, built up of laminations; used in some forms of a.c. motors.

lamination (*Elec. Eng.*). A sheet-steel stamping shaped so that a number of them can be built up to form the magnetic circuit of an electric machine, transformer, or other piece of apparatus. Also called CORE PLATE, PUNCHING, STAMPING.

lamination (*Geol.*). Stratification on a fine scale, each thin stratum, or *lamina*, being a small fraction of an inch in thickness. Typically exhibited by shales and fine-grained sandstones.

laminec'tomy (*Surg.*). Surgical removal of the posterior arch or arches of one or more spinal vertebrae.

laminiplan'tar (*Zool.*). (Of Birds) having the integument of the metatarsus scaly in front and smooth behind; as in Thrushes.

lamini'tis (*Vet.*). Inflammation of the keratogenous membrane of the feet of horses and cattle.

La Mont boiler (*Eng.*). A once-through or semi-flash boiler in which the feed is supplied to the upper ends of long closely spaced tubes of small diameter, from which the water and steam pass to a separating drum.

Lamont's law (*Elec. Eng.*). A law stating that the permeability of steel, at any flux density, is proportional to the difference between that flux density and the saturation value.

lamp (*Illum.*). A device for producing light.

See **arc—**
daylight—
electric—
filament—
gas—
miner's—
projector-type—
standard—
synchronising—
traction—
tubular—

lamp base (*Illum.*). See **lamp cap.**

lampblack (*Chem.*). The soot (and resulting pigment) obtained when substances rich in carbon (e.g. mineral oil, turpentine, tar, etc.) are burnt in a limited supply of air so as to burn with a smoky flame. See also **carbon black.**

lamp cap (*Illum.*). The cap of brass, bakelite, or other material, at the base of a filament or electric-discharge lamp, which contains the terminals, and also serves to support the lamp in the holder; also called LAMP BASE. See **bayonet cap, Edison screw-cap.**

lampholder (*Illum.*). A device for supporting an electric lamp; fitted with contacts connected to the source of supply; also called a HOLDER or LAMP SOCKET. See **backplate lampholder, bayonet holder, Edison screw-holder.**

lampholder plug (*Elec. Eng.*). A device for connecting a flexible electric cord, instead of a lamp, to an ordinary lampholder. Also called PLUG ADAPTOR.

lamphole (*San. Eng.*). A vertical shaft which is sunk in the ground and communicates with the crown of a sewer, thus enabling a lamp to be lowered into it to assist inspection from a nearby manhole.

lamp oil (*Fuels*). See **kerosene.**

lamp resistance (*Elec. Eng.*). A resistance consisting of one or more electric filament lamps.

lamp socket (*Illum.*). See **lampholder.**

lampas (*Vet.*). A swelling of the palatal mucous membrane behind the upper incisor teeth of horses.

lamp'rophyres (*Geol.*). Igneous rocks usually occurring as dykes intimately related to larger intrusive bodies; characterised by abnormally high contents of coloured silicates, such as biotite, hornblende, and augite, and a correspondingly small amount of feldspar, some being feldspar-free. See also **minette, monchiquite.**

lan'arkite (*Min.*). A very rare monoclinic sulphate of lead, occurring with anglesite and leadhillite (into which it easily alters) at Leadhills, Lanarkshire, Scotland.

lan'ate (*Bot., Zool.*). Covered with long and loosely tangled hairs: pertaining to or having wool: having the appearance of wool or of a woolly coat.

Lancashire boiler (*Eng.*). A cylindrical steam-boiler having two longitudinal furnace tubes containing internal grates at the front. After leaving the tubes the gases pass to the front along a bottom flue, and return to the chimney along side or wing flues.

Lancashire booster (*Elec. Eng.*). A special form of battery booster having four field windings connected respectively across the booster armature, across the main bus-bars, in series with the booster armature, and in series with the main circuit.

lance (*Carp.*). A sharp scribing part of a cutting tool, serving to cut through the grain in advance and on each side of the cutting tool proper.

lan'ceolate (*Bot.*). Flattened, two or three times as long as broad, widest in the middle, and tapering to a pointed apex.

lancet arch (*Build.*). A sharply pointed arch, of greater rise than an equilateral arch of the same span.

lancet-shaped (*Bot.*). Flattened, and shortly lanceolate, with a bluntish apex.

lancet window (*Build.*). A tall narrow window surmounted by a lancet arch.

lan'cinating (*Med.*). (Of pain) acute, shooting, piercing, cutting.

land and sea breezes (*Meteor.*). Light winds occurring at the coast during fine summer weather. During the day, when the land is hotter than the sea, convection causes a breeze from the sea; at night conditions are reversed, and the sea is warmer than the land, causing a breeze from the land.

landside (*Agric. Mach.*). A flat plate which is attached to the body of a plough and takes up the horizontal reactions of the ground when the plough is working.

landslip (*Geol.*). The sudden sliding of masses of rock, soil, or other superficial deposits from higher to lower levels, on steep slopes. Landslips on a very large scale occur in mountainous districts as a consequence of earthquake shocks, stripping the valley sides bare of all loose material. In other regions landslips occur particularly where permeable rocks, lying on impermeable shales or clays, dip seawards or towards deep valleys. The clays hold up water, becoming lubricated thereby, and the superincumbent strata, fractured by joints, tend to slip downhill, a movement that is facilitated on the coast by the undercutting consequent on marine erosion.

land tie (*Civ. Eng*). A tie-rod providing horizontal restraint against the lateral pressure exerted by earth retained by a wall.

land treatment (*Sewage*). The final or oxidising stage in sewage treatment, in which the liquid sewage is distributed over an area of land, through which it filters to underdrains. If the land will not permit of easy filtering, the sewage is applied to one plot of land by irrigation, and is then passed on to a second, third, and fourth plot, before final discharge into a stream.

landing (*Build.*). A flat platform at the head of a series of steps.

See **half-space—** **quarter-space—**

landing (*Civ. Eng.*). A space on a pier or quayside, intended to provide access for passengers alighting.

landing area floodlight (*Aero.*). A battery of lights specially designed to illuminate a sufficiently large surface for an aircraft landing.

landing bar (*Lace*). Part of the mechanism of a Levers lace machine, on which the tail of the carriage lands at the end of each swing.

landing-call push (*Elec. Eng.*). A push-button fitted at each landing of an electric lift, and arranged either to call the lift-car itself or to attract the attention of the attendant.

landing direction light (*Aero.*). A light, in the form of a beam, for indicating the direction in which landings are to be made. The aircraft alights upon, and travels along, the beam to its source.

landing ground (*Aero.*). In air transport, any piece of ground that has been prepared for landing of aircraft as required; not necessarily a fully equipped aerodrome. An *emergency landing ground* is any area of land that has been surveyed and indicated to pilots as being suitable for forced or emergency landings.

landing-switch (*Elec. Eng.*). (1) A two-way lighting switch.—(2) A switch operated by a lift car, to effect stoppage at a landing.

Landolt's fibres (*Zool.*). In some Vertebrates, the free outwardly directed processes of the cone-bipolars of the eye.

Landry's paralysis (*Med.*). An acute form of paralysis which starts at the feet and rapidly spreads upwards.

Landsberger apparatus (*Chem.*). An apparatus for the determination of the boiling-point of a solution by using the vapour of the solvent to heat the solution.

landscape marble (*Geol.*). A type of limestone containing markings resembling miniature trees, etc.; when polished, the surface has the appearance of a sepia drawing. See **dendritic markings, Cotham Marble.**

Lang lay (*Eng.*). A method of making wire ropes in which the wires composing the strands, and the strands themselves, are laid in the same direction of twist.

Lang′erhans′ cells (*Zool.*). Spindle-shaped cells in the centre of each acinus of the pancreas.

Langerhans′ islets (*Zool.*). Irregular masses of hyaline epithelium cells, unfurnished with ducts, occurring in the Vertebrate pancreas; they are responsible for the elaboration of the hormone insulin.

Langerhans′ layer (*Zool*). See **cytotrophoblast.**

lang′ite (*Min.*). A very rare ore of copper occurring in Cornwall, blue to green in colour; essentially hydrated copper sulphate, crystallising in the orthorhombic system.

Langmuir's theory (*Chem.*). (1) The assumption that the extra-nuclear electrons in an atom are arranged in shells corresponding to the periods of the periodic system. The chemical properties of the elements are explained by supposing that a complete shell is the most stable structure.—(2) The theory that adsorbed atoms and molecules are held to a surface by residual forces of a chemical nature.

Langport Beds (*Geol.*). A series of light-coloured limestones, with thin marl partings, occurring in the Rhaetic System between the Cotham Beds below and the Watchet Beds above. They reach 25 ft. in maximum thickness, and constitute the 'White Lias' proper.

languet, languette, lan′get (*Zool.*). In some *Urochorda*, a small process depending from the hyper-pharyngeal band.

lan′iary (*Zool.*). Adapted for tearing, as a canine tooth.

lan′olin (*Chem.*). Trade name for wool-fat (*adeps lanae*), a yellowish viscous mass of wax-like consistency, very resistant to acids and alkalis; it emulsifies easily with water and is used for making ointments. It consists of the palmitate, oleate, and stearate of cholesterol.

lantern (*Build.*). An erection on the top of a roof, projecting above the general roof level, and usually having glazed sides to admit light, as well as openings for ventilation.

lantern coelom (*Zool.*). In *Echinoidea*, the coelomic space lying within the lantern of Aristotle, and representing an enlarged perihaemal ring.

lantern, projection (*Light*). See **projection lantern.**

lantern wheel (or **pinion**) (*Horol.*). A form of pinion consisting of two circular brass discs connected by cylindrical pins, the pins acting as the leaves in an ordinary pinion. Lantern pinions are very satisfactory as followers but should not be used as drivers. Used extensively in cheap clocks, alarm clocks with pin-pallet escapement, and in some turret clocks. The lantern wheel is obsolete in general engineering.

lan′thanum (*Chem.*). Symbol, **La.** A metallic element in the third group of the periodic system, belonging to the rare earths group. At. no. 57, at. wt. 139·0, m.p. 810° C.

lan′tharin (*Zool.*). See **linin.**

lanu′ginose, lanuginous (*Bot.*, *Zool.*). Bearing a woolly coating, lanate.

lanu′go (*Zool.*). In Mammals, pre-natal hair.

lap (*Build.*). The length of overlap (varying between 2½ in. and 4 in.) of a slate over the slate next but one below it, in centre-nailed work; or that of a slate over the nail securing the slate next but one below it, in head-nailed work.

lap (*Eng.*). (1) The extent to which one plate overlaps another. See **lap joint.**—(2) In steam-engines, the amount by which the valve has to move from mid position to open the steam or exhaust port. See **exhaust lap, outside lap.**—(3) A piece of soft metal, wood, etc., often in the form of a rotating cylinder or disc, charged with abrasive or polishing powder; used in polishing or finishing metals, gem-cutting, etc. See **lapping, lapping machine.**

lap (*Met.*). A surface defect on rolled or forged steel. It is caused by folding a fin on to the surface and squeezing it in; as welding does not occur, a seam appears on the surface.

lap (*Textiles*). A rolled sheet of fibres produced at the delivery end of opening machinery during preparation of the material for spinning.

lap dissolve (*Cinema.*). The same as *dissolve*.

lap dovetail (*Join.*). An angle joint between two members, in which only one shows end grain, a sufficient thickness of wood having been left on this member, in cutting the joint, to cover the end grain of the other member. Also called DRAWER-FRONT DOVETAIL, from one of its common uses.

lap joint (*Carp.*). A joint between two pieces of timber, formed by laying one over the other for a certain length and fastening the two together with metal straps passing around the timbers, or with bolts passing through them.—(*Eng.*) A plate joint in which one member overlaps the other, the two being riveted or welded along the seam single, double, or treble.

lap winding (*Elec. Eng.*). A form of two-layer winding for electric machines in which each coil is connected in series with the one adjacent to it. Cf. *wave winding*.

laparot′omy (*Surg.*). Cutting into the abdominal cavity.—EXPLORATORY LAPAROTOMY, the operation of cutting into the abdominal cavity so that direct examination of abdominal organs may be made.

lapel′ microphone (*Acous.*). A small microphone, worn on the lapel; suitable for use when the speaker is addressing an audience, or when he cannot remain in a stable position.

lapidic′olous (*Zool.*). Living under stones.

lapil′li (*Geol.*). Small rounded pieces of lava whirled from a volcanic vent during explosive eruptions; lapilli are thus similar to volcanic bombs but smaller in size, usually about the size of walnuts.—*sing.* **lapillus.**

la′pis laz′uli (*Min.*). The original sapphire of the ancients, a beautiful blue stone used extensively for ornamental purposes; it consists of calcite stained deep-blue by three cubic minerals, sodalite, lazurite, and hauyne.

La Plata Sandstone (*Geol.*). A Jurassic sandstone, representing a dune-sand of desert origin, occurring in S.W. Colorado; equivalent to the White Cliff Sandstone of the Grand Canyon section.

lappet (*Zool.*). Any hanging, lobe-like structure; as the ciliated *lappets* of the actinotroch larva of Phoronis.

lappets (*Cotton Weaving*). Fabrics with figures of extra warp which resemble embroidered effects, the figures being produced during weaving.

lapping (*Eng.*). The finishing of spindles, bored holes, etc., to fine limits, by the use of laps of lead, brass, etc.

lapping (*Linen*). The operation of arranging cloth in yard folds after weaving, and again, usually, after bleaching.

lapping (*Paint.*). (1) A line or mark showing edges where each stretch of paint begins and ends.—(2) The art of concealing the line separating new work from old.

lapping (*Photog.*). Rubbing one surface against another, generally with an abrasive such as rouge, so that the softer takes up the contour of the harder; e.g. in a lens, or in making optical flats.

lapping machine (*Eng.*). A machine tool for finishing the bores of cylinders, etc., to fine limits by the use of revolving circular laps supplied with an abrasive powder suspended in the coolant.

lapse (*Meteor.*). The temperature gradient of the atmosphere taken vertically. The average lapse-rate is about 0·6° C. per 100 metres, being taken as positive when the temperature decreases with height.

lapsed intelligence (*Zool.*). See **instinct.**

Lara'mian or **Lar'amie Sands** (*Geol.*). A thick formation of sand laid down under continental conditions during the shallowing and retreat of the Cretaceous sea from the central U.S.A. The formation contains the remains of the last great dinosaurs (the *Ceratops* fauna) in Wyoming and Montana.

Lar'amide revolution (*Geol.*). A period of earth movement in early Tertiary times during which the interior regions of N. America were folded, producing the Rockies and the Andean and Antillean chains. The Appalachians were uplifted at this time, and the cycle of erosion was initiated which has produced the existing land forms. Volcanic activity occurred from Mexico into Canada.

larda'ceous disease (*Med.*). Amyloid or waxy kidney. Amyloid degeneration of the blood-vessels of the kidney (and usually elsewhere), associated with the copious excretion of urine of low specific gravity and containing albumin. See also **amyloid degeneration.**

lardalite (*Geol.*). See **laurdalite.**

large (*Paper*). A standard size of cut card, 3 × 4½ in.

large calorie (*Heat*). See **calorie.**

large imperial (*Paper*). A standard board size, 22 × 32 in.

large post (*Paper*). A standard size of printing paper, 16½ × 21 in.

lar'mier (*Build.*). A corona placed over a door or window opening to serve as a dripstone.

larnite (*Min.*). Orthosilicate of calcium, Ca_2SiO_4, discovered in the contact zone of a Tertiary dolerite intrusive into chalk containing flint nodules; formed by reaction between the calcium carbonate of the former and the silica of the latter. Cf. *wollastonite.*

larry (*Build.*). A tool having a curved steel blade fixed to the end of a long handle, to which it is bent normally; used for mixing mortar, or for mixing hair with coarse stuff to form a plaster.

larrying (*Build., Civ. Eng.*). The process of pouring a mass of mortar upon the wall and working it into the joints; sometimes used in building large masses of brickwork.

larva (*Zool.*). In *Acarina*, an immature stage intervening between the egg and the nymph, characterised by the possession of three pairs of legs only: in *Insecta*, an immature stage intervening between the egg and the adult, differing fundamentally from the latter, notably in the absence of compound eyes, and acquiring the adult structure by means of a complex metamorphosis, accompanied by a pupal instar: a self-supporting immature form of any animal, which differs fundamentally from the parents in structure.—*adj.* **larval.**

Larva'cea (*Zool.*). A class of *Urochorda* in which the adult is a free-living active form possessing a notochord, and closely resembles the larva in its anatomy; there are only two gill-slits, which open directly to the exterior; the animal secretes a curious non-adherent 'house' around itself, which is periodically replaced; pelagic forms.

larvikite (*Geol.*). See **laurvikite.**

larvip'arous (*Zool.*). Giving birth to offspring which have already reached the larva stage.—*n.* **larviparity.**

larviv'orous (*Zool.*). Larva-eating.

laryng-, laryngo- (Greek *larynx*, the larynx). A prefix used in the construction of compound terms; e.g. *laryngofissure* (q.v.).

larynge'al. *Adj.* from *larynx.*

laryngec'tomy (*Surg.*). Surgical removal of the larynx.

laryngis'mus (*Med.*). Spasm of the larynx.

laryngismus strid'ulus (*Med.*). In ill-nourished children, a condition in which sudden attacks of asphyxia are caused by collapse of the cartilaginous framework of the larynx.

laryngi'tis (*Med.*). Inflammation of the larynx.

laryngofis'sure (*Surg.*). Thyrotomy. Surgical exposure of the larynx by dividing the thyroid cartilage (Adam's apple) in the mid-line.

laryngol'ogy (*Med.*). That branch of medical science which treats of abnormal conditions of the larynx and adjacent parts of the upper respiratory tract.—*n.* **laryngol'ogist.**

laryngopharyngi'tis (*Med.*). Inflammation of the larynx and the pharynx.

laryn'goscope (*Surg.*). An instrument used for viewing the larynx.

laryngosteno'sis (*Med.*). Pathological narrowing of the larynx.

laryngos'tomy (*Surg.*). The surgical formation of an opening in the larynx.

laryngot'omy (*Surg.*). The operation of cutting into the larynx.

laryngotracheitis, —trak-e-i'tis (*Vet.*). A contagious filterable-virus infection of fowls, characterised by acute inflammation of the respiratory system.

lar'ynx (*Anat.*). The vocal organ in all land Vertebrates except Birds, situated at the anterior end of the trachea.—(*Acous.*) The fundamental of a speech sound is determined by the tension of the muscles in the larynx, and the spectral distribution of the frequency components in the emitted sound is determined by the acoustic resonance in the mouth and nasal cavities. See **voiced sound, unvoiced sound.**

lash-up (*Elec. Comm.*). The temporary connexion of apparatus, for experimental or emergency use.

lasher (*Mining*). A native employed to do *lashing* (q.v.).

lasher-on (*Mining*). A man employed to lash the chains from the tubs to the endless rope, in underground mechanical haulage.

lashing (*Mining*). A South African term for removing broken rock after blasting. Canadian term, MUCKING.

lasso-cell (*Zool.*). In *Ctenophora*, an adhesive cell, with a long anchoring filament, occurring on the tentacles.

last (*Boots and Shoes*). A wooden form, shaped like a foot, on which the various parts of a boot or shoe are shaped and attached to each other.

last-subscriber release (*Auto. Teleph.*). The release of automatic switching plant when the last of both subscribers has replaced his receiver and opened his loop.

lasting (*Textiles*). Strong twill cloth of hard twisted cotton or worsted yarns, or cotton warp and worsted weft; used for boot and bag linings, etc.

latch (*Join.*). A door-fastening device which exists in various forms but consists essentially of a pivoted bar, secured to the door, which falls into a hook on the frame.

latch needle (*Hosiery*). A hooked needle, with a latch over the hook which opens and closes while a stitch is in process of formation, the completed stitch opening the latch to receive a new thread.

latchet (*Plumb.*). A *tingle* (q.v.).

latching (*Surv.*). *Dialling* (q.v.).

latebric'olous (*Zool.*). Living in holes.

la'tent (*Zool.*). In a resting condition or state of arrested development, but capable of becoming active or undergoing further development when conditions become suitable: said also of hidden characteristics which may become evident under the right circumstances.

latent heat (*Phys.*). The heat which is required to change the state of a substance from solid to liquid, or from liquid to gas, without change of temperature. The numerical value of the latent heat is the amount of heat required to change the state of unit mass. Thus the latent heat of fusion of ice is 80 calories per gm., and the latent heat of vaporisation of water is 540 calories per gm.

latent image (*Photog.*). The non-detectable image registered in a sensitive emulsion by ionisation of molecules and realised by development.

latent magnetisation (*Elec. Eng.*). The property possessed by certain feebly magnetic metals (e.g. manganese and chromium) of forming strongly magnetic alloys or compounds.

latent time (*Bot.*). The period of time between the beginning of stimulation and the first signs of a response.

later (*Build.*). A brick or tile.

later-, latero-, lateri- (Latin *latus*, gen. *lateris*, side). A prefix used in the construction of compound terms; e.g. *laterocranium* (q.v.).

lateral. Situated on or at, or pertaining to, a side.—(*Bot.*) (1) Arising from the side of the parent axis.—(2) Attached to the side of another member.—(3) On or near the edge of a thallus or fruit.

lateral axis (*Aero.*). The cross-wise axis of an aircraft, particularly that passing through its centre of gravity, parallel to the line joining the wing tips.

lateral canal (*Hyd. Eng.*). A separate navigational canal constructed to follow the lie of a river which does not lend itself to canalisation.

lateral inversion (*Television*). A defect in a reproduced television image, the picture being reversed, the right-hand side appearing on the left, and vice versa. It is due to a reversal in the connexions to the line-scanning generator.

lateral line (*Zool.*). In Fish, a line of neuromast organs running along the side of the body.

lateral meristem (*Bot.*). A meristem located to the side of a plant member.

lateral mesenteries (*Zool.*). In *Zoantharia*, all mesenteries apart from the *directive mesenteries* (q.v.).

lateral plane (*Bot.*). The plane passing through a flower, parallel to the surface of the earth.

lateral recording (*Acous.*). The normal form of recording on a gramophone record; the cutting stylus removes a thread from the surface of a wax blank, the modulation being represented by a lateral, i.e. radial, deviation as the perfect spiral is traversed. Cf. *contour recording*.

lateral shift (*Geol.*). The displacement of outcrops in a horizontal sense, as a consequence of faulting. Cf. *throw*.

lateral traverse (*Eng.*). The longitudinal play given to locomotive trailing axles to permit of taking sharp curves.

latera'lis (*Zool.*). In Fish, a branch of the tenth cranial nerve, which innervates the lateral line.

later'igrade (*Zool.*). Moving sideways, as some Crabs.

lat'erite (*Geol.*). An aeolian clay formed under tropical climatic conditions by the weathering of igneous rocks, usually of basic composition. Consists chiefly of hydroxides of iron and aluminium, grading through increase of the latter into bauxite.

laterit'ious (*Bot.*). Brick-red.

lateritisation (*Geol.*). The process whereby rocks are converted into laterite, the details being imperfectly understood. Essentially, the process involves the abstraction of silica from the silicates. See **laterite.**

laterocra'nium (*Zool.*). In Insects, the side of the head, comprising the genae and postgenae.

laterosphe'noid (*Zool.*). The so-called 'alisphenoid' of Fish, Reptiles, and Birds (representing an ossification of the wall of the chondrocranium), as distinct from the alisphenoid of Mammals (developed from the splanchnocranium).

la'tex (*Bot.*). A milky fluid, present in many plants, usually white, sometimes yellow or reddish; it consists of a mixture of substances, proteins, gums, carbohydrates, etc.—(*Rubber*) A milky viscous fluid extruded when rubber trees (e.g. *Hevea Brasiliensis*) are tapped. It is a colloidal system of caoutchouc dispersed in an aqueous medium, sp. gr. 0.99, which forms rubber by coagulation. The coagulation of latex can be prevented by the addition of ammonia or formaldehyde. Latex may be vulcanised directly, the product being known as *vultex*.

latex (*Paper*). A solution of rubber sometimes used to increase the strength and durability of paper.

latex cell (*Bot.*). A simple or branched cell, derived by the enlargement of a single cell, and containing latex.

latex duct (*Bot.*). An elongated, branched, aseptate system of anastomosing hyphae present in some of the larger agarics, and containing latex.

latex tube (*Bot.*). A general term for *latex cells* and *latex vessels*.

latex vessel (*Bot.*). A simple or branched tube, usually anastomosing with other similar tubes, derived by the enlargement and union of a chain of cells, and containing latex.

lath (*Build.*). See **lathing.**

lath (*Min.*). A term commonly applied to a lath-like crystal.

lath and half laths (*Build.*). Wood laths $1 \times \frac{1}{2}$ in. in section.

lathe (*Eng.*). A machine tool for producing cylindrical work, facing, boring, and screw-cutting. It consists generally of a bed carrying a head-stock and tail-stock, by which the work is driven and supported, and a saddle carrying the slide rest, by which the tool is held and traversed.

lathe bed (*Eng.*). That part of a lathe forming the support for the head-stock, tail-stock, and carriage. It consists of a rigid cast box-section girder, supported on legs, its upper face being planed and scraped to provide true working surfaces, or 'ways.'

lathe carrier (*Eng.*). A clamp consisting of a shank which is formed into an eye at one end and provided with a set screw. It is attached to work supported between centres and driven by the engagement of the driver-plate pin with the shank or 'tail' of the carrier, which may be straight or bent.

lathe tools (*Eng.*). Turning tools with edges of various shape (round-nosed, side, etc.), and cutting angles, varying with the material worked on, formed by giving clearance to the front of the cutting edge and rake to the top of the tool. See **finishing tool, knife tool, roughing tool, side tool.**

lathe work (*Eng.*). Any work ordinarily performed in the lathe, such as all classes of turning, boring, and screw-cutting.

lathing, laths (*Build.*). Oak or fir strips, usually 3 or 4 ft. long, or steel meshing, used to cover surfaces to provide a basis for plaster.

lath'yrism (*Med.*). A disease characterised by stiffness and paralysis of the legs, due to poisoning with certain kinds of chick-pea.

laticif′erous duct (*Bot.*). A cavity in which latex is secreted.

latiplan′tar (*Zool.*). Having the posterior tarsal surface rounded.

latiros′tral (*Zool.*). Having a broad beak.

latisep′tate (*Bot.*). Having wide septa or dissepiments.

latitude and **longitude** (*Astron.*). (1) CELESTIAL. Spherical co-ordinates referred to the ecliptic and its poles. **Celestial latitude** is the angular distance of a body from the ecliptic. **Celestial longitude** is the arc of the ecliptic intercepted between the latitude circle and the First Point of Aries, and is measured positively eastwards from 0° to 360°.—(*Geog.*) (2) TERRESTRIAL. Spherical co-ordinates referred to the earth's equator and its poles; used to specify a point on the earth's surface. **Terrestrial latitude.** The angular elevation of the celestial pole above a plane tangential to the earth at a given place is known as the *geographical latitude*. The *geocentric latitude* is the angle made with the equatorial plane by the radius of the earth through the given point. The latter is slightly less than the former owing to the oblate form of the earth. **Terrestrial longitude** is the arc of the equator between the meridian through the point and the meridian at Greenwich; generally measured from 0° to 180° east or west of Greenwich.

latitude (*Photog.*). The range of exposure permissible, or range of density usefully obtainable, in a photographic emulsion. The range of exposure obtainable with the linear portion of the gamma curve of an emulsion.

latitude (*Surv.*). (1) The projected length of a survey line upon the reference meridian.—(2) See **latitude (terrestrial)** above.

latitude, libration in (*Astron.*). A phenomenon by which, owing to the moon's axis of rotation not being perpendicular to her orbital plane, an observer on the earth sees alternately more of the north and south regions of the lunar surface, and so, in a complete period, more than a hemisphere.

latitude, variation of (*Astron.*). A phenomenon, first detected in 1888 by Küstner, who showed that, owing to the spheroidal form and non-rigid consistency of the earth, its axis of rotation does not remain constant in direction but varies in a regular manner about a mean position, so that the latitude of a place also undergoes periodic variations.

latitudinal furrow (*Zool.*). In a segmenting ovum, a constriction encircling the ovum above or below, and parallel to, the equatorial furrow.

Latour alternator (*Radio*). See **Bethenod-Latour alternator.**

Latour-Winter-Eichberg motor (*Elec. Eng.*). A form of compensated repulsion motor sometimes used for traction work.

latterkin (*Plumb.*). A piece of hardwood suitably shaped at one end so that it may be used for clearing the grooves in cames.

lattice (*Bot.*). A weakly developed sieve plate on a lateral wall of a sieve tube, having vaguely defined edges and very minute pores.

lattice (*Chem.*). See **space-lattice.**

lattice (*Civ. Eng.*). Any structure formed of diagonal crossing bars.

lattice bars (*Struct.*). The diagonal bracing of struts and ties in an *open frame girder* or *lattice girder* (qq.v.).

lattice bridge (*Struct.*). A bridge formed of lattice girders.

lattice coil (*Elec. Eng.*). A form of coil used for the armature winding of electric machines, which is arranged so that the end connexions cross over one another in a regular pattern, giving a lattice appearance.—(*Radio*) An inductance coil in which the turns are wound so as to cross each other obliquely, to reduce the self-capacity. See **honeycomb coil.**

lattice diagram (*Elec. Eng.*). A diagram for simplifying the calculation of travelling waves on a transmission line when there are a large number of successive reflections.

lattice filter (*Elec. Comm.*). An electric wave filter constructed from lattice networks.

lattice girder (*Struct.*). A girder formed of upper and lower horizontal members connected by an open web of diagonal crossing bars; used in structures such as bridges and large cranes.

lattice network (*Elec. Comm.*). A filter network formed by two pairs of identical arms on opposite sides of a square, the input terminals being across one diagonal and the output terminals across the other.

lattice winding (*Elec. Eng.*). A winding, made up of lattice coils, for electric machines; always used for d.c. machines and frequently for a.c. machines.

lattice window (*Build.*). A window in which diamond-shaped panes are supported in a leaden frame consisting of diagonally intersecting cames, the longer axes of the diamonds being vertical.

laudanum (*Med.*). Tincture of opium.

laughing gas (*Chem.*). See **nitrous oxide.**

laumontite, lō′— (*Min.*). A zeolite consisting essentially of hydrated silicate of calcium and aluminium, crystallising in the monoclinic system; occurs in cavities in igneous rocks and in veins in schists and slates.

launder (*Mining*). A wooden trough for conveying water or crushed ore and water (pulp), in a mill or concentration works.

laur′dalite or **lardalite** (*Geol.*). A coarse-grained soda-syenite from South Norway; it resembles laurvikite but contains nepheline (elaeolite) as an essential constituent.

Laurent acid, lō-rahng′ (*Chem.*). See **L-acid.**

Laurentian Granites (*Geol.*). The oldest granitic intrusives in the Canadian Shield, of post-Keewatin, pre-Timiskaming age; they occur as batholiths elongated N.E. to S.W., and consist of granite, granite-gneiss, and pegmatites worked as a source of potash. See also **Algoman Granites.**

Laurer-Stieda (or **Laurer's**) **canal,** low′rer shtē′da (*Zool.*). In *Trematoda*, a canal leading away from the junction of the oviduct and the vitelline duct; it opens either to the exterior of the body dorsally or into the alimentary canal, or ends blindly.

laur′ionite (*Min.*). Oxychloride of lead, exceedingly rare, found in ancient lead slags at Laurium in Greece.

laurite (*Min.*). An iron-black sulphide of ruthenium and osmium occurring as small cubic crystals (octahedra), associated with platinum, in Borneo and Oregon.

laur′vikite or **larvikite** (*Geol.*). A soda-syenite from S. Norway, very popular as an ornamental stone when cut and polished; widely used for facing buildings, the distinctive feature being a fine blue colour, produced by schiller structure in the anorthoclase feldspars.

laut′arite (*Min.*). Monoclinic iodate of calcium, occurring rarely in caliche in Peru.

lava (*Geol.*). The molten rock material that issues from a volcanic vent or fissure and consolidates on the surface of the ground (*subaerial lava*), or on the floor of the sea (*submarine lava*). Chemically, lava varies widely in composition; it may be in the condition of glass, or a holocrystalline rock. See **basalt, obsidian, pillow structure, pumice;** also **volcano.**

lava flows (*Geol.*). See **extrusive rocks.**

lavage, lav-azh′ (*Med.*). Irrigation or washing-out of a cavity, such as the stomach or the bowel; e.g. gastric *lavage*.

lavender print (*Cinema.*). The specially dyed print, of low contrast, which is the first print made after editing the negative. It is suitable for making a duplicate negative, should the original negative become defective or be destroyed.

law. A scientific law is a rule or generalisation which describes specified natural phenomena within the limits of experimental observation. An apparent exception to a law tests the validity of the law under the specified conditions. A true scientific law admits of no exception. A law is of no scientific value unless it can be related to other laws comprehending relevant phenomena.

law calf (*Bind.*). Calf leather with a rough surface and light in colour; used for account-book bindings, etc.

law of conservation of matter (*Chem.*). Matter is neither created nor destroyed during any physical or chemical change.

law of constant (or **definite**) **proportions** (*Chem.*) Every pure substance always contains the same elements combined in the same proportions by weight.

law of Dulong and Petit, dü-lon^{g}′, pt-ĕ′ (*Chem.*). The atomic heats of solid elements are constant and approximately equal to 6·3. Certain elements of low atomic weight and high melting-point have, however, much lower atomic heats at ordinary temperatures.

law of equivalent (or **reciprocal**) **proportions** (*Chem.*). The proportions in which two elements separately combine with the same weight of a third element are also the proportions in which the first two elements combine together.

law of Guldberg and Waage, goold′berg, vah′ge (*Chem.*). See **law of mass action.**

law of isomorphism (*Chem.*). See **Mitscherlich's law of isomorphism.**

law of mass action (*Chem.*). The velocity of a homogeneous chemical reaction is proportional to the concentrations of the reacting substances.

law of multiple proportions (*Chem.*). When two elements combine to form more than one compound, the amounts of one of them which combine with a fixed amount of the other exhibit a simple multiple relation.

law of partial pressures (*Chem.*). See **Dalton's law of partial pressures.**

law of photochemical equivalence (*Chem.*). See **Einstein's law of photochemical equivalence.**

law of rational indices (*Crystal.*). A fundamental law of crystallography which states, in the simplest terms, that in any natural crystal the indices may be expressed as small whole numbers.

law of reciprocal proportions (*Chem.*). See **law of equivalent proportions.**

law of volumes (*Chem.*). See **Gay-Lussac's law of volumes.**

laws of electrolysis (*Chem.*). See **Faraday's laws of electrolysis.**

lawn (*Textiles*). A fine plain cloth, originally made from linen. Some light-weight cotton fabrics of good quality are now thus named.

Lawrence Smith method (*Chem.*). A method used in chemical analysis for the estimation of alkali metals, particularly in the analysis of glass and silicates.

lax (*Bot.*). Arranged loosely.

lax′ator (*Zool.*). A muscle which relaxes or loosens a part of the body without changing the relative position or direction of the axis of the part. Cf. *tensor.*

lay (*Cables*). The axial length of one turn of the helix formed by the core (in a telephone cable) or strand of a conductor (in a power cable). See also **lay ratio.**

lay (*Typog.*). The position of print on a sheet of paper. See **lay-out.**

lay-away pits (*Tanning*). See **layers.**

lay cords (*Bind.*). Cords with which a book is tied, to prevent the covers from warping whilst drying.

lay edge (*Print.*). The edge of a sheet of paper which is laid against the fixed guides in a printing or folding machine.

lay light (*Build.*). A window or sash, fixed horizontally in a ceiling, to admit light to a room.

lay marks (*Print.*). The marks to which sheets are laid in printing to ensure uniformity of position.

lay-out (*Typog.*). (1) The general appearance of a printed page.—(2) The art and practice of disposing display (e.g. advertising) matter to the best advantage.

lay panel (*Join.*). A long panel of small height formed in a panelled wall above a doorway, or all round the room immediately below the cornice.

lay ratio (*Cables*). The ratio of the *lay* (q.v.) to the mean diameter of the helix.

lay shaft (*Eng.*). An auxiliary geared shaft; as the secondary shaft running alongside the mainshaft of an automobile gear-box, to and from which the drive is transferred by gear-wheels of varying ratio.

layer (*Bot.*). A stratum of vegetation, as the shrubs in a wood.

layer (*Build.*). (1) A course in a wall.—(2) A bed of mortar between courses.

layers (*Tanning*). Pits containing tan liquor, in which heavy hides are laid out with a layer of ground tanning material separating them, after passing through the handlers. Also called LAY-AWAY PITS. See **handlers.**

layer board (*Build.*). See **lear board.**

layer, dielectric (*Cables*). Maxwell showed that absorption phenomena are exhibited by a model composed of the series combination of two leaky dielectrics of unequal time-constants.

layered map (*Surv.*). A map on which relief is represented by the use of contours, the areas between adjacent contours being coloured according to a definite system.

layering (*Bot.*). (1) See **stratification.**—(2) A method of artificial propagation in which stems are pegged down and covered with soil until they root, when they can be detached from the parent plant.

laying (*Plast.*). The first coat in two-coat work.

laying-in (*Join.*). The operation of forming a *laid-in moulding* (q.v.).

laying-off (*Ship Constr.*). The process of transferring the design form to full scale, for the purpose of 'fairing' and ultimately of fabrication of details.

laying-out (*Eng.*). The marking-out of material, especially plate work, full size, for cutting and drilling.

laying-over seams (*Furs*). The operation of lapping over the edges of two skins in order to obtain greater length or breadth.

laying press (*Bind.*). See **lying press.**

laying trowel (*Plast.*). A tool similar to the *hand-float* (q.v.) but made of steel.

laz′ulite (*Min.*). A deep sky-blue, strongly pleochroic mineral, crystallising in the monoclinic system. In composition essentially a hydrated phosphate of aluminium, magnesium, and iron, with a little calcium.

laz′urite (*Min.*). An ultramarine-blue mineral occurring in cubic crystals or shapeless masses; it consists of silicate of sodium and aluminium with some sulphur. A constituent of lapis-lazuli.

L.B. (*Teleph.*). Abbrev. for *local battery* (q.v.).

lb. Abbrev. for *pound.*—For **lb.-calorie,** see **pound-calorie.**

l.c. (*Typog.*). Abbrev. for *lower case* (q.v.).

lea (*Textiles*). A length of yarn; 80 yds. in worsted, 120 yds. in cotton. In linen, the term indicates the size of yarns; or a length of 300 yds.

leaching (*Bot.*). The removal, by percolating water, of mineral salts from the soil.

leaching (*Met.*). The extraction of a soluble metallic compound from an ore by dissolving in a solvent (frequently sulphuric acid). The metal is subsequently precipitated from the solution. Also called LIXIVIATION.

leaching or **leeching** (*Tanning*). The extraction of tannic acid from bark or other tanning material, by passing water through a series of pits (*leaches*) containing the pulverised material.

leaching cesspool (*Sewage*). A cesspool which is not watertight.

lead, led (*Met.*). Symbol, Pb. A metallic element in the fourth group of the periodic system. At. wt. 207·2, at. no. 82, valency 2 or 4, m p. 327·5° C, sp. gr. at 20° C. 11·35. Specific electrical resistivity 20·65 microhms per cm. cub. Used as the basis for the manufacture of massicot, litharge, white lead, red lead, orange lead, and lead chromes. The metal is bluish-grey, the heaviest and softest of the common metals. On account of its resistance to corrosion, extensively used for roofing, cable sheathing, and for lining apparatus in the chemical industry. Other principal uses:—in storage batteries, ammunition, foil, and as a constituent of bearing metals, solder, and type-metal. Lead can be hardened by the addition of arsenic or antimony. Lead occurs very rarely in the native form, and then appears to have been formed by fusion of some simple lead ore accidentally incorporated in lava.

lead (*Build.*). See **sheet lead.**

lead (*Plumb.*). The leaden came of a lattice window.

lead (*Surv.*). The leaden sinker secured at one end of a *lead-line* (q.v.).

leads (*Eng.*). Lengths of thin lead wire inserted between a very large journal and the bearing cap during assembly to test the clearance.

leads (*Typog.*). Thin strips of lead, of varying thickness, used to separate lines of type. Thicknesses are 1-point, 1½-point (*thin*), 2-point, and 3-point (*thick*).

lead-acid (or **lead**) **accumulator** (*Elec. Eng.*). A secondary cell consisting of lead electrodes, the positive one covered with lead dioxide, dipping into sulphuric acid solution. It yields 2 volts electromotive force, but is comparatively heavy.

lead azide (*Chem.*). PbN_6. Explosive like most azides. Sometimes used, instead of mercury fulminate, as a detonator for T.N.T.

lead burning (*Plumb.*). The process of welding together two pieces of lead, thus forming a joint without the use of solder.

lead carbonate (*Chem.*). $PbCO_3$. Occurs in nature as cerussite. At about 200° C. it decomposes into the monoxide and carbon dioxide. Readily reduced to metal by carbon monoxide.

lead carbonate, basic (*Chem.*). See **basic lead carbonate.**

lead chloride (*Chem.*). $PbCl_2$. Made by dissolving lead oxide or carbonate in hot hydrochloric acid. Crystals of lead chloride deposited on cooling.

lead chromate (*Chem.*). $PbCrO_4$. Precipitated when potassium chromate is added to the solution of a lead salt. Used as a pigment, called *chrome yellow.* The colour may be varied by varying the conditions under which the precipitation is made.

lead chromate, basic (*Chem.*). See **basic lead chromate.**

lead disilicate (*Chem.*). Obtained by fusing lead oxide and silica together. As lead frit, it is used as a ready means of incorporating lead oxide in the making of lead glazes.

lead dot (*Build.*). A lead peg or dowel used to fasten sheet-lead to the upper surface of a coping or cornice, for which purpose it is run into a mortise in the stone.

lead flare (*Cables*). See **flare (lead).**

lead-flat (*Build.*). A *flat roof* (q.v.) formed of sheet-lead laid on boarding and joists.

lead frit (*Chem.*). Also known as *lead disilicate* (q.v.).

lead glance (*Min.*). See **galena.**

lead glass (*Glass*). Glass containing lead oxide. The amount may vary from 3-4% to 50% or more in special cases. 'English Lead Crystal' used for tableware contains 33-34%.

lead grip (*Elec. Eng.*). A bonding device for providing continuity of a lead-sheathed electric cable.

lead hydroxide (*Chem.*). $Pb(OH)_2$. Dissolves in excess of alkali hydroxides to form plumbites.

lead joint (*Plumb.*). A joint formed between the spigot and the socket of successive lengths of large water-pipes by pouring molten lead into the annular space between them, or by ramming in lead wool.

lead-lights (*Build.*). *Leaded lights* (q.v.).

lead-line (*Surv.*). A line with which soundings are taken. The depth of water is indicated on the line by 'marks,' or by knots in the line, indicating fathoms; fathoms not indicated on the line (e.g. between 7 and 10) are known as *deeps* (q.v.).

lead monoxide (*Chem.*). PbO. An oxide of lead, varying in colour from pale yellow to brown depending on the method of manufacture. An intermediate product in the manufacture of red lead. Known also as LITHARGE, and under certain conditions as MASSICOT.

lead nail (*Build.*). A small copper alloy nail used for fixing sheet-lead on roofs.

lead oxychloride (*Chem.*). $PbCl_2{\cdot}PbO$. See **Cassel's yellow.**

lead paint (*Paint.*). The ordinary paint, in which the base is white lead.

lead peroxide (*Chem.*). PbO_2. A strong oxidising agent. Industrial application very limited. Present, in certain conditions, in accumulators or electrical storage batteries as a chocolate brown powder.

lead plug (*Masonry*). A cast-lead connecting-piece binding together adjacent stones in a course; formed by running molten lead into suitably cut channels in the jointing faces.

lead sulphate (*Chem.*). $PbSO_4$. Formed as a white precipitate when sulphuric acid is added to a solution of a lead salt.

lead sulphate, basic (*Chem.*). See **basic lead sulphate.**

lead sulphide (*Chem.*). Found in nature as *galena.* Formed when lead sulphate is reduced by carbon and when hydrogen sulphide is passed through a solution of a lead salt.

lead tetraethyl (*Chem.*). $Pb(C_2H_5)_4$. A colourless stable liquid, obtained by the action of a zinc or magnesium ethyl halide on lead chloride. It is used in motor spirit to increase the anti-knock rate.

lead wire (*Cables*). Used in cable joints. The lead (Pb) wire is wound round the lead flare and oil-resisting poultice, on to the lead sheath.

lead wool (*Plumb.*). A specially prepared form of lead made in fine threads; used, instead of molten lead, in making pipe joints.

lead, lēd (*Civ. Eng.*). The distance over which earthwork has at any time to be conveyed from a cutting to a place of deposit.

lead (*Elec. Eng.*). (1) A term often used to denote an electric wire or cable.—(2) See **backward shift, brush shift, forward shift.**

lead (*Rail.*). The distance from the nose of a crossing to the nose of the switch.

lead-in (*Radio*). That portion of an antenna wire which connects the indoor apparatus with the outdoor antenna system.

lead-in insulator (*Elec. Eng.*). See **bushing.**

lead screw (*Eng.*). A square or acme-thread screw running alongside the bed of a lathe, and driven through *change wheels* (q.v.) from the mandrel, for traversing the slide rest in screw cutting.

lead, slide-valve (*Eng.*). The amount by which the steam port of a steam-engine is already uncovered by the valve when the piston is at the beginning of its working stroke. See also **inside lead.**

leaded bronze (*Met.*). Copper base alloy containing 5-10% of tin and 8-20 and sometimes 30% of lead. Used for heavy-duty bearings.

leaded lights (*Build.*). A window formed of (usually) diamond-shaped panes of glass connected together by leaden cames.

leader (*Bot.*). One of the main shoots of a tree.

leader (*Cinema.*). A blank strip of film, generally white to facilitate threading and for identification purposes, attached or printed at the start of each reel of film, so that the speed of projection may be normal when the projected picture commences. Cf. *trailer.*

leader (*Mining*). A thin mineralised vein parallel to, or in continuation of, the main vein formation.

leader (*Plumb.*). See **conductor.**

leader (*Surv.*). The chainman who has charge of the forward end of a chain. He is directed into line by the follower.

leader (*Typog.*). A series of dots (...) placed at intervals to guide the eye across a table of contents, index, etc.

leader-hook (*Build.*). A device, such as a *holderbat* (q.v.), for securing a rain-water pipe to a wall.

leadhillite (*Min.*). Carbonate and sulphate of lead, so called from its occurrence with other ores of lead at Leadhills (Lanarkshire, Scotland).

leading, leading-out (*Typog.*). The process of inserting leads between lines of type matter, in order to open them out, thus presenting more white space between the printed lines.

leading axle (*Eng.*). The front axle of a locomotive.

leading current (*Elec. Eng.*). An alternating current which reaches its maximum value at an earlier instant in the cycle than the voltage which is producing it. See **angle of lead, phase-angle.**

leading edge (*Aero.*). The edge of a streamline body or aerofoil which is forward in normal motion: structurally, the member that constitutes that part of the body or aerofoil.

leading edge (*Elec. Eng.*). A term used in connexion with the brushes of electric machines. See **entering edge.**

leading-in insulator (or tube) (*Radio*). A tubular form of insulator through which the lead-in enters a building.

leading-in wire (*Radio*). The same as *lead-in.*

leading-in wires (*Illum.*). The wires conducting the current from the cap contacts of an electric filament or discharge lamp to the filament itself or to the electrodes.

leading load (*Elec. Eng.*). A reactive load on an a.c. circuit in which the current leads upon the voltage. Also called a CAPACITIVE LOAD.

leading note (*Acous.*). The note one semitone below the tonic or key note of the normal musical scale; essential in combining harmonic frequencies.

leading-out wire (*Elec. Comm.*). The flexible insulated wire which is attached to the more delicate insulated wire used for the windings of transformers, etc., and which is insufficiently robust for connecting to terminals.

leading phase (*Elec. Eng.*). (1) A term used in connexion with measuring equipment on 3-phase circuits to denote a phase whose voltage is leading upon that of one of the other phases by approximately 120°.—(2) Particularly in connexion with the two-wattmeter method of 3-phase power measurement, the phase in which the current at unity power factor leads upon the voltage applied to the meter in which that current is flowing.

leading pole horn (*Elec. Eng.*). The portion of the pole-shoe of an electric machine which is first met by a point on the armature or stator surface as the machine revolves. Hence also *leading pole tip.*

leading ramp (*Elec. Eng.*). The end of a conductor-rail at which the collector-shoe of an electric train first makes contact.

leaf (*Bot.*). An outgrowth from the stem of a plant, usually green, and largely concerned with photosynthesis and with transpiration. It consists ordinarily of a leaf base, a petiole or stalk, and a flattened lamina, which in a simple leaf is in one piece; in a compound leaf it is in two or more separate pieces. The lamina is usually conspicuously veined.

leaf (*Civ. Eng., etc.*). A term applied to an object which has a large area in relation to its thickness; e.g. one of a pair of lock-gates.

leaf (*Textiles*). (1) A heald shaft.—(2) One plate of a shedding tappet.

leaf base (*Bot.*). The base of the leaf stalk, where it joins the stem.

leaf bud (*Bot.*). A bud containing vegetative leaves only.

leaf cushion (*Bot.*). A swollen leaf base.

leaf divergence (*Bot.*). The angle at the intersection of the planes passing longitudinally through the middles of two successive leaves.

leaf fall (*Bot.*). See **fall of the leaf.**

leaf gap (*Bot.*). An interruption of the vascular tissues of a stem, beneath the insertion of a leaf.

leaf incept (*Bot.*). The earliest recognisable rudiment of a leaf.

leaf mosaic (*Bot.*). The arrangement of the leaves on a shoot or a plant in such a way that as much leaf surface as possible is exposed to light, and as little as possible is shaded by other leaves.

leaf scar (*Bot.*). The scar left on a stem at the point where a leaf has fallen off; it is commonly covered by a thin sheet of cork.

leaf sheath (*Bot.*). The base of the leaf when it is in the form of a sheath more or less surrounding the stem.

leaf trace (*Bot.*). The vascular tissue between the stele and the base of the leaf.

leaflet (*Bot.*). One separate portion of the lamina of a compound leaf.

leafy raceme (*Bot.*). A raceme in which the bracts differ little, or not at all, from the ordinary foliage leaves of the plant.

leak (*Radio*). A high resistance, of the order of megohms. Frequently used as a discharging path for a condenser. See **grid leak.**

leakage coefficient (*Elec. Eng.*). The ratio of the total flux in the magnetic circuit of an electric machine or transformer to the useful flux which actually links with the armature or secondary winding. Also called LEAKAGE FACTOR.

leakage conductance (*Elec. Eng.*). See **leakance.**

leakage current (*Elec. Eng.*). Current flowing from one pole of an electric system to earth, or to another pole, through the insulation. Usually confined to currents of a small value.

leakage factor (*Elec. Eng.*). See **leakage coefficient.**

leakage flux (*Elec. Eng.*). That part of the total flux of the magnetic circuit of an electric machine or transformer which does not link with the armature or secondary winding. Also called MAGNETIC LEAKAGE.

leakage indicator (*Elec. Eng.*). An instrument for measuring or detecting a leakage of current from an electric system to earth. Also called an EARTH DETECTOR.

leakage protective system (*Elec. Eng.*). A protective system which operates as a result of leakage of current from electrical apparatus to earth.

leakage reactance (*Elec. Eng.*). The reactance of a circuit arising from the interlinkages between it and the leakage flux associated with it.

leakance (*Elec. Eng.*). The reciprocal of insulation resistance. Also called LEAKAGE CONDUCTANCE.

leaky grid rectification (or **detection**) (*Radio*). A system of grid rectification in which the signal is applied to the grid of a thermionic tube via a series condenser shunted by a grid leak.

lean lime (*Build.*). *Hydraulic lime* (q.v.).

lean mixture (*I.C. Engs.*). A fuel-air mixture which is weaker than desired, or weaker than the chemically correct mixture.

Lean's dial (*Surv.*). A form of compass adapted for taking inclined sights; it consists of a pair of sighting vanes, or a telescope capable of rotation about a horizontal axis and moving over a fixed vertical graduated arc.

lean-to roof (*Build.*). A roof, having only one slope, spanning the distance between two walls one of which is higher than the other.

leaning thread (*Eng.*). See **buttress screw-thread.**

leap years (*Astron.*). Those years in which an extra day, February 29, is added to the civil calendar to allow for the fractional part of a tropical year of 365·2422 days. Since the Gregorian reform of the Julian calendar, the leap years are those whose number is divisible by 4, except centennial years unless these are divisible by 400.

leaping weir (*Civ. Eng.*). A special arrangement whereby flood flows may be diverted from a channel into which normal flows would ordinarily pass, the water having to go over a weir set at such a height that flood flows leap beyond the channel to an overflow. Also called a SEPARATING WEIR.

lear (*Glass*). See **lehr.**

lear board (*Build.*). A board carrying a lead gutter. Also called a LAYER BOARD.

lease rods (*Weaving*). Two rods across a warp, used to separate the threads and to keep them in their correct position.

leasing (*Weaving*). The process of dividing the threads of a warp by a band or rods. The threads are placed end-and-end (1-and-1) or 2-and-2, as required.

least action, principle of (*Phys.*). The path described between two points A and B by a particle under the influence of forces is such that the line integral of the velocity v is a minimum. That is:

$$\int_{A}^{B} v\, ds = \text{minimum},$$

where ds is an element of path.

least count (*Surv.*). The lowest fractional part to which it is possible to read with a vernier.

least distance of distinct vision (*Optics*). For a normal eye it is assumed that nothing is gained by bringing an object to be inspected nearer than 25 cm., owing to the strain imposed on the ciliary muscles if the eye attempts to focus for a shorter distance.

least squares, law of (*Maths.*). The law which postulates that the best value to take from a set of observations is that which makes the sum of the squares of the deviations from this value a minimum.

least time, principle of (*Phys.*). See **Fermat's principle of least time.**

leat (*Mining*). A small stream of water.

leather. An animal skin or hide which, by tanning or tawing and subsequent dressing, has been rendered imputrescible and suitable for special purposes. The skins of numerous reptiles, as well as shark and fish skins, are converted into leather on a large scale.

leather hollows (*Eng.*). Strips of leather used by pattern-makers to form the fillets in wood patterning.

leather yellow (*Chem.*). *Phosphine* (2, q.v.).

Leatheroid (*Diel.*). A proprietary *vulcanised fibre* (q.v.).

leaving edge (*Elec. Eng.*). The edge of the brush of an electric machine which is last met during revolution by a point on the commutator or slip ring. Also called HEEL, BACK, TRAILING EDGE.

Leber's disease, lā'ber (*Med.*). Hereditary optic atrophy; hereditary optic neuritis. A hereditary condition, transmitted through an unaffected female to males, in which there is gradual loss of sight due to an affection of the optic nerve behind the eyeball.

Le-Blanc phase advancer, le blahn^{g} (*Elec. Eng.*). A phase advancer consisting of a d.c. armature with three sets of brushes per pole pair on the commutator; the brushes are connected to the three slip rings of the induction motor, and the advancer is driven from the motor shaft at an appropriate speed, thereby causing it to take a leading current and improve the motor power-factor; the armature is usually arranged in a stator frame, although the latter has no windings.

Leblanc process, le-blahn^{g} (*Chem.*). A process formerly used on a large scale for the manufacture of sodium carbonate and intermediate products from common salt.

Le Chatelier-Braun principle, shat-lyā brown (*Chem.*). If any change of conditions is imposed on a system at equilibrium, then the system will alter in such a way as to counteract the imposed change. This principle is of extremely wide application.

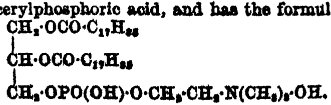
lechatel'ierite (*Min.*). A name sometimes applied to naturally fused amorphous silica, such as that which occurs as fulgurites.

lechosos opal, lek-ō'— (*Min.*). A variety of precious opal exhibiting a deep-green play of colour.

lech'riodont (*Zool.*). Having the teeth borne by the pterygoid and those borne by the vomer forming a transverse row.

lecith-, lecitho- (Greek *lekithos*, yolk of egg). A prefix used in the construction of compound terms; e.g. *lecithoblast* (q.v.).

lecithin, les'i-thin (*Chem.*). A phosphatide found in the yolk of the egg and in the brain. It may be described as the choline ester of distearyl-glycerylphosphoric acid, and has the formula:



$$\begin{array}{l} CH_2{\cdot}OCO{\cdot}C_{17}H_{35} \\ | \\ CH{\cdot}OCO{\cdot}C_{17}H_{35} \\ | \\ CH_2{\cdot}OPO(OH){\cdot}O{\cdot}CH_2{\cdot}CH_2{\cdot}N(CH_3)_3{\cdot}OH. \end{array}$$

Other lecithins contain, besides stearic acid, palmitic or oleic acid. Lecithin is an important constituent of protoplasm.

lec'ithoblast (*Zool.*). The blastomeres of a segmenting ovum which contain yolk.

lec'ithocoel, —sēl (*Zool.*). The segmentation cavity of a holoblastic egg.

lecithoproteins (*Chem.*). Compounds formed from proteins and lecithin.

Leclanché cell, le-klahn^{g}-shā (*Elec. Eng.*). A primary cell consisting of a carbon cathode covered with manganese dioxide and a zinc anode dipping into ammonium chloride solution, the manganese dioxide being retained in a porous pot. See also **agglomerate Leclanché cell.**

Ledbury Shales (*Geol.*). A local name for the 300 ft. of olive-green and purple shales occurring in Herefordshire, at the level of the Temeside Shales of Downtonian age.

ledge (*Join.*). One of the battens across the back of a batten door.

ledged-and-braced door (*Join.*). A door similar to a batten door, but framed diagonally with braces across the back, between the battens.

ledged door (*Join.*). A *batten door* (q.v.).

ledgement (*Build.*). A horizontal line of mouldings, or a string-course.

ledger (*Build.*). A horizontal pole or member, lashed or otherwise fastened across the standards in a scaffold.

ledger board (*Carp*) See **ribbon strip.**

leeches (*Vet.*). See **bursattee.**

leer (*Glass*). See **lehr.**

left-hand rule (*Elec. Eng.*). See **Fleming's rule.**

left-hand thread (*Eng.*). A screw-thread cut in the opposite direction to the normal right-hand. Viewed in elevation, the external thread is inclined upwards from right to left. Used when a normal thread would tend to unscrew.

left-hand tools (*Eng.*). Lathe side-tools with the cutting edge on the right, thus cutting from left to right.

left twist (*Woollen*). Yarn twist which runs to the left; obtained by driving the spindle by means of a crossed band, so that it turns in an anti-clockwise direction. See **cross band.**

leg (*Elec. Comm.*). A side of a loop circuit, i.e. either the *go* or *return* of an electrical circuit.

leg (*Instruments*). One of the limbs of a pair of compasses.

legal ohm (*Elec. Eng.*). A unit of resistance adopted by the International Congress of Electricians at Paris in 1884 but never given legal sanction. It is equal to the resistance of a column of mercury 106 cm. long and 1 sq. mm. in cross-section at 0° C., i.e. equal to 0·99718 of the international ohm.

legend line (*Typog.*). The line of descriptive matter set below an illustration; a caption.

leg'ume (*Bot.*). A fruit formed from a single carpel, splitting along the dorsal and the ventral sutures, and usually containing a row of seeds borne on the inner side of the ventral suture. A pea pod is a familiar example.

lehr, leer, or **lear** (*Glass, etc.*). An enclosed oven or furnace used for annealing, or other form of heat-treatment, particularly used in glass manufacture. It is a kind of tunnel down which the glass, hot from the forming process, is sent to cool slowly, so that strain is removed, and cooling takes place without additional strain being introduced. Lehrs may be of the open type (in which the flame comes in contact with the ware), or of the muffle type.

Leicester wool (*Textiles*). The best quality of the English lustre wools, staple 10 ins.; used for lining fabrics.

Leidig's cell, lī'dig (*Zool.*). A type of connective tissue cell, occurring in *Crustacea*, consisting of a central cytoplasmic mass, with an eccentric nucleus, and a number of radiating branched processes arising from the periphery.

Leighton Buzzard Silver Sand (*Geol.*). Clean white sand used for refractory moulding purposes; it occurs at the top of the Woburn Sands of Lower Cretaceous age, and is named from the locality where it is exploited in Bedfordshire, England.

leimtype, līm'— (*Photog.*). A half-tone block process involving the use of an exposed bichromated film, which is attached directly to the block before development.

Leintwardine Flags, lĕnt'— (*Geol.*). Strata of Lower Ludlow age, flags being developed in the higher part of the group. At Leintwardine they contain a rich star-fish bed.

leiomyo'ma (*Med.*). A tumour composed of unstriped muscle fibres.

leiospo'rous (*Bot.*). Having smooth spores.

leishmani'asis, leishmanio'sis (*Med.*). A term applied to a group of diseases caused by infection with protozoal parasites of the genus *Leishmania*. See also **kala-azar.**

leizure (*Textiles*). A term used in the silk trade for *selvedge*.

lemma (*Bot.*). A glume subtending a flower of a grass.

lemnis'cus (*Zool.*). In *Acanthocephala*, one of a pair of sac-like organs situated at the base of the proboscis and containing fat globules.

lemon chrome (*Paint.*). A mixture of lead chrome and lead sulphate, forming a pale-yellow pigment.

lemon yellow (*Paint.*). A mixture of chromic acid and barium ground in water or oil to form a yellow pigment.

Lemstrom machine (*Elec. Eng.*). An electrostatic generator consisting of concentric cylinders of insulating material revolving in opposite directions and carrying strips of tin foil for collecting the charge.

Lenard rays, lā'nart (*Phys.*). Cathode rays which pass into the atmosphere through a thin foil window sealed into the envelope. See **Lenard tube.**

Lenard tube (*Phys.*). A cathode ray tube provided with a very thin aluminium window, through which the cathode rays can penetrate into the air. By means of such tubes it has been possible to investigate the absorption and scattering of electrons by matter.

length of lay (*Cables*). See **lay.**

lengthening bar (*Instruments*). An extension piece which may be fitted to the leg of a pair of compasses in order to increase its length and so enable an arc of larger radius to be drawn.

lengthening rod (*Civ. Eng.*). A rod with a male thread at one end and a female thread at the other, capable of being used to extend the length of shank carrying a boring piece at its lower end.

Lenham Beds (*Geol.*). Deposits of sand and gravel named from Lenham in Kent, where they rest at an elevation of about 650 ft. O.D. on the Chalk. They were deposited in a gulf of the Diestian Sea that occupied the London Basin in early Pliocene times.

lenit'ic fauna (*Ecol.*). Animals living in still waters such as lakes and ponds.

leno (*Textiles*). A fabric with an openwork or an embroidered effect, produced by cross-weaving; fabrics of this character that are of regular texture are usually termed *gauze* (q.v.).

leno brocade (*Textiles*). A brocade cotton, or cotton and rayon cloth, produced by a combination of ordinary and cross-weaving; used for dress and furnishing purposes.

lens (*Light*). (Latin *lens*, a lentil.) A portion of a homogeneous transparent medium bounded by spherical surfaces. Each of these surfaces may be convex, concave, or plane. If in passing through the lens a beam of light becomes more convergent or less divergent the lens is said to be *convergent* or *convex*. If the opposite happens, the lens is said to be *divergent* or *concave*. See **lens formula, image, thick lens, focal length, chromatic aberration, spherical aberration.**

See also

achromatic—
anallatic—
anamorphote—
anastigmat—*
antispectroscopic—
aperture—
apochromatic—*
bull's eye—
Coddington—*
collecting—
condensing—
convertible—
cylindrical—
divided—
field—*
landscape—*
matched—
projection—
rectilinear—
telephoto—
wide-angle—
zoom—

lens (*Zool.*). In a compound eye, a modified portion of the cornea lying in front of each visual element: in a simple eye, a lens-shaped mass of transparent connective tissue which is situated between the cornea and the retina, and serves to focus the rays of light on to the latter. See also **crystalline lens.**

lens barrel (*Photog.*). The metal tube in which one or more lenses are mounted.

lens cap (*Photog.*). A temporary light-tight protective covering for the external end of a camera lens; removed during exposure and focusing; it protects the lens when the camera is not in use.

lens disc (*Television*). A rotating disc having a series of lenses arranged around the periphery, used in some forms of mechanical scanning. The light is projected through the lenses in a direction parallel to the axis of the disc.

lens drum (*Television*) A device similar to a lens disc, except that the lenses are arranged on the surface of a rotating drum, the light being projected radially.

lens formula (*Light*). The equation giving the relation between the image and object distances, *v* and *u*, and the focal length *f* of a lens:

$$\frac{1}{f}=\frac{1}{v}-\frac{1}{u}.$$

See **convention of signs** for the rule for applying the correct signs to *f*, *v*, and *u*.

lens grinding (*Glass*). The process of grinding pieces of flat sheet-glass (or pressed blanks) to the correct form of the lens. Cast-iron 'tools' of the correct curvature, supplied with a slurry of abrasive and water, are used.

lens hood (*Photog.*). A funnel for fixing in front of the lens, in order to exclude stray light from strong sources not in the camera angle.

lens mount (or **mounting**) (*Photog.*). The metal unit in which the lens of a camera is fixed, incorporating the focusing and stop adjustments, the whole being detachable from the rest of the camera.

len′ticel (*Bot.*). A tiny pore in the periderm, which is packed with loose corky cells and allows gaseous diffusion to occur between the interior of the plant and the atmosphere.

lenticle (*Geol.*). A mass of lens-like form. The term may have reference to masses of clay in sand, or vice versa, and, in metamorphic rocks, to enclosures of one rock type in another.

lentico′nus (*Med.*). Abnormal curvature of the lens of the eye, in which the surface becomes conical instead of spherical.

lentic′ular (*Bot., Zool.*). Shaped like a double convex lens.—(*Min.*) Said of a mineral or rock of this particular shape, embedded in a matrix of a different kind.

lenticular bob (*Horol.*). A pendulum bob whose cross-section corresponds to that of a double convex lens; the usual form of bob for household clocks.

lenticular girder bridge (*Struct.*). A type of girder composed of an arch whose thrust is taken by a suspension system hanging below it, the anchorages of the latter system being provided by the arch thrust.

lenticulation (*Photog.*). The embossing of a series of minute lenses on the base carrying sensitive emulsion, for additive colour photography.

lenti′go (*Med.*). Freckles.

Lentz valve gear (*Eng.*). A locomotive valve gear in which the steam is admitted and exhausted through two pairs of *poppet valves* (q.v.), spring-controlled and operated from a camshaft rotating at engine speed.

Lenz's law (*Elec. Eng.*). A fundamental law stating that the direction of currents induced in a circuit as a result of a change in the interlinkages between the circuit and a magnetic field is such as to oppose the change of interlinkages.

Leo (*Astron.*). Lion. The fifth sign of the *Zodiac* (q.v.).

Le′onids (*Astron.*). A swarm of meteors whose orbit round the sun is crossed by the earth's orbit at a point corresponding to about November 14, when a display of more than average numbers is to be expected every three years; the radiant point is in the constellation Leo.

leonti′asis os′sea (*Med.*). A rare condition characterised by diffuse hypertrophy of the bones of the skull.

leopard (*Furs*). The dressed skin of the panther or leopard; the ground is a pale or reddish buff marked with dark-brown or black rosettes.

Lepel discharger (*Radio*). A quenched-spark discharger used in radio systems.

lepido- (Greek *lepis*, gen. *lepidos*, a scale). A prefix used in the construction of compound terms; e.g. *lepidotrichia* (q.v.).

lepidocro′cite (*Min.*). An orthorhombic hydrous oxide of iron ($Fe_2O_3\,H_2O$), occurring as scaly blood-red crystals, associated with limonite, in iron ores.

lep′idolite (*Min.*). See **lithia-mica.**

lepidomelane′ (*Min.*). A variety of biotite, rich in iron, occurring commonly in igneous rocks.

Lepidop′tera (*Zool.*). An order of *Endopterygota*, having two pairs of large and nearly equal wings densely clothed in scales; the mouth-parts are suctorial, the mandibles being absent and the maxillae forming a tubular proboscis; the larva or caterpillar is active and herbivorous, with biting mouth-parts. Butterflies and Moths.

lep′idote (*Bot.*). Said of a surface which bears scale-like hairs.

lepidote (*Zool.*). Having a coating of minute scales, as the wings of a Butterfly.

lepidotrichia, —trik′i-a (*Zool.*). Jointed, branched, bony dermotrichia, occurring in Fish with a bony skeleton; believed to have been derived from scales. Cf. *ceratotrichia.*

lepospon′dylous (*Zool.*). Said of vertebral centra in which there is a skeletal ring constricting the notochord in the intervertebral region, with an expansion between each pair of adjacent centra.

leprar′ioid, lep′rose (*Bot.*). Having a whitish, mealy, or scurfy surface.

lepro′ma (*Med.*). A leprous swelling or tumour.

leprosy (*Med.*). A chronic infection with the *Bacillus leprae*, characterised by the appearance of nodules on the skin and mucous membranes, and by neuritis.

lepto- (Greek *leptos*, slender). A prefix used in the construction of compound terms; e.g. *leptodactylous* (q.v.).

leptocen′tric vascular bundle (*Bot.*). A concentric vascular bundle, in which a central strand of phloem is surrounded by xylem.

leptoceph′alus (*Zool.*). The larval form of the family *Anguillidae* (Eels), a ribbon-shaped transparent animal, with a slender head.

leptocer'cal, leptocer'cous (*Zool.*). Having a long slender tail.

leptodac'tylous (*Zool.*). Having slender digits.

leptoder'matous (*Zool.*). Thin-skinned.

leptoder'mous (*Bot.*). Having a thin wall; said especially of capsules of *Bryophyta* which are soft.

leptome (*Bot.*). The conducting elements of the phloem.

leptomedu'sae (*Zool.*). The medusoid persons of the members of the order *Calyptoblastea* (q.v.), which may possess otocysts and ocelli, and in which the gonads are situated on the radial canals.

leptomenin'ges (*Anat.*). The two innermost membranes—the arachnoid and the pia mater—investing the brain and the spinal cord.

leptomeningi'tis (*Med.*). Inflammation of the leptomeninges.

leptone'ma (*Cyt.*). See **leptotene.**

leptosporan'giate (*Bot.*). Said of ferns in which the sporangium originates from a single cell.

Leptos'traca (*Zool.*). See **Phyllocarida.**

lep'totene (*Cyt.*). The first stage of meiotic prophase, in which the chromatin thread acquires definite polarity.

leptus (*Zool.*). A larval form of *Acarina*, having three pairs of legs.

Leroux formation, le-roo' (*Geol.*). Continental beds, of varied type (largely marls and sandstones), and of Triassic age, occurring in Arizona; includes one of the famous fossil forests consisting of silicified tree trunks, associated with reptilian remains. Equivalent to the Lower Dolores beds of Colorado.

Ler'wick Series (*Geol.*). Grey micaceous and pebbly sandstones, occurring in the Middle Old Red Sandstone of the Shetland Isles, and equivalent to some part of the Caithness Flagstone Group of the mainland.

lesion (*Med.*). Any wound or morbid change anywhere in the body.

leste, les'tā (*Meteor.*). A dry south wind blowing in Madeira and N. Africa in front of a depression.

let-in (*Carp., etc.*). Said of a connexion between two pieces in which one is sunk into the other.

le'thal (*Biol.*). Causing death; as any factor of the environment, normal or abnormal, the presence of which is fatal to an organism; or any hereditary factor fatal to an embryo, or tending to retard development, especially of the gametes and zygotes.

lethargic encephalitis (*Med.*). See **epidemic encephalitis and Von Economo's disease.**

letterpress (*Print.*). (1) A term applied to printing from type or block surfaces, as distinct from lithography, intaglio, etc. See **printing.**—(2) The reading matter in a book, apart from illustrations, etc.

letterpress paper (*Paper*). Paper manufactured for the various processes of letterpress printing.

letting-down (*Eng.*). The process of tempering hardened steel by heating until the desired colour is reached and then quenching.

letting-in (*Furs*). The operation of cutting the edges of furs, to permit of joining them. See **laying-over seams.**

***l*-leucine** (*Chem.*). $(CH_3)_2CH \cdot CH_2 \cdot CH(NH_2)COOH$, *α*-amino-*iso*caproic acid, colourless flakes, m.p. 270° C., formed by the decomposition of albuminous substances.

leucite (*Min.*). A silicate of potassium and aluminium, closely related in chemical composition to orthoclase, but containing less silica. Two varieties occur in rocks: a low-temperature form crystallising in the orthorhombic system, the shape being almost identical with the icositetrahedron; and a high-temperature form, which is cubic. Occurs in igneous rocks, particularly lavas, of intermediate and basic composition, as for example at Vesuvius.

leucitohe'dron (*Min.*). See **icositetrahedron.**

leucit'ophyre (*Geol.*). A fine-grained igneous rock, commonly occurring as a lava, carrying phenocrysts of leucite and other minerals in a matrix essentially trachytic; a well-known example comes from Rieden in the Eifel.

leuco- (Greek *leukos*, white). A prefix used in the construction of compound terms; e.g. *leucocyte* (q.v.).—(*Geol.*) See under **leucocrate.**

leuco-bases or **leuco-compounds** (*Chem.*). Colourless compounds formed by the reduction of dyes, which when oxidised are converted back into dyes.

leu'coblast (*Zool.*). A cell which will give rise to a leucocyte.

leu'cocrate (*Geol.*). A general name for light-coloured igneous rock rich in felsic minerals and correspondingly poor in mafic constituents. The adjective *leucocratic* is more commonly met with; while the prefix *leuco-* is used with such names as syenite, diorite, etc., to indicate a marked deficiency of coloured silicates. Thus albitite is a soda-leucosyenite consisting almost exclusively of albite.

leucocrat'ic (*Geol.*). A term used to denote a light colour in igneous rocks, due to a high content of felsic minerals, and a correspondingly small amount of dark, heavy silicates. Cf. *melanocratic*.

leu'cocyte (*Zool.*). A white blood-corpuscle; one of the colourless amoeboid cells occurring in suspension in the blood-plasma of many animals.

leucocytol'ysis (*Physiol.*). The breaking down of white cells of the blood.

leucocytope'nia (*Med.*). Abnormal diminution in the numbers of white cells in the blood.

leucocyto'sis (*Med.*). An increase in the number of leucocytes in the blood.

leucoder'mia, leucoder'ma (*Med.*). Vitiligo; melanodermia. A condition in which white patches, surrounded by a pigmented area, appear in the skin.

leu'con grade (*Zool.*). In *Porifera*, the third grade of structure, in which the choanocytes are confined to flagellated chambers and exhalant canals occur.

leucope'nia (*Med.*). See **leucocytopenia.**

leu'cophore (*Zool.*). See **iridocyte.**

leu'cophyre (*Geol.*). An old name, not now used, for dolerites particularly rich in feldspar and therefore very light in colour.

leucopla'kia (*Med.*). The stage of a chronically inflamed area at which the surface becomes hard, white, and smooth. On the tongue, it is usually due to syphilitic infection.

leu'coplast (*Bot.*). A colourless plastid.

leucopoie'sis (*Physiol.*). The production of white cells of the blood.

leucorrhoe'a, leucorrhe'a (*Med.*). A whitish discharge from the vagina.

leucosapphire (*Min.*). See **white sapphire.**

leucospo'rous (*Bot.*). Having white spores.

leucox'ene (*Min.*). An opaque whitish mineral formed as a decomposition product of ilmenite; believed to be a variety of sphene.

leukae'mia, leukemia (*Med.*). A fatal condition in which there is hyperplasia of the tissues producing white cells, with consequent increase in the numbers of white cells in the blood and great enlargement of the spleen. See also **lymphocythaemia.**

leukaemia, avian (*Vet.*). A filterable-virus infection of fowls.

leuko-. A variant spelling of *leuco-* (q.v.).

levant'er (*Meteor.*). An east wind blowing at Gibraltar, the resulting cloud on the Rock being termed the *levant*.

leva'tor (*Zool.*). See **elevator.**

leveche, lā-vā'chā (*Meteor.*). A dry S.W. wind blowing in Spain in front of a depression.

lev'ee (*Hyd. Eng.*). A well-consolidated bank of earth or spoil, having a central core forming an impervious connexion with the natural ground; used as a form of training works to control river flow and prevent flooding of adjacent country. In America the name also signifies a quay, landing-place, or pier.

level (*Acous., Elec. Comm.*).
See **black—**
blur—
noise—
power—
sensation—
transmission—
zero power—

level (*Auto. Teleph.*) The row of contacts in a selector which is found by the vertical motion of the selector under the action of an impulse train. The wipers then traverse the row of contacts either by impulse, finding, or hunting action.

level (*Build.*). A *level tube* (q.v.).

level (*Civ. Eng.*). To reduce a cut or fill surface to an approximately horizontal plane. *

level (*Mining*). An approximately horizontal tunnel in a mine, generally marking a working horizon or level of exploitation.

level (*Surv.*). An instrument used by the surveyor for determining the difference in height between two points.

level book (*Surv.*) The specially ruled book in which the surveyor records his observations when levelling, and performs any subsequent reduction required.

level canal (*Hyd. Eng.*). A canal which is level throughout. Also called a DITCH CANAL.

level-compounded (*Elec. Eng.*). See **flat-compounded.**

level line (*Surv.*). A line lying wholly on a level surface, and therefore perpendicular at all points to the direction of gravity.

level-luffing crane (*Eng.*). A jib crane in which, during derricking or luffing, the load is caused to move radially in a horizontal path, with consequent power saving.

level man (*Surv.*). The operator of a surveyor's level.

level multiple (*Auto. Teleph.*). That section of a multiple which is concerned with the outlets from a given level in the selector switches.

level small caps (*Typog.*). See **even small caps.**

level surface (*Surv.*). A surface which is everywhere perpendicular to the direction of gravity.

level trier (*Surv.*). An apparatus for measuring the angular value of a division on a level tube; it consists of a beam, hinged about a horizontal axis at one end and capable of being moved up or down at the other end by means of a micrometer screw, which records the inclination corresponding to a given number of divisions of movement of the bubble.

level tube (*Surv.*). A specially shaped glass tube nearly filled with spirit, so as to leave a 'bubble' of air and spirit vapour, which always rises to the highest part of the tube. The level tube is used to test whether a surface to which it is applied is horizontal. It is an essential feature of many forms of surveying instrument.

levelling (*Surv.*). The operation of finding the difference of elevation between two points.

levelling block (*Eng.*). A large flat cast-iron plate, stiffened by ribs on the under side, on which iron and steel plates are laid for flattening.

levelling staff (*Surv.*). The graduated wooden rod used to give the vertical distance between the line of sight of the level and the point on which the staff is held. See **self-reading staff** and **target rod.**

lever (*Mech.*). One of the simplest machines. It may be considered as a rigid beam pivoted at a point called the *fulcrum*, a load being applied at one point in the beam and an effort, sufficient to balance the load, at another. Three classes of lever may be distinguished: (1) fulcrum between effort and load; (2) effort between fulcrum and load; (3) load between fulcrum and effort. See **machine, mechanical advantage, velocity ratio.**

lever (*Horol.*). The pivoted arm which carries the pallets in the lever escapement.

lever brace (*Carp.*). A *brace* (q.v.).

lever escapement (*Horol.*). The most important type of watch escapement. The impulse from the escape wheel is transmitted to the balance by the equivalent of two levers—a pivoted lever carrying the pallets, and the roller carrying the impulse pin. In the 'English' lever, the escape wheel is planted at right-angles to the line joining the pallet staff and balance staff centres. In the 'Swiss' lever or 'straight-line' escapement the escape wheel, pallet staff, and balance staff centres are in a straight line. Strictly speaking, the pin-pallet escapement is a lever escapement, but it is not generally referred to as such.

lever (or **locker**) **jack** (*Textiles*). An accessory part on the under side of the combs of a lace machine, which controls the locker carriage.

lever key (*Teleph.*). A hand-operated key for telephone switchboards; operated by a small lever, which opens and closes one or more spring contacts. May be locking or non-locking.

lever safety-valve (*Eng.*). A safety-valve in which the valve is held on its seating by a long lever, loaded by a weight at the other end; a form of *dead-weight safety-valve* (q.v.).

lever-type brush-holder (*Elec. Eng.*). A type of brush-holder in which the brush is held at the end of an arm pivoted about the brush spindle.

lever-type starter (*Elec. Eng.*). See **faceplate starter.**

lever watch (*Horol.*). A watch fitted with the lever escapement.

Levers machine (*Textiles*). A lace machine originally made by John Levers; the modern machine is used for straight-down fabrics.

lev'igate (*Bot.*). Correct form of *laevigate* (q.v.)

levigation (*Chem.*). The reduction of a substance to a fine powder by grinding in water, followed by fractional sedimentation.

levulosu'ria (*Med.*). See **laevulosuria.**

lew (*Build.*). A light covering or roof of straw used to protect bricks on *hacks* (q.v.) during the drying period.

lew'is (*Masonry*). A truncated steel wedge or dovetail made in three pieces, with the larger end downwards and fitting into a similarly shaped hole in the top of a block of masonry; it then provides, by its attached hoist ring, a means of lifting the stone.

lewis bolt (*Civ. Eng.*). A foundation bolt with a tapered and jagged head, which is securely fixed into a hole in the anchoring masonry by having molten lead run round it.

Lewis gun (*Small Arms*). A light machine-gun fed by a circular magazine, which holds 47 rounds, placed horizontally over the mechanism.

Lewis's theory (*Chem.*). The assumption that atoms can combine by sharing electrons, thus completing their shells without ionisation.

Lewis'ian Gneiss (*Geol.*). See **Hebridean Gneiss.**

lew'isson (*Masonry*). A *lewis* (q.v.).

Leyden jar, li'den (*Elec. Eng.*). A capacitor consisting of a glass jar having its inner and outer surfaces coated with a conducting material. Its use gave rise to the unit jar for capacitance.

Leydig's duct, li'dig (*Zool.*). See **Wolffian duct.**

Leydig's organs (*Zool.*). Minute structures occurring on the antennae of some *Arthropoda*; believed to be olfactory in function.

lher'zolite (*Geol.*). An ultramafic plutonic rock, a peridotite, consisting essentially of olivine, with both ortho- and clino-pyroxene; named from Lake Lherz in the Pyrenees.

Li (*Chem.*). The symbol for *lithium*.

Li'as or Lias'sic System (*Geol.*). A thick series of marine strata occurring in a broad belt of country extending from the coast of Dorset to that of Yorkshire, and including the well-known Liassic clays, at some levels interbedded with thin, pale limestones, sands, shales, and, in the Middle Lias, ironstone. See **Blue Lias** and **marlstone**; also **Hardgrave Sandstone** and **Trail formation.**

Lias Clay (*Geol.*). A thick bed of clay found in the Lower Jurassic rocks of Britain. See **Blue Lias.**

li'ber (*Bot.*). See **phloem.**

libeth'enite (*Min.*). An orthorhombic hydrous phosphate of copper, occurring rarely as olive-green crystals in the oxide zone of metalliferous lodes.

libido, lib-ē'dō (*Psycho-an.*). A term introduced by Freud to denote the energy attached to the sexual impulse, manifesting itself in various forms; subsequently used by some authors (e.g. Jung) to cover vital energy in general, without special reference to the sexual impulse. See **Freud's theory of the libido.**

Libra (*Astron.*). Balance. Seventh sign of the *Zodiac* (q.v.).

librations (*Astron.*). A phenomenon by which, owing to a variety of causes, slightly more than half the moon's surface is visible to an observer on the earth, if observations are taken over a sufficiently long time. The three principal librations are: (1) in longitude, (2) in latitude, (3) diurnal.

libration, diurnal (*Astron.*). The name given to the phenomenon by which, owing to the finite dimensions of both the earth and the moon, an observer can see rather more than half the moon's surface when his observations at different times or from different places on the earth are combined. The effect is one of *parallax* (q.v.), the term *libration* being a misnomer in this case.

lib'riform fibre (*Bot.*). An elongated thick-walled element of the xylem, formed from a single cell.

lich gate (*Build.*). See **lych gate.**

lichen, lī'ken (*Bot.*). A member of the *Lichenes*.

lichen planus (*Med.*). An itchy eruption of pinkish papules on the skin, usually localised to certain parts.

Liche'nes (*Bot.*). A large group of composite plants, consisting of an alga and a fungus in intimate association, and divided into genera and species as if they were independent plants.

lichen'icole (*Bot.*). Living on lichens; said particularly of parasitic fungi.

lichen'ifica'tion (*Med.*). The condition in which the skin becomes thick and rigid, owing to excessive rubbing or scratching.

Licht'enberg figure (*Elec. Eng.*). A figure appearing on a photographic plate or on a plate coated with fine dust when the plate is placed between electrodes and a high voltage is applied between them.

licker-in (*Cotton Spinning*). In a carding engine, a revolving cylinder covered with saw-like teeth; sheets of cotton entering the machine are torn up by the teeth.

Lickey Quartzite (*Geol.*). A stratum of quartzite occurring at the local base of the Cambrian System of rocks in the Birmingham district; occupying the same position, and of the same age, as the Wrekin Quartzite in Shropshire, the Erribol Quartzite in Scotland, etc.

licking disease (*Vet.*). Pica (of cattle).

Lie'berkühn's crypts (*Zool.*). Simple tubular glands occurring in the mucous membrane of the small intestine in Vertebrates.

Lie'bermann-Burchard test, boor'hhart (*Chem.*). A colour test for cholesterol, based on a change of colour from red to bluish-green in chloroform solution on addition of acetic anhydride and concentrated sulphuric acid.

lien, lĕn (*Zool.*). See **spleen.**

lie'nal (*Zool.*). Pertaining to the spleen.

lie'nculus (*Zool.*). An accessory spleen.

lienogas'tric (*Zool.*). Pertaining to, or leading to, the spleen and the stomach.

lierne, li-ėrn' (*Arch.*). A connecting rib between the main ribs in a groined vault.

lierne vaulting (*Arch.*). Vaulting which is divided into panels by the use of lierne ribs.

Liesegang phenomenon, lĕ'ze-gang (*Chem.*). The stratification, under certain conditions, of precipitates formed in gels by allowing one reactant to diffuse into the other.

life-cycle (*Biol.*). The various stages through which an organism passes, from fertilised ovum to the fertilised ovum of the next generation.

life form (*Bot.*). The form of a plant determined by the position of its resting buds (if any), in respect to the surface of the soil.

life tests (*Elec. Eng.*). Tests carried out on cables, electric lamps, etc., to ascertain the time elapsing before failure occurs.

lift or **elevator.** An enclosed platform made to ascend or descend in a vertical shaft or framework; used for transferring persons, goods, or vehicles from one floor or level to another. The majority of lifts are operated electrically, but hydraulic lifts are generally used for short rises (e.g. to pavement level), and air-operated lifts in automobile service stations.

lift (*Aero.*). The component of the aerodynamical forces supporting an aeroplane along the lift axis, which is normal to the lateral axis and to the direction of the wind relative to the aircraft.

lift (*Hyd. Eng.*). (1) The vertical distance through which a vessel is raised in the process of passing through a lock.—(2) A mechanical contrivance for lifting a vessel from one reach of a canal to the next, either by transfer vertically or on an inclined plane.

lift (*Quarrying*). The plane, parallel to the floor of the quarry, along which the rock is split.

lift (*Textiles*). The movement of a tappet lever, heald, or griffe; it is effected by a cam.

lift-bridge (*Civ. Eng.*). A type of movable bridge which is capable of being lifted bodily through a sufficient vertical distance to allow of the passage of a vessel beneath.

lift-gate (*Build.*, *Civ. Eng.*). A gate which opens by bodily vertical movement, as distinct from one swinging about an axis at one end.

lift-lock (*Hyd. Eng.*). A canal lock serving to lift a vessel from one reach of water to another.

lift-motor (*Elec. Eng.*). A motor, sometimes having special characteristics, used for operating an electric lift.

lift-valve (*Eng.*). Any valve consisting of a disc, ball, plate, etc. which lifts or is lifted vertically to allow of the passages of a fluid.

lifter (*Foundry*). An L- or Z-shaped bar of cast- or wrought-iron, used for supporting the sand in a cope, the upper end being hooked on to a box bar.

lifting blocks (*Eng.*). A lifting machine consisting of a continuous rope passing round pulleys mounted in blocks, whereby an effort applied at the free end of the rope lifts a larger weight attached to the lower block. See **mechanical advantage.**

lifting magnet (*Elec. Eng.*). A large electromagnet used, instead of a hook, on cranes or hoists, when lifting iron and steel.

lifting of patterns (*Foundry*). See **drawing of patterns.**

lifting piece (*Horol.*). In the rack-striking work of a striking clock, a cranked lever which carries the warning piece at one end and lifts the rack hook just before the hour.

lifting plan (*Weaving*). See **peg plan.**

lifting plates (*Foundry*). Small iron plates, let into a pattern, into which a lifting screw is inserted for withdrawing the pattern from the mould.

lifting screw (*Foundry*). An iron rod screwed into a pattern to withdraw it from the mould.

lifting the offsets (*Ship Constr.*). The process of measuring the ship's form as 'laid off' on buttocks, waterlines, and sections. These offsets are the permanent record and are used to reproduce the ship's form, initially, for design work and ordering material, and, subsequently, in cases of repair or alterations.

lifting truck (*Transport*). A truck with three, or four, wheels, drawn by a handle which can be raised and lowered to lift a loaded platform standing on feet. The lift is effected either by leverage or by hydraulic mechanism.

lig'ament (*Zool.*). A bundle of fibrous tissue joining two or more bones or cartilages.

ligate' (*Surg.*). To tie with a ligature.—*n.* **ligation.**

lig'ature (*Med.*) A piece of thread, silk, horsehair, catgut, or any other material, for tying round blood-vessels · to tie with thread, etc.

light. Electromagnetic radiation capable of inducing visual sensation through the eye. Light is precisely defined as the product of the visibility and the radiant power, the latter being the rate of propagation of radiant energy. See also **illumination, velocity of light.**

light (*Build.*). (1) A term applied to any glazed opening admitting light to a building.—(2) A single division of a window.

light-adapted (*Optics*). See **adaptation.**

light-centre length (*Illum.*). The distance from the geometrical centre of the filament of an electric filament lamp to the contact plate or plates at the end of the lamp cap remote from the bulb. With automobile headlight lamps the measurement is taken from the bulb side instead of from the remote side of the pin.

light current (*Photo-electronics, Television*). The same as *photo-current.*

light-curve (*Astron.*). The line obtained by plotting, on a graph, the apparent change of brightness of a variable star, against the observed times; analysis then divides these stars into *long-* or *short-period variables, Cepheids,* and so on.

light flux (*Light*). The measure of the quantity of light passing through an area, e.g. through a lens system. Light flux is measured in lumens, one candle-power radiating 4π lumens. Illumination is light flux per unit area.

light-fog (*Photog.*). Fog in an emulsion, caused by intrusion of extraneous light into a camera or other apparatus which is intended to be light-tight.

lighthouse (*Civ. Eng.*). A permanent structure which is founded on rock at a point along a coastline or out at sea, and is equipped with a powerful light serving as a warning or guide to shipping.

light modulation (*Television*). Control of the intensity of light by electrical means, such as a combination of Kerr cell and crossed Nicol prisms.

light quantum (*Light*). A single train of waves emitted by an atom or molecule, with no abrupt changes of phase. Such trains are some metres in length and persist for about 10^{-8} second. See **photon.**

light ratio (*Astron.*). See **magnitudes.**

light relay (*Television*). See **light valve.**

light resistance (*Photo-electric Cells*). The resistance, when exposed to light, of a photo cell of the photo-conductivity type.

light restraint (*Photog.*). The impregnation of a dye in an emulsion, to prevent the deep penetration of light.

light seed (*Bot.*). A seed which requires exposure to light in order that it may germinate.

light-sensitive cell (*Photo-electric Cells*). Any device which, when exposed to light, generates a current or changes its resistance.

lightship (*Civ. Eng.*). A kind of floating *lighthouse* (q v), consisting of an anchored vessel carrying a powerful light as a warning or guide to shipping.

light splitter (*Photog.*) The same as *beam splitter.*

light-trap (*Photog.*). An arrangement for modifying doors or windows of dark-rooms, so that air can pass but light is excluded.

light valve. Any device whereby the passage of light is controlled electrically.—(*Cinema.*) A device, such as the double-ribbon light valve in the Western Electric sound-film recorder, which varies the width of a beam of light in accordance with the variation of electric currents, and so varies the exposure on the sound-track of a steadily moving film.

light-year (*Astron.*). A spatial unit sometimes used to express distances in the stellar universe. It is the distance travelled by light in one year, amounting to 63,290 astronomical units, or $5\,880 \times 10^{12}$ miles.

light alloys (*Met.*). See **aluminium alloys.**

light automatic (*Small Arms*). An automatic-fire weapon, which is normally fired from the shoulder with the aid of a rest.

light machine-gun (*Small Arms*). The modern term for a *light automatic gun.*

light oils (*Chem.*). A term for oils with a boiling range of about 100°-210° C., obtained from the distillation of coal-tar.

light railway (*Civ. Eng.*). (1) A *narrow-gauge* (q v.) railway.—(2) A tramway constructed under the Light Railways Act of 1896, i.e. a tramway which does not run along a public highway.

light-spring diagram (*Eng.*). An indicator diagram taken by a piston or diaphragm-type engine indicator, using a specially weak control spring or diaphragm in order to reproduce the low-pressure part of the diagram to a large scale.

light-weight concrete (*Build.*). Concrete of low unit weight (e.g. 20 lb. per cu. ft. instead of the usual 140 lb. per cu. ft), made by using aggregates such as pumice, sawdust, and cork, with cellular concrete; useful when lightness is required, not strength.

lighter-than-air craft (*Aero.*). See **aerostat.**

lighting. See **illumination.**

lighting (*Photog.*). The technique of illuminating objects to be photographed, so that they are well-defined and possess artistic contrast.

See **flat—** **hard—** **soft—**

lightning (*Meteor.*). The very large spark which marks the discharge of an electrified thunder cloud, either to earth or to another cloud. See **thunder.**

lightning arrester or **lightning protector** (*Elec. Eng.*). An over-voltage protection device in parallel with apparatus to be protected from surges such as those arising from lightning. It provides a low impedance so that the voltage reaching the apparatus is limited. In electrical communication circuits, the lightning protector takes the form of two blocks of smooth carbon, separated by a punched slip of mica. This insulation is adequate for normal operating voltages, but short-circuits the line to earth when a high voltage initiates an arc. See also **autovalve arrester.**

lightning conductor (*Elec. Eng.*, etc.). A system of metal conductors connected between the highest points of a building and earth, in order to provide an easy passage to earth for a lightning discharge striking the conductor in preference to the building, thereby obviating damage to the building. The primary function is, however, to reduce the ambient electric field and electric charges, by providing the conductor with sharp points, so that the probability of a lightning stroke in the neighbourhood is greatly reduced. Also called a LIGHTNING ROD.

lightning protector (*Elec. Eng.*). See **lightning arrester.**

lightning rod (*Elec. Eng.*). See **lightning conductor.**

lightning tubes (*Min.*). See **fulgurites.**

ligne, lēn'y^{e} (*Horol.*). A unit used in the measurement of watch movements. It is equal to 2·256 mm. The *twelfth*, or *douzième* (0·188 mm.), is the unit used for the height or thickness of a movement. There are 12 twelfths in a ligne. Lady's wrist watches vary from 3½ lignes to about 8 lignes; gents.' wrist watches from 10 to 13, pocket watches from 17 to 19, and deck watches from 20 to 32. The word ligne is sometimes spelt LINE. Symbol, ‴.

lig'neous (*Bot.*). Woody.

lig'nicole, lignicolous (*Bot.*). Growing on or in wood, or on trees.—(*Zool.*) Living on or in wood, as certain species of Termites.

lignification (*Bot.*). The deposition of lignin on and in a cell wall.

lignin (*Bot.*). A complicated mixture of substances formed by certain cells of plants and deposited in thickened cell walls, particularly in woody tissue.

lig'nite (*Geol.*). Dull-brown compact fossil wood, representing one stage in the conversion of plant remains into coal. In this country it occurs in the Bovey Tracey Beds in Devonshire; while it is liable to be found in smaller quantities in lacustrine and estuarine deposits of Mesozoic and Tertiary age. See also **brown coal.**

ligniv'orous (*Zool.*). Wood-eating.

ligno-celluloses (*Chem.*). Compounds of lignin and cellulose found in wood and other fibrous materials.

lig'roin, —rō-in (*Chem.*). A term for a petroleum fraction with a boiling range of from about 90° to 120° C.

lig'ula (*Zool.*). In Insects, a median structure lying between the labial palps; composed of the paraglossae and the glossae, which may be separate or fused.

lig'ulate (*Bot.*). (1) Strap-shaped, long, flattened, and narrow.—(2) Said of a corolla which has a very short tube and is prolonged above into a flattened group of united petals.—(3) Said of a capitulum in which all the flowers have ligulate corollas.

lig'ule (*Bot.*). A small outgrowth, commonly membranous, from the upper surface of a leaf or leaf-like member, and arising close to the base of the leaf, or at the junction of the lamina and petiole.

limacel' (*Zool.*). In Slugs, the shell, which is reduced and usually embedded in the integument.

limaciform, lim-as'— (*Zool.*). Slug-like.

limb (*Astron.*). The term applied to the edge or rim of a heavenly body having a visible disc; used specially of the sun and moon.

limb (*Bot.*). (1) The lamina of a leaf.—(2) The widened upper part of a petal.—(3) The upper, often spreading, part of a sympetalous corolla.

limb (*Zool.*). A jointed appendage, as a leg.

limber (*Artillery*). The connecting link between the gun and its tractive power. The limber also carries rounds of ammunition and part of the detachment.

limberneck (*Vet.*). *Botulism* (q.v.) of birds.

limbous (*Zool.*). Overlapping.

limbric (*Textiles*). A plain grey cotton cloth of medium quality; used for curtains, etc. after being piece-dyed or printed.

lim'burgite (*Geol.*). An ultramafic, fine-grained igneous rock occurring in lava flows, similar to the dyke-rock, monchiquite, but having interstitial glass between the dominant olivine and augite crystals. Typically, limburgite is feldspar-free; but re-examination of material from the type locality has proved that feldspar does occur in most samples.

limbus (*Zool.*). In Mammals, the thickened, overhanging extremity of the spiral lamina of the cochlea.

lime (*Build.*). A substance produced by heating limestone to 825° C. or more, as a result of which the carbonic acid and moisture are driven off. Sometimes called QUICKLIME or CAUSTIC LIME.

lime bag (*Foundry*). A bag of powdered lime used for testing the fit of joints. Lime is sprinkled on the parting face, and the cope is lowered and lifted; if the lime adheres to the top face, the joint is good.

lime blast (*Leather*). Dark patches that appear on limed skins while being tanned; caused by carbonate of lime on the skins.

lime blue (*Paint.*). A blue pigment used in distemper colours; it is made by precipitating copper sulphate by means of milk of lime under the influence of heat.

lime, chloride of (*Chem.*). See **bleaching powder.**

lime chlorosis (*Bot.*). Yellowing in a plant growing in a soil containing an excess of calcium carbonate; due to chlorophyll deficiency.

lime knot (*Bot.*). A widening in the threads of the capillitium of *Myxomycetes*, containing calcium carbonate.

lime mortar (*Build., Civ. Eng.*). A mortar composed of lime and sand, with the addition sometimes of other material, such as crushed bricks, ground slag, or coke. It is not generally suitable for use under water.

lime paste (*Build.*). Slaked lime.

lime powder (*Build.*). The material produced as a result of subjecting quicklime to the process of air-slaking.

lime-silicate rocks (*Geol.*). These result from the contact (high-temperature) metamorphism of limestones containing silica in detrital grains, nodules of flint or chert, or siliceous skeletons, the silica combining with the lime to form such silicates as lime-garnet, anorthite, wollastonite, and idocrase.

limestone (*Geol.*). Sedimentary rock containing carbonate of lime or magnesia to the extent of 50% of the whole. If the carbonate is calcite, the rock is termed *calcite-limestone*; if dolomite is present as well, it is *dolomitic limestone*—or *dolomite rock* if calcite be absent. Limestones are formed by the consolidation of calcareous ooze, which may be chemically precipitated, derived from some pre-existing limestone by the normal processes of rock wastage, or formed by organic agencies.

Limestone Coal Group (*Geol.*). See **Edge Coal Group.**

lime uranite (*Min.*). See **uranite (lime).**

limewash (*Paint.*). A mixture which is prepared by slaking lump lime with about one-third of its weight of water, and then adding sufficient water to make a 'milk'; used as a wall covering in cases where a frequent application is necessary.

lime water (*Chem.*). A suspension of calcium hydroxide in distilled water.

limic'olous (*Zool.*). Living in mud.

lim'inal (*Physiol.*). Pertaining to the threshold value, especially of perception.

liminal value (*Optics*). The threshold of intensity of a specified colour, below which there is no visual appreciation.

liming (*Leather*). The process of soaking hides and skins in milk of lime, which causes them to swell and facilitates removal of the hair. To loosen the wool, sheepskins are painted on the flesh side with a paste consisting of milk of lime and a small amount of alkaline sulphides.

limit gauge (*Eng.*). A gauge used for verifying that a part has been made to within specified dimensional limits. Limit gauges consist, for example, of a pair of plug gauges on the same bar, one of which should just enter a hole ('go') and the other just not enter ('not go').

limit gauging (*Eng.*). A method of measurement which ensures that pieces intended to fit together shall do so within certain specified limits of clearance, and that similar pieces shall be interchangeable.

limit of proportionality (*Met.*). The point on a stress-strain curve at which the strain ceases to be proportional to the stress. Its position varies with the sensitivity of the extensometer used in measuring the strain.

limit-switch (*Elec. Eng.*). A switch fitted to electric lifts, travelling cranes, etc. in order to cut off the power supply if the lift-car or moving carriage travels beyond a certain specified limit.

limits of audition (*Acous.*). The extreme frequencies of sound-waves perceivable by the normal ear, and the extent of perception between the maximum tolerable loudness and the minimum perceptible. See **audibility.**

limited availability (*Auto. Teleph.*). See under **full availability.**

limiter valve (*Thermionics*). A thermionic valve operated as an amplifier and so biased that the output resulting from a large input voltage is substantially the same as that from a small one.

limiting conductivity (*Chem.*). The equivalent conductivity of a substance at infinite dilution, i.e. when completely ionised.

limiting density (*Chem.*). The relative density of a gas at vanishingly low pressures.

limiting factor (*Bot.*). The slowest-acting factor of a group of factors simultaneously affecting a physiological process in a plant.

limiting frequency (*Elec. Comm.*). The frequency at which there is a recognisable change in response, as contrasted with a cut-off frequency, which (as in a filter) may be nominal and not apparent.

limiting friction (*Mech.*). See **friction.**

limiting gradient (*Civ. Eng.*). *Ruling gradient* (q.v.).

limiting range of stress (*Met.*). The greatest range of stress (mean stress zero) that a metal can withstand for an indefinite number of cycles without failure. If exceeded, the metal fractures after a certain number of cycles, which decreases as the range of stress increases. Also called ENDURANCE RANGE; half this range is the fatigue limit or endurance limit.

limiv'orous (*Zool.*). Mud-eating; as certain aquatic Invertebrates which swallow mud in order to extract from it the nutritious organic matter that it contains.

lim'nobiot'ic (*Zool.*). Living in fresh water.

limnoph'ilous (*Zool.*). Living in marshes, especially fresh-water marshes.

limnoplank'ton (*Ecol.*). The plankton of fresh waters, such as ponds, lakes, rivers, and marshes. Cf. *haliplankton.*

***d*-lim'onene** (*Chem.*). Hesperidene, citrene, carvene. The oil of the orange peel consists almost entirely of this essential oil, b.p. 175° C. *l*-Limonene is present in the oil of fir cones. The systematic name of these compounds, which are monocyclic terpenes, is Δ-1,8-menthadiene.

limon'iform (*Bot.*). Lemon-shaped.

li'monite (*Min.*). An amorphous hydrated oxide of iron (and an important ore of that metal) occurring as pseudomorphs after magnetite and haematite. Also the chief constituent of bog iron-ore.

limp (*Bind.*). Said of a book having non-rigid sides; described as *limp cloth, limp leather*, according to the covering material.

limpet washer (*Build.*). A form of washer used in fixing corrugated sheeting, for which purpose it is shaped on one side to conform to the curve of a corrugation.

li'narite (*Min.*). Hydrous sulphate of lead and copper, found in the oxide zone of metalliferous lodes; a deep-blue mineral resembling azurite, and, like it, crystallising in the monoclinic system.

linch pin. A pin placed in a transverse hole on the outside of the axle of a vehicle, to retain a wheel; at the top it has a projection on one side, to prevent it from passing through the hole.

Lincoln wool (*Worsted*). The longest of the lustre wools, with a staple of 12 ins.; used for Sicilians, linings, etc.

Lincolnshire Limestone (*Geol.*). Oölitic limestones, famous as building-stones, which form a prominent escarpment running through Lincolnshire and Northamptonshire. They are of the same age as the Inferior Oölite of the Cotteswold Hills in Gloucestershire.

Lincrusta (*Plastics*). A trade-name for a plastic material, made of linoxyn, resins, and fillers, pressed on canvas or paper; used as a building material for covering walls, etc.

Linde process (*Chem.*). A process for the liquefaction of air and for the manufacture of oxygen and nitrogen from liquid air.

line. The twelfth part of an inch. See **ligne.**

line (*Build.*). A cord stretched between steel line-pins driven into each end of a wall, as a guide to the bricklayer for level and direction of succeeding courses.

line (*Carp.*). To mark a straight line on timber as a guide for working or erection.

line (*Elec. Comm.*). That part of a communication circuit which has, substantially, uniformly distributed constants. It may consist of two equal wires on a pole route; two wires twisted, frequently with others, in a lead-covered cable; or a single conductor, supported by insulators at the centre of a conducting tube.

See **air—(2)** **long-distance—**
artificial— **open-wire—**
coin-box— **party—**
direct— **programme—**
distortionless— **shielded—***
exchange— **subscriber's—**
individual— **tie—** **toll—**
infinite— **trunk—**

For *coaxial line* see **concentric tube feeder.**

line (*Elec. Eng.*). A power transmission circuit or one of the conductors of that circuit.

See **artificial—** **Kapp—**
bus— **pump—**
control— **train—**
also **line of electric flux**
line of electric force
line of magnetic flux
line of magnetic force.

line (*Horol.*). (1) The cord or gut supporting the weight or weights of a weight-driven clock.—(2) See **ligne.**

line (*Rail.*). A common term for a railway track.

line (*Surv.*). The cord to which the lead of a lead-line is secured. See also **centre line*.**

line (*Textiles*). Yarn spun from flax fibre of good quality.

line amplifier (*Elec. Comm.*). In broadcasting equipment, the amplifier which is the output amplifier for supplying power to the line, either to the control room or to the radio transmitting station.

line amplitude (*Television*). The amplitude of the voltage generated by the line-scanning generator, or the length of the line on the screen produced thereby.

line balance (*Elec. Comm.*). The matching impedance, equalling the impedance of the line at all frequencies, which is used to terminate a two-wire line when it divides through a hybrid-coil or bridge-set into a four-wire line. Also called BALANCING IMPEDANCE, BALANCING NETWORK.

line block (*Print.*). A printing block of a subject consisting of black and white parts only, without gradations of tone. It is produced by photography and etched into relief on metal, usually zinc. Cf. *half-tone process*.

line-breaker (*Elec. Eng.*). A contactor on an electric vehicle, arranged for closing or interrupting the main current circuit.

line choking coil (*Elec. Eng.*). An inductor included in an electric power supply circuit in order to protect plant connected to the line from the effect of high-frequency or steep-fronted surges. Also called SCREENING PROTECTOR.

line-colour (*Print.*). A colour-picture produced by superimposed impressions of two or more line blocks printed in different colours. Varied tones are obtainable by the use of stipples.

line distortion (*Elec. Comm.*). Distortion in the wave-form of a transmitted signal, arising from the propagation constant of the line not being the same for all frequencies.

line finder (*Auto. Teleph.*). A uniselector which automatically hunts to find the line of a subscriber, when he lifts his telephone receiver, in order to connect selectors to his circuit.

line, frame (*Cinema.*). See **frame line.**

line frequency (*Television*). The frequency of repetition of the individual lines in a scanned image, i.e. the reciprocal of the interval between the commencements of two successive lines.

line frequency generator (*Television*). The generator of the voltage or current which causes the scanning spot to traverse the individual lines of the image.

line integral (*Elec. Eng.*). The continuous integration of the product of the element of a line by the tangential component of the vector along it. See **potential difference.**

line jack (*Elec. Comm.*). A jack connected to a line for testing purposes.

line jump scanning (*Television*). The same as *interlaced scanning*.

line noise (*Teleph.*). Noise in telephone circuits which may arise from cross-talk, babble, or induction from power lines, and which interferes with the normal use of such circuits. See **interference.**

line of action (*Mech.*). The line along which a force acts.

line of centres (*Horol.*). A line passing through two or more centres: the line joining the centres of two or more wheels: in a lever escapement, the line joining the balance staff and the pallet staff.

line of collimation (*Surv.*). See **collimation (line of).**

line of electric flux (*Elec. Eng.*). A line drawn in a graphical representation of an electric field so that its direction at any point is the direction of the electric flux at that point.

line of electric force (*Elec. Eng.*). A line drawn in a graphical representation of an electric field so that its direction at any point is the direction of the electric force at that point.

line of magnetic flux (*Elec. Eng.*). A line drawn in a graphical representation of a magnetic field so that its direction at any point is the same as the direction of the field at that point. The line is also commonly used as a unit of magnetic flux, one line being equal to one maxwell. Also called a LINE OF MAGNETIC INDUCTION.

line of magnetic force (*Elec. Eng.*). A line drawn in a graphical representation of a magnetic field so that its direction at any point is the direction of the magnetic field at that point.

line of nosings (*Build.*). The line tangential to the nosings of a stair.

line of sight (*Surv.*). Alternative term for line of collimation (see **collimation, line of).**

line of sight velocity (*Astron.*). The rate, always expressed in kilometres per second, at which a heavenly body is approaching or receding from the observer. It is measured spectroscopically by observing the shift of the spectral lines of the body relative to those of a terrestrial source, a phenomenon known as the *Doppler effect*. A shift towards the red indicates a velocity of recession and is by convention considered positive, and vice versa.

line-pin (*Build.*). See **line.**

line ranger (*Surv.*). An instrument for locating an intermediate point in line with two distant signals. It consists of two reflecting surfaces so arranged as to bring images of the two signals into coincidence when the instrument is in line with the signals.

line scanning (*Television*). A method of scanning in which the scanning spot repeatedly traverses the field of the image in a series of straight lines.

line screen process (*Photog.*). A colour photographic process in which the screen takes the form of lines ruled on the emulsion.

line shafting (*Eng.*). Overhead shafting used in factories to transmit power from an engine or motor to individual machines.

line spectrum (*Light*). A spectrum consisting of relatively sharp lines, as distinct from a *band spectrum* (q.v.) or a *continuous spectrum* (q.v.). Line spectra originate in the atoms of incandescent gases or vapours. See **spectrum, Bohr theory.**

line-squall (*Meteor.*). A system of squalls occurring simultaneously along a line, sometimes hundreds of miles long, which advances across the country. It is characterised by an arch or line of low dark cloud and a sudden drop in temperature and rise in pressure. Thunderstorms and heavy rain or hail often accompany these phenomena.

line standard. A standard of length consisting of a metal bar near whose extremities are engraved fine lines, the standard length being the distance between these lines measured under specified conditions.

line survey (*Bot.*). A record of the plants occurring along a line taken across a piece of country.

line switch (*Auto. Teleph.*). A small uniselector which immediately hunts to seize a free A-digit selector when the subscriber lifts his receiver.

line synchronisation (*Television*). Synchronisation of the line-scanning generator at the receiver with that at the transmitter so that the scanning spots at the two ends keep in step throughout each line.

line transect (*Bot.*). A chart showing the position and names of all the plants occurring on a line drawn across a piece of country.

line-up (*Elec. Comm.*). The adjustment of a number of circuits in series so that they function in the desired manner when required.

line voltage (*Elec. Eng.*). See **voltage between lines.**

lin'ea alba (*Anat.*). The tendinous line which extends down the front of the belly, from the lower end of the chest to the pubic bone, and gives attachment to abdominal muscles.

linea ni'gra (*Med.*). Pigmented linea alba, occurring in pregnant women.

lineage (*Gen.*) In evolution, a time-character concept representing a racial complex of lines of descent.

linear (*Bot.*). Having parallel edges, and at least four to five times as long as broad.

linear amplification (*Radio*). Amplification in which the output current or voltage is strictly proportional to the input voltage.

linear detection (*Radio*). The same as *linear rectification.*

linear distortion (*Elec. Comm.*). That form of amplitude distortion in which the envelope of the output signal is not proportional to the corresponding input envelope, but in which alien frequencies are not introduced. See **compandor, automatic volume control.**

linear modulation (*Radio*). Modulation in which the amount by which the instantaneous peak amplitude of the alternating output current or voltage differs from its unmodulated value is directly proportional to the instantaneous modulating voltage.

linear network (*Elec. Comm.*). A network of electrical elements which are constant in magnitude with varying current.

linear rectification (*Radio*). Rectification in which the unidirectional output current is directly proportional to the instantaneous peak amplitude of the applied alternating voltage.

linear resistance (*Elec. Comm.*). A resistance in which the current and voltage are always proportional, e.g. in a copper wire, provided the temperature and other physical factors remain constant. Ohm's law is a description of this property.

linear tetrad (*Bot.*). A row of four megaspores, as is usual in flowering plants.

linear time base (*Television*). An oscillator giving a 'saw-toothed' waveform, which, when applied to a cathode ray tube, causes the spot to move at a uniform rate across the tube in one direction and then rapidly return to its starting point, after which the process is repeated indefinitely.

linel'lae (*Zool.*). In some *Sarcodina*, a system of smooth filaments uniting the xenophya.

linen. A cloth woven from yarn prepared from the fibres of the flax plant, *Linum usitatissimum*, family *Linaceae*; underpick looms are generally used, and, for damasks, jacquard machines.

linen-fold (or **linen-scroll**) **panel** (*Join.*). See **drapery panel.**

liner (*Dec.*). A type of brush used for drawing lines.

liner (*Eng.*). A separate sleeve placed within an engine cylinder to form a renewable and more durable rubbing surface; in I.C. engines, termed *dry* if in continuous contact with the cylinder wall, and *wet* if supported only at the ends and surrounded by cooling water.

liner-off (*Ship Constr.*). A tradesman engaged in shipbuilding, whose function it is to 'mark off' by fair lines, using battens to enable plate workers and others to prepare material to fit *in situ.*

lingel, ling'gl (*Boots and Shoes*). A shoemaker's thread rubbed with beeswax.

lin'gua (*Zool.*). Any tongue-like structure: in Insects, the hypopharynx: in *Acarina*, the floor of the mouth.

lingual (*Zool.*). In Arthropods, pertaining to the lingua: in Molluscs, pertaining to the radula: in Vertebrates, pertaining to the tongue.

lin'gula (*Zool.*). In *Aleurodidae*, a tongue-shaped organ on the dorsal surface of the last abdominal somite, on which honey-dew accumulates.

Lingula Flags (*Geol.*). Well-stratified rocks, consisting of alternating slaty and sandy layers (the latter known as *ringers*), occurring in the Upper Cambrian of N. Wales and containing large numbers of the Lingula-like brachiopod, *Lingulella davisii*. In the Upper Lingula Flags, the Dolgelley Beds, trilobites also are comparatively common.

lingu'late (*Bot.*). Tongue-shaped; proportionally shorter and wider than *ligulate*, and somewhat fleshy, with a bluntish apex.

lin'in (*Cyt.*). The more solid, form-conserving part of the nucleus, which holds the chromioles in definite relation to one another.

lining (*Bind.*). (1) The operation of pasting a strip of brown paper down the back of a book after backing.—(2) A strip of linen fixed down the middle of a section for strengthening purposes.

lining (*Hyd. Eng.*). A layer of clay puddle covering the sides of a canal, making them watertight.

lining (*Join.*). Thin boarding covering an interior surface in a building.

lining (*Pot.*). A cup or other hollow vessel partially formed on the wheel, to be finished in a mould.

linings (*Furs*). A number of furs sewn together and used for lining garments.

lining paper (*Dec.*). An undercoat paper applied to a wall or ceiling as a basis for a figured paper or for distemper.

lining-papers (*Bind.*). Another name for *end-papers.*

lining-up (*Eng.*). The operation of arranging the bearings of an engine crankshaft, etc. in perfect alignment.

link (*Auto. Teleph.*). (1) A circuit or outlet between one rank of selectors and the next in order of operation, or between such selectors and a manual position. Also termed a TRUNK, which is a circuit in the trunking.—(2) See **U-link.**

link (*Elec. Eng.*). See **fuse-link, isolating link.**

link (*Eng.*). (1) Any connecting piece in a machine, pivoted at the ends.—(2) The curved slotted member of a *link motion* (q.v.).

link (*Surv.*). The one-hundredth part of a chain. In the Gunter's chain, 1 link=7·92 ins.; in the Engineer's chain, 1 link=1 ft.

link block (*Eng.*). A sliding block pivoted to the end of the valve rod, and working in the slotted link of a *link motion* (q.v.).

link motion (*Eng.*). A valve motion, invented by Stephenson, for reversing and controlling the cut-off of a steam-engine. It consists of a pair of eccentrics, set for ahead and reverse rotation, connected to the ends of a slotted link carrying a block attached to the valve rod. Variation of the link position (known as *linking-up*) makes either eccentric effective, and also varies the cut-off.

link rods (*I.C. Engs.*). The auxiliary or articulated connecting-rods of a radial aero engine, which work on the wrist pins carried by the master rod.

linkage (*Gen.*). The tendency shown by certain genetical characteristics to be inherited together.

linkage (*Chem.*). A chemical bond, particularly a covalent bond in an organic molecule.

linkage (*Elec. Eng.*). A measure of the product of the magnetic flux passing through a closed electric circuit and the number of turns in the circuit, the unit being one line passing through a circuit having one turn.

linkage group (*Gen.*). A group of hereditary characteristics which remain associated with one another through a number of generations.

linkage map (*Gen.*). A diagram showing the position of the genes in a chromosome or group of chromosomes.

linked switches (*Elec. Eng.*). Switches mechanically linked, so that they operate together or in a definite sequence. Also called COUPLED SWITCHES.

linking-up (*Eng.*). See **link motion.**

Linnae'an (or **Linnean**) **system** (*Bot., Zool.*). The system of classification and of *binomial nomenclature* (q.v.) established by the Swedish naturalist Linnaeus.

Linnaean species (*Bot.*). A wide conception of a species, in which many varieties are included.

lino'leum. A very widely used floor-covering material made by impregnating a foundation of hessian fabric with a *linoleum cement.* This linoleum cement is made of oxidised linseed oil (linoxyn) mixed with resins (e.g. **kauri gum**) and fillers (e.g. cork), and has to undergo a prolonged curing process before it can be applied to the fabric.

Li'notype composing machine (*Typog.*). See **composing machines.**

linox'yn (*Chem.*). An elastic substance obtained by the oxidation of linseed oil; used as the basis for making *linoleum* (q.v.).

linseed oil (*Chem.*). An oil obtained from the seeds of flax (*Linum usitatissimum*). It contains solid and liquid glycerides of oleic and other unsaturated acids. Its iodine value is 160-200, which is the highest of all fats. It is easily oxidised and polymerised, forming elastic films. Used for the mixing of paints and varnishes and for the manufacture of linoleum.

linsey (*Textiles*). A fabric which is a combination of linen and wool; used for dresses.

lint (*Med.*). A material made from cotton or linen, with a soft, teased surface; usually rendered antiseptic and used for bandages and dressings.

lintel (*Build.*). A beam across the top of an aperture. Also called the HEAD.

linters or **cotton linters.** Short stiff fibres remaining on cotton seeds after removal of the longer fibres; usually removed before the seeds are crushed (if subsequently, known as HULL FIBRE). Linters are used extensively in the manufacture of rayon, guncotton, celluloid, absorbent cotton, etc.

lintol (*Build.*). A *lintel* (q.v.).

Linville truss (*Struct.*). See **Pratt truss.**

lip (*Bot.*). (1) A large projecting lobe of a corolla.—(2) See **label.**

lip (*Horol.*). The edge of the cylinder of the cylinder escapement which receives impulse from the escape wheel.

lip-and-leg ulceration (*Vet.*). See **necrobacillosis.**

lip block (*Civ. Eng.*). A block of wood spiked to the end of a strut used in timbering a trench; it overhangs the end of the strut and rests upon the waling, so that the strut is supported and prevented from dropping if the sides of the trench give way.

lip union (*Plumb.*). A union which has an inner annular projection to prevent the gasket from being forced partially into the pipe and thereby obstructing the flow.

lipae'mia, lipe'mia (*Med.*). Excess of fat (Greek *lipos*) in the blood.

lip'arite (*Geol.*). A name suggested in 1860 by Roth to include all the fine-grained granitic rocks occurring as lava flows, such as those found in the Lipari Isles. The synonymous term *rhyolite* is more widely used.

li'pase (*Bot., Zool.*). A fat-digesting enzyme.

lipec'tomy (*Surg.*). Surgical removal of fatty tissue.

lip'ochromes (*Chem.*). Pigments of butter fat.

lipodystro'phia progressi'va (*Med.*). A rare condition in which there is progressive loss of fat from the subcutaneous tissues of the upper half of the body.

lipogas'try (*Zool.*). Temporary disappearance of the gastric cavity or of the paragaster.

lipogenous, li-poj'— (*Zool.*). Fat-producing.

lipo'ma (*Med.*). A tumour composed of cells containing fat.

lipo'mato'sis (*Med.*). A term applied to a number of conditions (e.g. Dercum's disease) in which there is an excessive accumulation of fat in the body or part of the body.

lipomatosis, bovine (*Vet.*). A diffuse growth of lipoma throughout the mesentery of cattle.

lipom'erism (*Zool.*). In metameric animals, disappearance of metamerism by overgrowth or rearrangement of somites.

lip'oplast (*Bot.*). A fatty globule.

lip'osome (*Bot.*). A fatty or oily globule in cytoplasm.

lipos'tomy (*Zool.*). Temporary disappearance of the mouth, or of the osculum.

lipox'enous *or* —zē'nus (*Bot., Zool.*). (Of parasitic forms) leaving the host before development is completed.

lipu'ria (*Med.*). The presence of fat in the urine.

liquation (*Chem.*). A process used in metallurgical chemistry depending on slowly cooling a molten alloy, or metallic mixture, and combining this with the different freezing-points of the various constituents as a means of their separation.

liquefaction. The change of a gas or a solid into the liquid state. See **gases (liquefaction of).**

liquid. A state of matter in which the shape of a given mass depends on the containing vessel, but the volume is independent thereof. A liquid is a practically incompressible fluid.

liquid controller (*Elec. Eng.*). A liquid rheostat arranged for speed or other control of an electric motor.

liquid crystals (*Chem.*). Certain pure liquids which are turbid and, like crystals, anisotropic over a definite range of temperature above their freezing-points.

liquid dimmer (*Elec. Eng.*). A dimmer making use of liquid resistances and therefore giving a smooth variation in the illumination.

liquid drier (*Paint.*). See **drier.**

liquid-quenched fuse (*Elec. Eng.*). A fuse in which a liquid is used for quenching the arc.
See **semi-immersed— immersed—**

liquid resistance (*Elec. Eng.*). A resistance consisting of a liquid of low conductivity, the current being led to and from the liquid by means of suitable electrodes.

liquid rheostat (*Elec. Eng.*). A liquid resistance whose value can be varied continuously, usually by movement of one of the electrodes relative to the other, or relative to the surface of the liquid.

liquid starter (*Elec. Eng.*). A liquid rheostat arranged to operate as a motor starter.

liq'uidus (*Met., etc.*). A line in a constitutional diagram indicating the temperatures at which solidification begins or melting is completed, in alloys of different composition or in silicate melts. See **solidus** and **solidification range.**

liquor amnii, li'kor am'ni-i (*Physiol.*). The clear fluid in the amniotic cavity, in which the embryo is suspended.

lirel'la (*Bot.*). A long narrow apothecium with a ridge in the middle, found in some lichens.

lirel'liform (*Bot.*). Like a furrow.

liroc'onite (*Min.*). A rare ore of copper, sky-blue to green in colour; essentially, hydrated oxide of arsenic combined with hydroxide of copper and aluminium.

lisle, lil (*Textiles*). Long-staple, hard-twisted cotton yarn, gassed to produce a lustrous effect; used extensively for stockings.

Lissajous figures, lēs'a-zhoo' (*Phys.*). The curves obtained by compounding two linear harmonic vibrations at right-angles to each other, there being a simple ratio between their frequencies.—(*Cathode Ray Tubes*) The stationary patterns which are obtained on the screen of a cathode ray tube when two alternating voltages, whose frequencies are related to each other by a simple integral ratio, are applied to the two pairs of deflector plates or coils.

lissenceph'alous (*Zool.*). Having smooth cerebral hemispheres.

lissoflagellate, —flaj'el-āt (*Zool.*). Having the flagellum unprovided with a collar at the base.

listed (*Woollen*). A term denoting defects near the lists or selvedge in a length of cloth; due to uneven dyeing, uneven tension of the lists, or other causes.

listel (*Arch.*). See **facette.**

listening key (*Teleph.*). The lever key which the operator throws, to put her head-set on to a cord circuit and speak to a subscriber.

listing (*Carp.*). (1) A narrow edge of a board.—(2) The operation of removing the sappy edge of a board.

lists or **listing** (*Textiles*). See **selvedge.**

literals (*Typog.*). Casual errors of composition, such as one character substituted for another, worn letters, turned letters, etc.

lith'arge (*Chem., Dec.*). Lead monoxide, used in paint-mixing as a drier; used also in the rubber and electrical accumulator industries.

litharge cement (*Chem.*). See **glycerine litharge cement.**

lithia (*Chem.*). Lithium monoxide.

lithia emerald (*Min.*). A trade name for the mineral species *hiddenite.*

lithia mica (*Min.*). An important member of the mica group of minerals, occurring as pinkish-mauve crystals, or more typically as scaly aggregates, hence the name (from the Greek *lepis, lepidos,* a scale). The composition is complicated, but it is essentially silicate of potassium, lithium, and aluminium. Also called LEPIDOLITE.

lithi'asis (*Med.*). The formation of calculi in the body. The condition in which an excess of uric acid and urates is excreted in the urine—the gouty diathesis.

lithioph'ilite (*Min.*). Orthorhombic phosphate of lithium and manganese, forming with triphilite a continuously variable series.

lithite (*Zool.*). See **statolith.**

lithium (*Met.*). The lightest metallic element. Chem. symbol, Li; at. wt. 6·94, at. no. 3, sp. gr. at 20° C. 0·534, m.p. 186° C., specific electrical resistivity 8·5 microhms per cm. cub. Used, in alloy with calcium, as a deoxidiser for copper; also added, in small amounts, to some lead-base bearing metals.

lithium hydride (*Chem.*). LiH. Formed when lithium unites with hydrogen at a red heat.

lithium monoxide (*Chem.*). Li_2O. Also called LITHIA. Formed when the metal is heated in air.

lithium nitride (*Chem.*). Li_3N. Lithium combines with nitrogen to form *lithium nitride.*

li'tho (*Print.*). A common abbreviation for *lithography* (q.v.).

litho-offset (*Print.*). Offset printing.

lith'ocyst (*Zool.*). See **statocyst.**

lithod'omous (*Zool.*). Living in rocks.

lithogenous, —oj'en-us (*Zool.*). Rock-building, as certain Corals.

lithographic paper (*Paper*). High machine-finished or supercalendered paper, made so that any stretch occurs the narrow way of the sheet. Such paper is often double-supercalendered or plate-glazed.

lithographic stone (*Geol.*). A compact, porous, fine-grained limestone, often dolomitic, employed in lithography. Pale creamy-yellow in colour, but occasionally grey. Fair samples may be obtained from the Jurassic rocks of this country, but the finest material comes from Solenhofen and Pappenheim in Bavaria. See also **Solenhofen stone.**

lithog'raphy (*Print.*). Originally the art of printing from stone (see **lithographic stone**), but now applied to printing processes depending on the mutual repulsion of water and greasy ink. Damp rollers pass over the surface, followed by inking rollers. The design, which is greasy, repels the water but retains the ink (also greasy), which is transferred to the paper. In modern practice, a sheet of zinc or aluminium, grained to retain moisture, is commonly used in place of stone. See also **chromolithography, photo-lithography.**

lithol'ogy (*Geol.*). The character of a rock expressed in terms of its mineral composition, its structure, the grain-size and arrangement of its component parts; that is, all those visible characters that in the aggregate impart individuality to the rock.

lith'olopaxy (*Surg.*). The operation of crushing a stone in the bladder, followed by the washing out of the crushed fragments.

lith'omarge (*Geol.*). An old name applied to various clays differing in origin and physical characters; of no systematic importance.

lithopae'dion, lithope'dion (*Med.*). A dead foetus which has become calcified within the maternal body.

lithoph'agous (*Zool*). Stone-eating; said of graminivorous Birds which take small stones into the gizzard, to aid mastication; also of certain Molluscs which tunnel in rock.

lithoph'ilous (*Ecol.*). Using stones as a shelter; said especially of aquatic animals.

lithophy'sae (*Geol.*). Literally 'stone bubbles'; they are spherical bodies up to the size of a fist occurring in glassy igneous rocks, particularly in some varieties of rhyolites. They usually exhibit, when broken across, a strongly developed series of concentric shells.—*sing.* **lithophysa.**

lith'ophyte (*Bot.*). A plant growing on rocks or stones.

lith'opone (*Paint.*). A white pigment, having good covering qualities, used for inside painting; compounded of 66% barium sulphate and 34% zinc sulphide approximately.

lith'osphere (*Geol.*). The outer rocky earth shells that surround the centrosphere or 'core' and which include the continuous *sima* and the discontinuous *sial* (qq.v.): a more scientific name for the *crust of the earth.* See **Earth, barysphere*.**

lithot'omous (*Zool.*). Stone-boring, as certain Molluscs.

lithot'omy (*Surg.*). Cutting into the bladder for the removal of a stone or calculus.

lith'otripsy (*Surg.*). The crushing of a stone in the bladder.

lith'otrite (*Surg.*). An instrument, with special blades, adapted for crushing stones in the bladder.

lithot'rity (*Surg.*). The operation of crushing stones in the bladder.

lithu'ria (*Med.*). An excess of uric acid and of urates in the urine.

litmus (*Chem.*). A material of organic origin used as an indicator in acidimetry and alkalimetry. See also **indicator** (1).

litter (*Bot.*). More or less undecomposed plant residues on the surface of the soil in a wood.

Little's disease (*Med.*). Spastic paralysis of the lower half of the body, due to congenital failure of development of nerve cells in the brain.

litt'oral (*Bot., Zool.*). Living on, or pertaining to the shore, especially the seashore (Latin, *litus*, *-oris*).

littoral conditions (*Geol*.). Conditions which obtain in the littoral zone (i.e. the shore zone); they involve strong current and wave action, causing intense marine abrasion, and the development of much sand and well-rounded pebbles. See also **littoral deposits.**

littoral deposits (*Geol*.). Deposits of the shore zone lying between high- and low-water mark. According to local conditions, these consist of shingle grading into sand, or one of these only. In special areas, the chief or only deposit may be coral sand. Littoral deposits are recognised by their coarse grain, by ripple marking, and by the fauna they contain, which includes in British seas such well-known forms as whelks (*Littorina littorea*), mussels (*Mytilus edulis*), etc.

littoral zone (*Bot*.). The part of the seashore inhabited by plants, below average low-water level.—(*Zool.*) The part of the seashore lying between low and high tide marks.

Littré's glands, lĕt'rā (*Zool*.). In male Mammals, small mucous glands occurring in the mucous membrane of the urethra.

Littrow spectrograph, lit'rō (*Light*). A convenient prism spectrograph in which the same lens serves both to collimate the light and to focus the spectrum on the photographic plate, the light being reflected back through the prism and lens by a plane mirror behind the prism. The instrument has several obvious advantages over the type with separate collimator and camera lens.

litz'endraht (*Radio*). Abbrev. **litz.** The German name, commonly used in English, for a high-frequency conductor made up of a number of strands, each separately insulated and interwoven, and connected together in parallel at the ends. Its a.c. resistance is less than that of the equivalent cross-section of solid conductor, owing to the reduction in skin effect.

live (*Acous*.). Said of an enclosure, or motion-picture set, which is not rendered dead by the presence of sound-absorbing areas, and in which the reverberation is normal or above normal.

live (*Elec. Eng*.). Said of an electric circuit or conductor in which there is a potential difference between it and earth.

live axle (*Eng*.). A revolving axle to which the road-wheels are rigidly attached, as distinct from a fixed or *dead axle* (q.v.).

live load (*Struct*.). A moving load or a variable force on a structure; e.g. that imposed by traffic movement over a bridge, as distinct from a dead weight or load, such as that due to the weight of the bridge.

live rail (*Elec. Eng*.). The conductor-rail of an electric traction system, the rail being at a potential above or below earth.

live ring (*Eng*.). A large roller-bearing, used for supporting turn-tables and revolving cranes.

live steam (*Eng*.). Steam supplied direct from a boiler, as distinct from exhaust steam or steam which has been partly expanded.

liver (*Zool*.). In *Invertebrata*, the digestive gland or *hepatopancreas* (q.v.): in *Vertebrata*, a large mass of glandular tissue arising as a diverticulum of the gut, which secretes the bile and plays an important part in excretion and other aspects of the general metabolism of the body.

liver of sulphur (*Chem*.). The literally translated name of *hepar sulphuris* (q.v.).

liver opal (*Min*.). A form of opaline silica, in colour resembling liver.

liver rot (*Vet*.). See **distomiasis.**

livering (*Paint*.). The condition when a paint in bulk becomes jelly-like or tough.

livid (*Bot*., *etc*.). Of the colour of an old bruise.

lixiviation (*Met*.). See **leaching.**

Llanber'is Slates (*Geol*.). Argillaceous rocks of Cambrian age occurring in the Cambrian Slate Belt of N. Wales, from Penrhyn to Nantlle in Carnarvonshire. They are famous for their perfect cleavage, which makes them perhaps the finest roofing slates known.

Llandeilian Series, lan-dī'li-an (*Geol*.). A division of the Ordovician System, lying between the Llanvirn Series below and the Caradocian Series above. As described by Murchison from the type locality (Llandeilo, Wales), the series comprises flags and limestones; but, traced westwards into Mid-Wales, these pass into shales containing graptolites. Their equivalents occur also in Shropshire, S. Scotland, and the Lake District.

Llandeilo Flags and Limestone (*Geol*.). These constitute the Llandeilian Series in the type locality, and reach about 2500 ft. in thickness, the flags and limestones alternating. They contain an abundant shelly fauna.

Llando'very (or **Llandoverian**) **Series** (*Geol*.). The lowest series in the Silurian System, divisible at the type locality (Llandovery, Wales) into three groups of beds—Lower, Middle, and Upper, defined by the graptolite faunas they contain.

Llanvirn Series (*Geol*.). A division of the Ordovician System, the name being taken from a S. Welsh locality. The series consists of blue-black shales containing a graptolite fauna, the characteristic forms being the 'tuning-fork' graptolites, *Didyomograptus bifidus* and *D. murchisoni*. In Wales and the Lake District the Llanvirn Series is largely volcanic.

Lloyd's mirror (*Light*). A device for producing interference fringes. A slit, illuminated by monochromatic light, is placed parallel to and just in front of the plane of a plane mirror or piece of unsilvered glass. Interference occurs between direct light from the slit and that reflected from the mirror. See **interference fringes.**

load. (1) The weight supported by a structure. —(2) The power output of an engine or motor under given circumstances.

load (*Aero*.). See **pay—** **useful—**

load (*Build*.). 50 cu. ft. of squared or hewn timber.

load (*Elec. Eng*.). A term used to denote the output of an electric machine or transformer, or a group of such apparatus, e.g. a generating station or substation. It may also denote the power carried by a particular circuit.

load curve (*Elec. Eng*.). A curve whose ordinates represent the load on a system or piece of apparatus, and whose abscissae represent time of day, month, or year, so that the curve indicates the value of the load at any time.

load curve (*Eng*., *etc*.). See **influence line.**

load despatcher (*Elec. Eng*.). An engineer who is responsible for the distribution of load over a large interconnected power system, and also, usually, for the general control of the system.

load displacement (*Ship Constr*.). A ship's displacement at load draught, i.e. the draught to the centre of the freeboard disc marking, which is set off to the summer freeboard.

load draught (*Ship Constr*.). See **draught.**

load-extension curve (*Met*.). A curve, plotted from the results obtained in a tensile test, showing the relations between the applied load and the extension produced.

load-factor (*Elec. Eng*.). The ratio of the average load, during a given period, on an electric circuit or piece of equipment to the maximum load during that period. See **plant load-factor.**

load-levelling relay (*Elec. Eng*.). A relay used in connexion with certain forms of apparatus such as storage-water heaters. It automatically switches them off when the demand on the system exceeds a certain value.

load line (*Ships*). A line marked on the outside of a ship to indicate the depth to which it may be immersed when loaded. Sometimes called PLIMSOLL MARK (after Samuel Plimsoll, the originator). See **freeboard.**

load line (*Thermionics*). A line drawn on a set of anode-current/anode-voltage characteristics of a thermionic valve in the graphical representation of the operating conditions. Its slope and position are determined by the anode load-impedance and steady electrode potentials respectively.

load-rate prepayment meter (*Elec. Eng*). A form of prepayment meter in which the charge per unit is changed whenever the load exceeds a certain predetermined value.

loaded (*Photog.*). A camera or film magazine is said to be *loaded* when it contains film.

loaded antenna (*Radio*). An antenna in which series inductance has been added to increase its natural wavelength.

loaded cable (*Elec. Comm.*). See **loading.**

loaded circuit (*Elec. Comm.*). A circuit which includes loaded cable and therefore has a reduced and uniform attenuation up to a cut-off frequency but a lower velocity of transmission.

loaded push-pull amplifier (*Elec. Comm.*). A push-pull stage of valve amplification in which the amplitude distortion arising from grid-current is minimised by shunting the grids with resistances low in comparison with the effective non-linear grid-resistance.

loader (*Mining*). A mechanical shovel or other device for loading trucks underground.

loading or **loaded cable** (*Elec. Comm.*). An inductance added to a communication circuit, such as an open-line or conductor-pair in a cable, to decrease the attenuation over a specified frequency-band, as predicted by Heaviside.

See **coil—**
continuous—
intermittent—
Krarup—
phantom—
Pupin—

loading (*Eng., etc.*). See **on-costs.**

loading (*Paper*). A material, such as clay, added to the pulp in order to produce a smooth surface and solidity.

loading (*Radio*). The addition of inductance to an antenna to increase its natural wavelength.

loading (*Textiles*) The weighting of fabrics by means of size or metallic compounds.

loading coil (*Elec. Comm.*). The inductance coil placed at uniform spacing in transmission lines, to reduce and unify the attenuation with frequency. Such coils are invariably made in the toroid form, with four equal windings, to facilitate the maintenance of balance.

loading gauge (*Rail.*). (1) The limiting dimensions governing height, width, etc. of rolling stock to ensure that adequate clearance is obtained for passage under bridges and through tunnels.—(2) A shaped bar suspended over a railway track, at the correct height and position, to check compliance of trucks passing underneath with the above limiting dimensions.

loadstone (*Min.*). See **lodestone.**

loam (*Build.*). A brick earth composed of clay and sand, which requires a fluxing material to fuse its constituents at furnace temperature. Also called MILD CLAY, SANDY CLAY.

loam (*Foundry*). A clayey sand milled with water to a thin plastic paste, from which moulds are built up on a backing of soft brick; generally swept or strickled to shape without the use of a pattern.

loam board (*Foundry*). See **strickle board.**

loam bricks (*Foundry*). Cakes of loam, or soft building-bricks built up with loam, which form a solid but porous support for the loam forming the wall of the mould. See **loam.**

loam mill (*Foundry*). A mortar mill used for mixing floor sand, clay, and water to form loam.

loam plates (*Foundry*). Cast-iron plates on which loam moulds are built up, or between a pair of which a mould is bolted. They are provided with lugs and projections to hold the loam.

loamy clay (*Geol.*). An earthy mixture of clay, silt, and sand, with more or less organic matter.

loan (*Paper*). Animal-sized rag paper made for bank-notes, bonds, etc.

lobar pneumonia (*Med.*). Inflammation of one or more lobes of the lung, the affected lobes becoming solid; due usually to infection with the pneumococcus. See also **pneumonia.**

Loba'ta (*Zool.*). An order of *Tentaculata*, the members of which are laterally compressed, and possess two lateral lobes in the oral region; the tentacles are non-retractile and without sheaths.

lobe (*Bot.*). One of the parts into which a flattened plant member is cut when the parts are too large and distinct to be called teeth but not wholly separated from one another.—(*Zool*) A rounded or flap-like projection.—*adjs.* **lo'bate, lobed, lobose, lob'ulate.**

lobe (*I.C. Engs.*). A rounded projection or cam. The term is usually applied to the projections on an ignition contact-breaker, and to the several cams formed on one ring, used in radial aero engines.

lobec'tomy (*Surg.*). Removal by operation of a (diseased) lobe of the lung.

lo'beline (*Chem.*). $C_{23}H_{29}O_2N$, an alkaloid of unknown constitution, obtained from *Lobelia inflata* It forms broad needles, m.p. 130°-131° C. It is monoacidic, and has the remarkable property of yielding acetophenone when heated with water.

lobing (*Bot.*). Division of the blade of a leaf, or of a flat thallus, when the separation does not extend much more than half way in, but is deeper than is necessary to cut out teeth.

lobopo'dia (*Zool.*). Thick, blunt pseudopodia of some *Sarcodina.*

Lobo'sa (*Zool.*). See **Amoebina.**

lobose (*Zool.*). Said of pseudopodia which are short and blunt and contain both ectoplasm and endoplasm. Cf. *filose.*

lob'ule or **lob'ulus** (*Zool.*). A small lobe: one of the polyhedral cell masses forming the liver in Vertebrates.—*adjs.* **lob'ular, lobulate.**

local action (*Chem.*). The corrosion of a piece of metal by the formation of galvanic cells between different parts of its surface.

local attraction (*Surv.*). An effect (due to mineral deposits in the ground or to other local causes, such as a nearby iron fence or lamp-post) which may give trouble in compass surveying, the compass needle being deviated from its magnetic north-south direction.

local battery (*Teleph.*). A telephone system in which each subscriber's telephone station is provided with its own battery, wet or dry. Abbrev. **L.B.** Cf. *central battery.*

local call (*Teleph.*). A call within a prescribed area surrounding a telephone exchange.

local exchange (*Teleph.*). The exchange to which a given subscriber has a direct line. Called in America CENTRAL OFFICE.

local extension (*Met.*). The extension which is produced in a tensile test after the ultimate tensile stress has been passed, and which is concentrated on part of the gauge length where a neck is formed. See **uniform extension.**

local junction circuit (*Teleph.*). A junction between exchanges in the unit-fee area, i.e. where the calling subscriber pays unit fee for a successful connexion.

local oscillations (*Radio*). Oscillations generated by the local oscillator.

local oscillator (*Radio*). The oscillator used in a heterodyne or supersonic heterodyne receiver to generate the currents which beat with the incoming signal. Also called BEATING OSCILLATOR.

local race (*Zool.*). A collection of individuals occurring in a particular locality and differing in minor characters from typical members of the species.

local time (*Astron.*). Applied to any of the three systems of time reckoning, sidereal, mean solar, or apparent solar time, it signifies the hour angle of the point of reference in question measured from the local meridian of the observer as against *standard time* (q.v.). The local times of a given instant at two places differ by the amount of their difference in longitude expressed in time, the local time at a place east of another being the greater.

local vent (*Plumb.*). A connexion enabling foul air in a room or plumbing fixture to escape to the outer air.

localisation (*Acous.*). See **auditory perspective.**

localisation of function (*Zool.*). The specialisation of certain areas of the brain to deal with certain types of stimuli.

localisation of respiration (*Zool.*). The specialisation of certain parts or areas of the body (as lungs, trachea, etc.) to perform the function of respiration, as opposed to the utilisation of the whole surface of the body for this purpose.

location (*Cinema.*). Used in the phrase *on location* to indicate the making of a motion-picture outside the studio, e.g. in a natural setting.

location (*Civ. Eng.*). (1) The exact position of an engineering project, as decided upon in the light of technical and other considerations.—(2) The process of determining the above position in the field.

locator (*Acous.*). See **sound locator.**

lochia, lō′ki-a (*Physiol.*). The normal discharge from the vagina during the first week or two after childbirth.

lock (*Elec. Comm.*). A relay *locks* when, on operation, it trips a ratchet device which holds it in operation after the operating current ceases; or if, on operation, it makes a circuit which maintains in a winding of the relay a current sufficient to keep it operated, after the original operating current has ceased.

lock, locking (*Horol.*). The stopping of the escape wheel.

lock-and-key theory (*Chem.*). A theory devised by Emil Fischer to explain the specific action of enzymes; based on the assumption that enzyme and substrate must possess a similar geometrical structure in order that a chemical reaction can occur.

lock-and-key theory (*Zool.*). A theory which postulates that the sharply marked differences between the genitalia of different species of Insects act, by preventing interbreeding, as a mechanical means of isolating the species.

lockjaw (*Med.*). See **tetanus.**

lock-nut (*Eng., etc.*). (1) An auxiliary nut used in conjunction with another, to prevent it from loosening under vibration.—(2) Any special type of nut designed to obviate accidental loosening.

lock rail (*Join.*). The door-rail which is level with the lock.

lock-saw (*Carp.*). See **compass saw.**

lock stile (*Join.*). That stile of a door in or on which the lock is fastened.

lock-woven mesh (*Civ. Eng.*). A mechanically woven fabric, made of steel wires crossing at right-angles and secured at the intersections, used as a reinforcement in ferro-concrete construction.

lock (*Furs*). The belly or under part of skins.

lock (*Hyd. Eng.*). A communicating channel, having gates at both ends, between the higher and lower reaches of a canal. It is used to transfer a vessel from one reach to the other.

lock-bay (*Hyd. Eng.*). The water space enclosed in a *lock-chamber* (q.v.).

lock-chamber (*Hyd. Eng.*). The space between the head-gates and tail-gates of a lock.

lock-gate (*Hyd. Eng.*). A pair of doors at one end of a lock, serving, in conjunction with a similar pair at the other end, to enclose water within the lock-chamber.

lock-paddle (*Hyd. Eng.*). A sluice through which water is passed to fill an empty lock-chamber.

lock-sill (*Hyd. Eng.*). See **mitre-sill.**

lockage (*Hyd. Eng.*). Water lost, i.e. transferred from a higher to a lower level, in the operation of passing a vessel through a lock.

locked-coil conductor (*Elec. Eng.*). A form of stranded conductor in which the outer wires are so shaped that they are prevented from having any radial movement.

locked-cover switch (*Elec. Eng.*). A switch which can be operated only after unlocking the cover. Also called ASYLUM SWITCH, LOCKING SWITCH, SECRET SWITCH.

locker jack (*Textiles*). See **lever jack.**

locker rack (*Civ. Eng.*). A form of rack railway in which the rack is centrally located and has, on each side, teeth in which horizontal cog-wheels work.

locking (*Radio*). A phenomenon which occurs when two thermionic valve oscillators, between which the initial difference in frequencies is small, are coupled together. As the coupling is increased, or the frequency difference is reduced, the oscillations suddenly ‘ jump ’ into synchronism.

locking angle or **angle of lock** (*Horol.*). The angle, measured from the pallet centre, through which the pallets have to move before unlocking can take place.

locking face (*Horol.*). The portion of the pallet upon which the teeth of the escape wheel drop for locking.

locking key (*Teleph.*). A hand-operated telephone key, which, when operated, remains in its operated position until released by the hand.

locking lampholder (*Elec. Eng.*). A lampholder with a switch for locking the lamp in position.

locking plate (*Horol.*). A circular plate around the periphery of which notches are cut, the distance between the notches regulating the number of hours struck.

locking relay (*Teleph.*). A telephone relay which, when operated, remains in its operated condition when the operating current ceases, either by closing a winding which carries a sustaining current or, more rarely, by mechanical means.

locking stile (*Join.*). A *lock stile* (q.v.).

locking switch (*Elec. Eng.*). See **locked-cover switch.**

Lockport Limestone and Dolomite (*Geol.*). Marine, highly fossiliferous strata which form the top of the scarp and the lip of the Niagara Falls, having a thickness of 130 ft. above the falls and faunally closely resembling the Wenlock Limestone in England. Sometimes called the NIAGARA LIMESTONE.

lockrand (*Masonry*). A course of stones laid as bondstones.

locomotive (*Eng.*). A vehicle driven by steam, oil, or electricity, for hauling trucks or carriages on a railway.

See **Diesel—** **electric—**
Diesel-electric— **steam—**

locomotive boiler (*Eng.*). The type of boiler used on steam locomotives; it consists of an internal fire-box at one end of the horizontal cylindrical shell, from which the hot gases are led through fire-tubes passing through the water space into the smoke-box at the front of the boiler. See **fire-tube boiler, fire-box.**

locomotor atax'ia (or **ataxy**) (*Med.*). See **tabes dorsalis.**

loc'ular, locula'tous (*Bot.*). Divided into compartments by septa.

loculici'dal (*Bot.*). Said of a fruit which splits open along the midribs of the carpels.

loc'ulus (*Bot.*). (1) One portion of a septate spore.—(2) One compartment in a synangium.—(3) One compartment in an anther, or in an ovary.—(*Zool.*) A small space or cavity; as in *Foraminifera*, a shell, chamber.

locus (*Bot.*). The same as the ***hilum*** (q.v.) of a starch grain.—(*Cyt.*) The position of a gene in a chromosome.

lode (*Civ. Eng.*). An artificial dyke.

lode (*Mining*). An inclined tabular mineral deposit of value, occurring between the definite walls of a fissure, crack, or vein in the earth's surface. When it contains gold the term *reef* is often used.

lodestuff (*Mining*). The minerals and gangue constituents of a lode.

lodestone, loadstone (*Min.*). A form of magnetite or manganite which exhibits polarity, behaving, when freely suspended, as a magnet. Occurs extensively at Magnet Heights in Sekukuniland (Transvaal) and elsewhere. See **armed lodestone.**

Lodge valve (*Thermionics*). See **ionic valve.**

Lodge-Muirhead coherer (*Radio*). A coherer consisting of a slowly rotating steel wheel whose periphery dips into a pool of mercury. The arrival of a signal causes a sudden drop in the resistance of the contact.

lod'icule (*Bot.*). One of two (or rarely three) small scales present below the stamens in the flower of a grass. They become distended with water and assist in the separation of the glumes.

loess, lō'es (*Geol.*). An aeolian clay, consisting of fine rock-flour, originating in arid regions and transported by wind. Vast accumulations of loess cover large areas in Asia.

Löffler boiler, lĕf'ler (*Eng.*). A high-pressure boiler employing forced circulation, by pumping steam through small-diameter tubes. Part of the high-temperature steam is returned to the water drum, to produce the saturated steam supply to the pump.

loft (*Build.*). (1) A garret formed within a roof-space.—(2) A raised gallery within a building, such as that for a choir in a church.

lofty (*Textiles*). Said of wool and woollen fabrics which possess bulky and springy qualities.

log (*Maths.*). The usual abbrev. of *logarithm* (q.v.).

log-dec. (*Radio*). Abbrev. for *logarithmic decrement.*

log, nautical (*Ships*). A device for estimating the speed of a vessel. In the old-fashioned log, a line divided into equal spaces (knots) runs freely off a reel and is attached to a *chip*, which is stationary in the water as the vessel travels. Time is measured by a log-glass. The modern *patent* (or *taffrail*) *log* mechanically indicates the rate of travel by means of a submerged fly or rotator, whose revolutions are conveyed to a register on the rail of the vessel by a braided hemp line secured to the rotator.

log (*Timber*). The stem of a felled tree when deprived of its limbs and ready for conversion.

logagraph'ia (*Med.*). Loss of the ability to express ideas in writing.

Loga'nian System (*Geol.*). A name suggested for the combined Coutchiching and Keewatin groups of Pre-Cambrian rocks in the Canadian Shield.

logarithm (*Maths.*). The *logarithm* of a number to a given base (usually 10 or *e*) is the index of the power to which the base must be raised to produce the number. The whole number preceding the decimal point of the logarithm is known as the *characteristic*, the decimal fraction being called the *mantissa*. Logarithms greatly facilitate long arithmetical operations. See ***e*** (*Maths.*).

logarithmic decrement (*Phys.*). For a body executing damped vibrations in which the damping force is proportional to the velocity, the *logarithmic decrement* is the natural logarithm of the ratio of the amplitudes of two successive swings, the ratio being constant during the decay of the oscillation. The undamped amplitude for a body set in motion by an impulse is $a\left(1+\frac{\lambda}{2}\right)$, where a is the first damped amplitude and λ the logarithmic decrement.—(*Radio*) The natural logarithm of the ratio of two successive maxima of current in a freely oscillating circuit containing inductance, capacity, and resistance in series. It is equal to the *decay factor* multiplied by the *periodic time*. Abbrev. **log-dec.** See also **damping factor, decay factor.**

log'atom (*Acous.*). An artificial word used in articulation testing. A logatom comprises a vowel with either an initial or a final consonant, or both, and is devoid of meaning in ordinary language. Long lists of such logatoms are read, the listeners recording their impression of the reception. See **articulation.**

logger (*Elec. Comm.*). An arrangement of thermionic valves for obtaining an output indication which is proportional to the logarithm of the input amplitude or intensity. Required in modulation and noise meters.

loggia, loj'i-a (*Build.*). A covered gallery or portico built into, or projecting from, the face of a building, and bounded by a colonnade on its open side.

log'otype (*Typog.*). A word, or several letters, cast as one piece of type.

lol'lingite (*Min.*). Arsenide of iron, $FeAs_2$, occurring as steel-grey crystals, prismatic in habit, belonging to the orthorhombic system.

lomen'tum (*Bot.*). A fruit, usually elongated, which develops constrictions as it matures, finally breaking across these into one-seeded portions.—*adj.* **lomen'tose.**

London Basin (*Geol.*). A geographical region of S.E. England, lying between the Chiltern Hills and the North Downs. Structurally the region is a great syncline, pitching towards the east and truncated by the sea.

London Clay (*Geol.*). A blue clay (brown when weathered), up to 600 ft. in thickness, occurring in the London and Hampshire Basins, of deltaic origin and Eocene in age. Contains septaria, sometimes fossiliferous, and yields the remains of plants (Sheppey), crustaceans, reptiles, fishes, and more prosaic shells on several horizons.

London tie (*Weaving*). The mounting of the harness in a jacquard loom in which the jacquard engine and the card cylinder lie at right-angles to the comber board, in such a way that the pattern cards are on one side of the loom. Also called CROSS-TIE.

London-shrunk (*Textiles*). A term used in the woollen and worsted trades to indicate that a fabric has been specially treated in order to prevent shrinkage during make-up and when worn.

lone pair (*Chem.*). A pair of valency electrons unshared by another atom. Such lone pairs are responsible for the formation of co-ordination compounds.

long-and-short work (*Masonry*). A mode of laying quoins and of forming door and window jambs in rubble walling, the stones being alternately laid horizontally and set up on end; the latter stones are usually longer than the former.

long column (*Civ. Eng.*). A column which fails by bending rather than by crushing; commonly taken as one whose length is more than 20 diameters.

long-day plant (*Bot.*). A plant which needs alternating periods of comparatively prolonged illumination and correspondingly reduced darkness for the proper development of flowers and fruit.

long-distance call (*Teleph.*). In America, any long-distance telephone call. In Europe, an international trunk call.

long-distance line (*Teleph.*). A line between toll centres, for establishing long-distance calls between subscribers through their local central offices.

long float (*Plast.*). A plasterer's trowel so long as to need two men to handle it.

long letters (*Typog.*). Letters with the long accent added (ā, ē, ī, etc.).

long line (*Ocean.*). A long line having many short subsidiary lines attached to it, each with one or more hooks, the whole being trailed behind a boat, to take certain kinds of midwater fish.

long-period variables (*Astron.*). See **variable star.**

long plane (*Join.*). A bench plane 27 in. long, used for planing very straight stuff.

long-primer (*Typog.*). The old name for a type-size, approximately 10-point.

long saw (*Tools.*). A *pit-saw* (q.v.).

long shot (*Cinema.*). In motion-picture production, a shot which comprises scenery or persons at a distance.

long-shunt compound winding (*Elec. Eng.*). A field winding arrangement for a compound-wound d.c. machine in which the shunt winding is connected across the external terminals, i.e. across the armature and the series winding.

long-sightedness (*Med.*). See **hypermetropia.**

long stick (*Textiles, etc.*). A length of 36½ in.; namely a yard with an extra ½ in. allowed for the folding of the cloth.

long superstructure (*Ship Constr.*). A superstructure which is sufficiently long to be included in calculations of the ship's main strength, and not simply as an excrescence.

long ton. A unit of weight equal to 2240 lb.

longwall coal-cutting machine (*Mining*). A machine with a rotating toothed-bar or disc for undercutting a long face of coal.

long waves (*Radio*). Electromagnetic waves whose wavelength is more than 1000 metres.

longeron, lon^{g}-zhe-ron^{g}' (*Aero.*). The main longitudinal member of a fuselage or nacelle, when of girder construction.

longi-, *usually* lon'ji- (Latin *longus*, long). A prefix used in the construction of compound terms; e.g. *longirostral*, having a long beak.

lon'gicorn (*Zool.*). Having elongate antennae, as some Beetles.

longipen'nate (*Zool.*). Having elongate wings or feathers.

longiros'tral (*Zool.*). Having a long beak or rostrum.

longitude, celestial and **terrestrial.** See under **latitude.**

longitude (*Surv.*). (1) Terrestrial longitude (see under **latitude**).—(2) The perpendicular distance of the mid-point of a survey line from the reference meridian.

longitude, libration in (*Astron.*). A phenomenon by which, owing to the uniform rotation of the moon on her axis combined with her non-uniform orbital motion, an observer on the earth sees more, now on the east and now on the west, of the lunar surface than an exact hemisphere. See **librations.**

longitudinal (*Aero.*). A girder that runs fore and aft on the outside of a rigid airship frame. Longitudinals connect together the outer rings of the transverse frames.

longitudinal clinometer (*Aero.*). An instrument that indicates the angle between the longitudinal axis of an aircraft and the horizontal. Sometimes called a FORE-AND-AFT LEVEL. (Not to be confused with *incidence indicator*.)

longitudinal currents (*Elec. Comm.*). Currents which travel along both legs of a circuit in parallel; e.g. interfering radio-frequency currents, and unbalance currents in line and measuring circuits. Generally undesired, but usefully employed in phantom circuits. Cf. *loop current.*

longitudinal frame (*Ship Constr.*). A stiffening member of a ship's hull disposed longitudinally, as opposed to a tranverse frame. It is supported at ends by either bulkheads or web frames, disposed transversely.

longitudinal joint (*Carp.*). A joint used to secure two pieces of timber together in the direction of their length.

Longmyn'dian Series (*Geol.*). A thick series of sedimentary rocks occurring in the Longmynd of Shropshire; believed to be Pre-Cambrian in age. The Eastern Longmyndian consists essentially of slaty rocks; the Western, of red feldspathic sandstones (arkoses).

lonk (*Textiles*). Wool that comes from the large type of mountain sheep of the same name, reared on the Lancashire and Yorkshire moorlands.

loo, low (*Vet.*). See **foot rot.**

loom (*Textiles*). A machine for weaving cloth, in which two sets of threads, *warp* and *weft*, are interlaced.

loom and spindle oils (*Lubricants*). The name given to oils of low viscosity, which are suitable for use in textile industries.

looming (*Meteor.*). The vague enlarged appearance of objects seen through a mist or fog, particularly at sea.

looming or **healding** (*Weaving*). The operation of drawing the threads of the warp through the eyes of the heald shaft, in the order arranged, prior to weaving; it may also include knotting and twisting.

loop (*Aero.*). An aeroplane manœuvre consisting of a complete revolution about a lateral axis, with the normally upper surface of the machine on the inside of the path of the loop. See also **inverted loop.**

loop (*Cinema.*). The slack which must be left between claws and sprocket wheels in a camera or projector, so that the intermittent motion arising from the one can be taken up before the film takes up the uniform motion of the other.

loop (*Elec. Comm.*). The *go* and *return* of an electrical circuit. The *loop current* is the normal current in an electrical two-wire circuit.

loop (*Radio*). See **antinode.**

loop antenna (*Radio*). See **frame antenna.**

loop cable (*Elec. Comm.*). The same as *twin cable.*

loop current (*Elec. Comm.*). The normal current which flows round a loop, *go* along one leg of the circuit, *return* along the other; *longitudinal currents* (q.v.) flow along both legs in parallel, and return *via* earth.

loop-dialling (*Auto. Teleph.*). The normal subscriber dialling, whereby trains of impulses are set up by interrupting the loop current from the exchange.

loop direction-finder (*Radio*). See **frame direction-finder.**

loop film (*Cinema.*). The same as *band film* or *cycle film.*

loop galvanometer (*Elec. Eng.*). A sensitive galvanometer in which the moving element is a

U-shaped current-carrying loop of aluminium foil, the two sides of the loop being in magnetic fields of opposite direction.

loop pile (*Textiles*). A surface covering, on a foundation texture, consisting of loops of thread formed usually by an extra warp. See **pile.**

loop resistance (or **impedance**) (*Elec. Comm.*). The total resistance or impedance of a circuit, from the sending end along the *go* wire and along the *return* wire or earth return.

loop test (*Elec. Eng.*). A method of test used for locating faults in electric cables. The faulty conductor is made to form part of a closed circuit or loop, an adjacent sound conductor usually forming another part.

See **Allen's— Murray— Varley—**

loop tuning error (*Radio*). The error in the bearings given by a direction finder, if the loop is improperly tuned.

loop yarn (*Textiles*). A fancy yarn, with small loops; composed of three threads folded together, one of which is an effect thread and forms the loops, which are bound by another thread.

looped filament (*Illum.*) A filament arranged in the form of a large helix of one or more turns; usually employed for carbon filament lamps.

looping-in (*Elec. Eng.*). A term used in wiring work to denote a method of avoiding the use of a tee-joint by carrying the conductor to and from the point to be supplied.

loose butt hinge (*Join.*). A butt hinge in which one leaf may be lifted from the other, enabling, e.g., a door to be easily removed.

loose centres (*Eng.*). Heads similar to the tailstock of a lathe; used for supporting work on the table of a planing machine, etc., so that it may be rotated.

loose coupler (*Radio*). An obsolete tuning system, which comprised two solenoids, sliding one within the other and forming part of two resonant circuits magnetically coupled.

loose coupling (*Elec. Eng.*). See **weak coupling.**

loose coupling (*Eng.*). A shaft coupling capable of instant disconnexion, as distinct from a *fast coupling*. See **claw coupling.**

loose eccentric (*Eng.*). An eccentric used on small reversing steam-engines. It rides freely on the shaft but is located by either of two stops on the shaft, which position and drive it for ahead- and reverse-running respectively.

loose gland (*Eng.*). A ring used in making an *expansion joint* (q.v.) between hot-water pipes. It slides on the spigot and compresses a rubber ring against the socket, to which it is bolted.

loose-key switch (*Elec. Eng.*). See **detachable-key switch.**

loose-leaf (*Bind.*). A binding system in which separate leaves are held together within a cover by means of a spring, ring, spiral, or other device, by unlocking which a leaf may be removed or inserted at any point.

loose pulley (*Eng.*). A pulley mounted freely on a shaft; generally used in conjunction with a *fast pulley* (q.v.) to provide means of starting and stopping the shaft by shifting the driving belt from one to the other.

loph (*Zool.*). A crest connecting the cusps of a molar tooth.

lopho- (Greek *lophos*, crest). A prefix used in the construction of compound terms; e.g. *lophocalthrops*, a sponge spicule with crested rays.

lophobran'chiate (*Zool.*). Having tuft-like, crest-like, or lobe-like gills.

lophocer'cal (*Zool.*). Having the caudal fin ridge-like and without rays.

loph'odont (*Zool.*). (Of Mammals) having cheek teeth with transverse ridges on the grinding surface.

lo'phophore (*Zool.*). An extrovert, bearing usually a ring of ciliated tentacles, found surrounding the mouth in certain aquatic animals of sedentary habit.

lophos'teon (*Zool.*). A sternal keel, as in *Carinatae.*

lophotrich'ous (*Biol.*). Said of organisms which have the flagella in one group arising from a single point on the surface of the cell.

lop'oliths (*Geol.*). Igneous intrusions having the form of a concavo-convex lens, thickest in the centre and tapering away in all directions; formed probably by the sagging downwards of an intrusion of laccolithic form. The great Bushveld intrusion in S. Africa is a good example.

lo'rate (*Bot., Zool.*). Shaped like a strap.

lor'doscolio'sis (*Med.*). A deformity of the spine in which *lordosis* (q.v.) is associated with lateral curvature of the spine.

lordo'sis (*Med.*). Deformity of the spine in which there is an increase of the forward convexity of the lower half of the spinal column.

lore (*Zool.*). In Birds, the space between the beak and the eye.—*adj.* **loral.**

Lorentz-Lorenz equation (*Chem.*). The equation by which molecular refractivity is defined:

$$[R]=\frac{n^2-1}{n^2+2}\cdot\frac{M}{\rho},$$

where $[R]$ is the molecular refractivity, n is the refractive index, M is the molecular weight, ρ is the density.

Lorenz apparatus (*Elec. Eng.*). A delicate apparatus for the absolute determination of the value of a resistance. A metal disc is rotated in an accurately known uniform field, and the e.m.f. produced between its centre and its periphery is balanced against the drop of potential caused by the field-producing current in the resistance to be measured.

Lorenzini's ampulla, —tsē'ne (*Zool.*). In *Selachii*, a large ampulla opening to the exterior by a pore, filled with mucus and innervated by the lateralis nerve; believed to subserve a pressure sense.

lo'rica (*Bot.*). An obsolete alternative for *testa.*—(*Zool.*) In *Rotifera* and *Protozoa*, a rigid inflexible case surrounding and protecting the body.—*adj.* **loricate.**

Lorica'ta (*Zool.*). An order of Reptiles having upper and lower temporal arcades, a hard palate, an immovable quadrate, loose abdominal ribs, socketed teeth; large powerful amphibious forms. Crocodiles, Alligators, Caimans, Gavials.

lorry or **lurry** (*Mining*). A movable bridge at the top of a sinking shaft.

lo'rum (*Zool.*). Any strap-shaped structure: in *Insecta*, a flexible transverse band supporting the base of the submentum.—*adj.* **lorate.**

Loschmidt number, losh'mit (*Chem.*). The number of molecules per c.c. in a gas at a standard pressure of one atmosphere at 0° C.; it is the same for all gases, with the approximate value of $2{\cdot}7\times10^{19}\ \mathrm{cm}^{-3}$.

loss (*Elec. Comm.*). The negative of gain in a transmission system; measured by the ratio, in decibels, of the output power level to the input power level of the whole or of a part of the system. Realised in an attenuator pad, consisting of a resistance-network, introducing a known loss when inserted in a line of specified impedance level. Cf. *gain.*

See **insertion— reflection—**
interaction— transmission—

loss of charge method (*Elec. Eng.*). A method of measuring very high resistances. The resistance is placed across the terminals of a charged condenser and the rate at which the charge leaks away is observed.

Lossiemouth Beds (*Geol.*). Well-bedded yellow sandstones, somewhat calcareous, occurring in the Elgin district on the south side of the Moray Firth in Scotland. Their Triassic age is proved by the occurrence of reptilian remains, the rock being sometimes known as REPTILIAN SANDSTONE.

lost-wax process (*Founding*). A process used in statuary founding. The figure is modelled in wax over a core, and then covered in plaster. The wax is melted out after the plaster has set and is replaced by the metal casting.

lot (*Cinema.*). The whole area of studios, workshops, and neighbouring locations in a motion-picture producing organisation.

lo′tic fauna (*Ecol.*). Animals living in running waters, such as rivers and streams.

loudness (*Acous.*). The subjective measure of the intensity of a sound, music, or noise. This subjective measure cannot be translated into objective measurement, but equalities of loudness can be adjusted subjectively.

loudness contour (*Acous.*). Lines drawn on the audition diagram of the average ear which indicate the intensities of sounds that appear to the ear to be equally loud. In an objective sound-level meter, any component in the applied sound is referred to the reftone by the use of these loudness contours.

loudness level (*Acous.*). The *loudness level* of a specified sound is the intensity of the reference tone, 1000 cycles per second, on the phon scale, which is adjusted to equal, in apparent loudness, the specified sound. The adjustment of equality is made either subjectively, or objectively, as in a *noise-meter* (q.v.).

loudspeaker (*Acous.*). An electro-acoustic transducer which accepts transmission currents and is particularly designed for radiating sound-waves for audition by a number of persons, as contrasted with the telephone receiver which is useful to one person only.

See **baffle—**
balanced-armature—
Blatthaller—
Brown—
condenser—
cone—
directional—
electrodynamic—
electrostatic—
horn—
inductor—
moving-coil—
moving-iron or -armature—
mushroom—
open-diaphragm—
pleated-diaphragm—
reed—
Riffel—
Schlenke—
tweeter—
Vogt—
Voigt—
Weil—
cellular horn
closed-diaphragm
Kone.

loudspeaker response (*Acous.*). The response of a loudspeaker is the response measured over its operating frequency range and in a particular direction. See **response.**

loudspeaking receiver (*Acous.*). The driving unit which is attached to a horn to form a complete loudspeaker. The unit may contain any moving-coil or moving-iron mechanism.

Loup River Series, loo (*Geol.*). Terrestrial deposits of Miocene age occurring in western N. America; famous for their rich vertebrate fauna, including several ancestors of the horse.

louping ill (*Vet.*). A filterable-virus infection of sheep, which is transmitted by ticks.

louvre or **louver,** loo′ver (*Build.*). A window space across which are sloping slats fixed horizontally, with spaces between for ventilation.

love arrows (*Min.*). See **flèches d'amour.**

low (*Meteor.*). A region of low pressure, or a *depression* (q.v.).

low (*Print.*). Type or blocks which are below the level of the forme surface are said to be *low*, and must be adjusted by underlaying or overlaying.

low-frequency amplifier (*Teleph.*). An amplifier for audio frequencies.

low-loading amplifier (*Elec. Comm.*). A more recent name for a *loaded push-pull amplifier* (q.v.).

low machine (or **mill**) **finish** (*Paper*). See **calendered paper.**

low melting-point alloys (*Met.*). See **fusible alloys.**

low-pass filter (*Elec. Comm.*). A filter which passes currents having frequencies lower than a nominal cut-off frequency, and highly attenuates those with frequencies above.

low-power modulation (*Radio*). A system of modulation used in radio-telephone transmitters, in which the high frequency oscillations are generated and modulated at a low power level, being subsequently amplified to the required level for transmission from the antenna. Cf. *high-power modulation.*

low-pressure cylinder (*Eng.*). The largest cylinder of a multiple-expansion steam-engine (e g. the third of a triple-expansion engine), in which the steam is finally expanded.

low red heat (*Met.*). A temperature between 550° and 700° C.

low-stop filter (*Elec. Comm.*). Same as *high-pass filter* (q.v.).

low tension (*Radio*). A term loosely applied to the currents and voltages associated with the filament or heater circuits of a thermionic tube.

low-tension battery (*Radio*). The battery which supplies the filament or heater current to a thermionic tube. See **A-battery.**

low-tension detonator (*Elec. Eng.*). The usual form of detonator, in which a charge is fired by heating a wire by an electric current.

low-tension ignition (*Elec. Eng.*). Electric ignition of the charge in the cylinder of an I.C. engine by the interruption of a current-carrying circuit inside the cylinder, no special means being employed to produce a high-voltage spark as in high-tension ignition.

low-tension magneto (*Elec. Eng.*). A magneto for producing the current impulses necessary in a low-tension ignition system.

low-volt release (*Elec. Eng.*). See **under-voltage release.**

low voltage (*Elec. Eng.*). A term used to denote any voltage not exceeding 250 volts.

low warp (*Textiles*). A term used to indicate a small number of threads per inch in the warp of a woven fabric.

low-water alarm (*Eng.*). An arrangement for indicating that the water-level in a boiler is dangerously low. See **low-water valve.**

low-water valve (*Eng.*). A boiler safety valve which is opened by a float in the water if the level of the latter falls dangerously low; generally fitted to stationary boilers such as the Lancashire.

lower case (*Typog.*). The type *case* (q.v.) in which small letters are kept (cf. *upper case*). Abbreviated (l.c.), the term is used as a proof-correction mark to indicate that a letter is to be changed from a capital to a small letter.

lower critical velocity (*Hyd.*). The critical velocity of change from eddy to viscous flow.

lower culmination (*Astron.*). See under **transit.**

lower deck (*Ship Constr.*). A deck below the weather deck. The term has no legal definition status, and is usually applied to a partial deck which acts simply as a platform and contributes nothing to main longitudinal strength.

Lower Greensand (*Geol.*). Marine strata of Lower Cretaceous age, forming the inner ring of hills in the Weald. They are also present in the Isle of Wight, and have a narrow outcrop extending from Leighton Buzzard to Hunstanton.

They consist mainly of sands, which contain bands of sandy limestone (Kentish Rag), chert, and fuller's earth. When unweathered, the beds are greenish in colour, owing to the presence of the mineral glauconite, but in surface exposures they are usually shades of red, buff, and brown, owing to the alteration of the glauconite.

lower layer (*Zool.*). In developing meroblastic ova, the secondary endoderm, which becomes separated from the under side of the blastoderm.

Lower Limestone Group (*Geol.*). A division of the Lower Carboniferous rocks of northern England; it consists of shales with limestones, delimited by the Dun Limestone at the base and the Oxford Limestone at the top, and is thus equivalent to the lower part of the Upper Bernician.

Lower Limestone Shales (*Geol.*). An obsolete term for the thinly bedded strata occurring at the base of the Carboniferous Limestone in England; not everywhere of the same age.

lower mean hemispherical candle-power (*Illum.*). See **mean hemispherical candle-power.**

lower transit (*Astron.*) Another name for *lower culmination* (see **culmination**).

lowering wedges (*Civ. Eng.*). See **striking wedges.**

lowry (*Rail.*). An open form of box-car.

lozenge. A rhombus shape.—(*Med.*) A medicated sweetmeat given usually for affections of the mouth or throat.

L.T. (*Radio*). Abbrev. for *low tension.*

Lu (*Chem.*). The symbol for *lutecium.*

lubricant. A substance capable of reducing friction between bearing surfaces in relative motion, either by virtue of separating them by a viscous fluid film (oil) or by an unctuous solid (graphite), or by providing an adsorbed layer of polarised oil molecules at the metallic surfaces.

lubrication. The use of a lubricant or lubricants (see above).

See **boundary—** **fluid—**

lu'bricous (*Bot.*). Having a slippery surface.

Lucas sounder (*Ocean.*). See **sounder.**

Lu'ciae (*Zool.*). See **Pyrosomatida.**

lucif'erase (*Zool.*). An oxidising enzyme which occurs in the luminous organs of certain animals and acts on luciferin to produce luminosity.

lucif'erin (*Zool.*). A protein-like substance which occurs in the luminous organs of certain animals and is oxidised by the action of luciferase.

luciph'ilous (*Ecol.*). Seeking light.

luciphu'gous (*Ecol.*). Shunning light.

Lüders lines (*Met.*). See **flow lines.**

Ludlow Beds (*Geol.*). A rock series in the Silurian System, often referred to as the LUDLOVIAN SERIES, lying above the Wenlockian, and divisible into the Lower Ludlow Group, the Aymestry Group, and the Upper Ludlow Group. The typical Ludlovian rocks are richly fossiliferous greenish mudstones and shales.

Ludlow Bone Bed (*Geol.*). A thin band, usually less than 6 in. in thickness, occurring at the base of the Downtonian stage of the Devonian System, and consisting largely of spines and fragmental hard parts of fossil fishes such as *Onchus.* Occurs in the Ludlow district of S. Shropshire.

Ludwig's angina, lood'vihh (*Med.*). Purulent infection in the region of the submaxillary gland below the lower jaw, the infection spreading into the floor of the mouth and towards the chin.

lues, loo'ēz (*Med.*). A plague or pestilence. The term is now synonymous with *syphilis* (q.v.).—*adj.* **luetic.**

luffer-boarding (*Build.*). Sloping slats arranged as in a *louvre* (q.v.).

luffing-jib crane (*Eng.*). A common form of jib crane, in which the jib is hinged at its lower end to the crane structure, so as to permit of alteration in its radius of action. Also called a DERRICKING JIB CRANE. See **level luffing-jib crane.**

lug (*Elec. Eng.*). On an accumulator plate, a projection to which the electrical connexion is made.

See **commutator—** **terminal—**

lug (*Eng.*). See **ear.**

lug sill (*Build.*). A *sill* (q.v.) which is of greater length than the distance between the jambs of the opening, so that its ends have to be built into the wall.

lu'garite (*Geol.*). A form of analcite-gabbro, occurring rarely among the basic intrusive rocks of Scotland; named from the Lugar sill in Ayrshire.

lum (*Mining*). A chimney sometimes erected at the top of an upcast shaft as a means of increasing the ventilating current.

lumachel'la (*Geol.*). The trade name for an ornamental marble containing opalised fossil shells.

lumbago (*Med.*). A rheumatic affection of the muscles and ligaments in the lumbar region or lower part of the back.

lum'bar (*Zool.*). Pertaining to, or situated near, the lower or posterior part of the back; as the *lumbar* vertebrae.

lumber (*Timber*). The term employed in the United States and Canada for sawn wood of all descriptions.

lu'men (*Bot.*). The space enclosed by the cell walls; used especially when the contents of the cell have disappeared.

lumen (*Zool.*). The central cavity of a duct or tubular organ.

lumen (*Light*). A unit of luminous flux defined as the amount of light energy emitted per unit space angle per second by a source of intensity one international candle. One lumen therefore falls on unit area at unit distance from one international candle, and the candle emits altogether 4π (or 12·57) lumens. See **luminous flux.**

lumen-hour (*Illum.*). A unit for quantity of light; it is the amount of light emitted by a lamp having an output of 1 *lumen* (q.v.) and operating for one hour.

lu'meter (*Illum.*). A term often used to denote a portable photometer for measuring illumination.

luminaire' (*Illum.*). A term sometimes used in America to denote an electric-light fitting.

lumines'cence (*Chem., Min.*). The emission of light as a result of causes other than high temperature; e.g. the effect of ultra-violet radiation on certain chemical compounds. Cf. *incandescence.*

lu'minophore (*Chem.*). (1) A substance which emits light at room temperature.—(2) A group of atoms which can make a compound luminescent.

luminosity (*Astron.*). The measure of the amount of light actually emitted by a star, irrespective of its distance; synonym for *absolute magnitude.*—(*Light*) See **intrinsic brilliancy.**

luminosity curve (*Light*). The curve which shows the spectral distribution of the light energy emission from a light-source.

See **photopic—*** **scotopic—***

luminosity factor (*Illum.*). The ratio of the total luminous flux emitted by a light source at a given wavelength to the total energy emitted.

luminosity function (*Astron.*). One of the formulae sought in statistical investigations of the heavens, and found by Kapteyn, which expresses what proportion of the stars per unit volume, say one million cubic parsecs, have absolute magnitudes lying in successive equal intervals.

luminous dial (*Horol.*). A dial the figures or chapters of which have been painted with a luminous paint containing radium salts.

luminous efficiency (*Illum.*). The ratio of the light emitted by a source of light to the energy input; usually expressed in lumens per watt for electric lamps.

luminous flux (*Illum.*). The rate of passage of radiant energy, i e. the quantity of light emitted from a light source.

luminous flux density (*Illum.*). The quantity of luminous flux passing through a normal unit area.

luminous hands (*Horol.*). Hands which have been painted or filled with luminous paint.

luminous intensity (*Illum.*). The amount of luminous flux emitted by a point source of light per unit solid angle. Also called CANDLE-POWER.

luminous paint (*Chem.*). The sulphides of calcium, barium, strontium, with traces of heavy metal impurities, added to a suitable medium, such as a varnish. They glow after exposure to light. Radioactive paints contain mesothorium or radiothorium, and do not require previous exposure to light.

luminous sulphides (*Chem.*). See **luminous paint.**

Lummaton Shell Bed (*Geol.*). A richly fossiliferous band occurring in the Upper Devonian Limestones at Lummaton Quarry in the Torquay district of E. Devonshire.

Lummer-Brodhun photometer, loom'er brod'hoon (*Illum*). A form of contrast photometer in which, by an arrangement of prisms, the surfaces illuminated respectively by the standard source and the source under test are next to one another, thus enabling an easy comparison to be made.

Lummer-Gehrcke interferometer, —gār'ke (*Light*). A very accurately worked, plane, parallel-sided glass plate, so arranged that light is internally reflected in a zig-zag path through the plate. The rays which emerge into the air at each reflection are in a condition to produce interference fringes of a very high order. The instrument is used for studying the fine structure of spectral lines. See **interference fringes.**

lump (*Worsted*). Light-weight fabric which has been made greater than the usual length.

lumps (*Vet.*). See **hypopteronosis cystica.**

lump lime (*Build*). The *quicklime* (q.v) produced by burning limestone in a kiln.

lumped constant (*Elec. Comm.*). An electrical magnitude may be taken as *lumped* or *concentrated* when its dimensions are small in comparison with the wavelength propagation of currents in it. Cf. *distributed constant.* See **primary constant.**

lumped voltage (*Thermionics*). A fictitious voltage formed by adding to the anode voltage of a multi-electrode thermionic tube the sum of the products of the various intermediate electrode voltages and the respective amplification factors associated with these electrodes. The total space current is a function of this quantity.

lunar bows (*Meteor.*). Bows of a similar nature to *rainbows* (q.v.) but produced by moonlight.

lunar distances (*Astron.*). The name applied to a method, much used in the past at sea, for determining a ship's longitude. It consisted of a comparison between the observed angular distance of the moon from a star, at a known local time, with the tabulated angular distance at a certain Greenwich time; rendered obsolete by radio.

lunar grid valve (*Thermionics*). See **inverted thermionic valve.**

lunar month (*Astron.*). See **synodic month.**

lu'nate, lu'nulate. Crescent-shaped; shaped like the new moon.

lunation (*Astron.*). See **synodic month.**

lunette (*Build.*). (1) A semicircular window or pediment over a doorway.—(2) A small arched opening in the curved side of a vault.

lung (*Zool.*). The respiratory organ in air-breathing Vertebrates. The lungs arise as a diverticulum from the ventral side of the pharynx; they consist of two vascular sacs filled with constantly renewed air.

lung book (*Zool.*). An organ of respiration in some *Arachnida* (Scorpions, Spiders), consisting of an air-filled cavity opening on the ventral surface of the body; it contains a large number of thin vascular lamellae, arranged like the leaves of a book.

lungsickness (*Vet.*). See **pleuropneumonia.**

lungworm disease (*Vet.*). See **husk.**

Lunge nitrometer, loong'e (*Chem.*). Apparatus devised for the estimation of oxides of nitrogen. May be used for other analytical processes which involve the measurement of a gas.

luni-solar precession (*Astron*). See **precession of the equinoxes.**

luniti'dal interval. The time interval between the moon's transit and the next high-water at a place.

lu'nule, lu'nula (*Zool*). A crescentic mark.—*adj.* **lu'nular.**

lu'pinine (*Chem.*). $C_{10}H_{19}ON$, an alkaloid of unknown constitution, obtained from the seeds of various species of *Lupinus*; rhombic crystals, m p. 69° C., b.p. 255°-257° C.

lupino'sis (*Vet.*). Poisoning of sheep, goats, cattle, and horses, by plants of the genus *Lupinus*.

lu'pus vulga'ris (*Med.*). Tuberculous infection of skin and mucous membranes, with the formation of nodules which later may ulcerate.

lurid (*Bot.*). Dingy yellowish-brown.

lurry (*Mining*). See **lorry.**

lustre (*Min.*). This depends upon the quality and amount of light that is reflected from the surface of a mineral. The highest degree of lustre in opaque minerals is *splendent*, the comparable term for transparent minerals being *adamantine* (i.e. the lustre of diamond). *Metallic* and *vitreous* indicate less brilliant lustre, while *pearly*, *resinous*, and *dull* are self-explanatory terms covering other degrees of lustre.

lustre (*Pot.*). A glaze applied to faience and porcelain in a thin layer in order to give a smooth, glistening surface, usually with metallic reflections.

lustre cloths (*Textiles*). Fabrics made from cotton warp and from weft consisting of mohair or lustre worsted; the cloth is either plain or figured, with lustrous surface.

lustring (*Textiles*). A process of friction-polishing applied to degummed, or nearly degummed, silk yarns, while under tension.

lute. A straightedge for levelling off clay in a brick mould by removing the excess.

lute'al (*Zool.*). Pertaining to, or resembling, the *corpus luteum* (q.v.).

lute'cium (*Chem.*). Symbol, Lu. A metallic element, a member of the rare earth group. At. no. 71, at. wt. 175·0. It occurs in bloomstrandite, gadolinite, polycrase, and xenotime.

lutein, lū'te-in (*Chem.*). Leaf xanthophyll. A yellow unsaturated compound occurring in the leaves and petals of various plants; formula, $C_{40}H_{56}O_2$. Also one of the colouring matters of egg yolk. It belongs to the group of carotenoid pigments.

lutein cells (*Zool.*). Peculiar cells occurring in the corpus luteum of the ovary.

luteino'ma (*Med.*). A tumour occurring in the ovary, composed of cells resembling those of the corpus luteum.

lu'teous (*Bot.*). Of a good yellow colour.

lutes'cent (*Bot.*). Pale-yellow.

lu'thern (*Build.*). A vertical window set in a roof.

lu'tidines (*Chem.*). Dimethyl-pyridines, which all occur in bone-oil and in coal-tar; general formula, $C_5(CH_3)_2H_3N$.

luting (*Pot.*). The process of affixing pre-cast or modelled ornament to ceramic bodies by means of liquid clay, before glazing and firing.

lux (*Light*). A unit of illumination, sometimes called a *metre-candle*. It is defined as the illumination produced by light from a source of unit intensity (one international candle) falling normally on a surface at a distance of one metre. See **illumination.**

luxmeter (*Illum.*). A name given to certain portable photometers which operate on the contrast principle and employ a variable aperture.

luxation (*Med.*). Dislocation.

luxul'yanite, luxul'liante (*Geol.*). A rare type of granite in which tourmaline, in stellate groups, replaces the normal coloured minerals, the other essential constituents being red orthoclase, partly replaced by tourmaline, and quartz. The rock is named from the original locality in Cornwall.

lycan'thropy (*Med.*). An insane delusion of a patient that he or she is a wolf.

lych (or **lich**) **gate** (*Build.*). A roofed gateway entrance to a churchyard.

lychnid'iate (*Zool.*). Phosphorescent; light-producing.

ly'coper'sicin, ly'copin (*Bot.*). A red pigment, allied to carotin, occurring in tomatoes and red pepper.

Lycop'sida (*Bot.*). A group of *Pteridophyta*; the plants have small leaves, and there are no leaf gaps in the stele of the stem.

Lydian stone, lydite, or **touchstone** (*Min.*). A highly siliceous rock, normally black in colour, although surface alteration may change this to grey. In England lydite occurs as small pebbles in many of the newer sedimentary rocks; for example, in the London Basin. They are uniformly fine-textured and even-grained, and frequently have a high polish. These lydites are rolled fragments of chert, derived from the Lower Carboniferous and Jurassic rocks. In other countries these terms have been applied to silicified argillaceous sedimentary rocks, such as flinty slates. The name *touchstone* has reference to the use of lydite as a streak plate for gold; the colour left on the stone after rubbing the metal across it indicates to the experienced eye the amount of alloy. It does not splinter.

lye (*Mining*). See **double parting.**

lying money (*Mining*). An allowance to piece-workers rendered idle by special circumstances.

lying panel (*Join.*). A door panel whose width is greater than its height.

lying (or **laying**) **press** (*Bind.*). A small portable screw-press in which books are held firmly during various operations.

Lyman series (*Phys.*). One of the hydrogen series occurring in the extreme ultra-violet region of the spectrum. The series may be represented by the formula $\nu = N\left(\frac{1}{1^2} - \frac{1}{n^2}\right)$, $n = 2,\ 3,\ 4\ldots$ (see **Balmer series**), the series limit being at wave number $N = 109678$, which corresponds to wavelength 912·6 A.U.

lymph-, lympho- (Latin *lympha*, water). A prefix used in the construction of compound terms; e.g. *lymphogenic*, produced in a lymph gland.

lymph (*Zool.*). A colourless circulating fluid occurring in the lymphatic vessels of Vertebrates and closely resembling blood plasma in composition.—*adj.* **lymphatic.**

lymph gland (*Zool.*). An aggregation of reticular connective tissue, crowded with lymphocytes, surrounded with a fibrous capsule, and provided with afferent and efferent lymph vessels.

lymph heart (*Zool.*). A contractile portion of a lymph vessel, which assists the circulation of the lymph and forces the lymph back into the veins.

lymphadeni'tis (*Med.*). Inflammation of lymph glands.

lymphad'enoid (*Med.*). Resembling the structure of a lymphatic gland.

lymphadeno'ma (*Med.*). Hodgkin's disease. A disease characterised by the progressive enlargement of the lymph glands and lymphoid tissue, anaemia, and enlargement of the spleen.

lymphadeno'sis (*Med.*). See **lymphocythaemia.**

lymphangiec'tasis (*Med.*). Dilatation and distension of lymphatic vessels, due usually to obstruction.

lymphangio'ma (*Med*). A nodular tumour consisting of lymphatic channels.

lymphangi'tis (*Med.*). Inflammation of a lymphatic vessel or vessels.

lymphangitis, epizootic (*Vet.*). A chronic contagious lymphangitis of horses, due to infection by *Cryptococcus farciminosus.*

lymphangitis, ulcerative (*Vet.*). A chronic contagious lymphangitis of horses, due to infection by *Corynebacterium pyogenes* (Bacillus of Preisz-Nocard).

lymphat'ic system (*Zool.*). In Vertebrates, a system of vessels pervading the body, in which the lymph circulates and which communicates with the venous system; lymph glands and lymph hearts are found on its course.

lymph'oblast (*Zool*). A large cell which occurs in a lymph gland and which, by subdivision, gives rise to lymphocytes.

lymph'ocyte (*Zool.*). A type of leucocyte formed largely in the lymph-glands and the spleen, characterised by hyaline basiphil cytoplasm and slight phagocytic powers.

lymphocythae'mia, lymphocythe'mia (*Med.*). Abnormal increase in the number of lymphocytes in the blood, associated with hyperplasia of lymphatic tissue. Also termed LYMPHATIC LEUKAEMIA, LYMPHADENOSIS.

lymphocytope'nia (*Med.*). Diminution, below normal, of the number of lymphocytes in the blood.

lymphocyto'sis (*Med.*). Increase in the number of lymphocytes in the blood, as in certain infections.

lymphogenous, —oj'en-us (*Zool.*). Lymph-producing.

lymphogranulo'ma. See **lymphadenoma.**

lymphogranuloma inguina'le (*Med.*). Poradenitis venerea. A venereal infection thought to be due to a filter-passing virus; characterised by enlargement of the glands in the groin; common in the tropics.

lymphoid tissue (*Zool.*). The type of reticular connective tissue, containing lymphocytes and lymphoblasts in the interstices, which occurs in lymph glands.

lympho'ma (*Med.*). A tumour consisting of lymphoid tissue.

lymphosarco'ma (*Med.*). A sarcoma arising in lymphatic glands or lymphoid tissue.

lymphu'ria (*Med.*). The presence of lymph in the urine.

lynx (*Furs*). The dressed skin of a lynx, one of the cat family. The fur of some of the lynxes is of very fine quality and is occasionally dyed black. The natural fur of the Canada lynx is shaggy and grey in colour; that of the Southern Bay lynx is reddish or yellowish, sometimes spotted; the spotted Spanish lynx has a fine fur.

ly'ocyto'sis (*Zool.*). Histolysis by the action of enzymes secreted outside the tissue, as in Insect metamorphosis.

lyol'ysis (*Chem.*). The formation of an acid and a base from a salt by interaction with the solvent; i.e. the reaction which opposes neutralisation.

Lyom'eri (*Zool.*). An order of *Neopterygii* comprising black, scaleless, abyssal marine forms, having an enormous mouth and a distensible stomach; capable of swallowing prey larger than themselves. Gulper Eels.

lyophil'ic colloid (*Chem*.). A colloid which is readily dispersed in a suitable medium, and may be re-dispersed after coagulation.

lyopho'bic colloid (*Chem*.). A colloid which is dispersed only with difficulty, yielding an unstable solution which cannot be re-formed after coagulation.

lyosorp'tion (*Chem*.). The adsorption of a liquid on a solid surface, especially of solvent on suspended particles.

lyotro'pic series (*Chem*.). Ions, radicals, or salts arranged in order of magnitude of their influence on various colloidal, physiological, and catalytic phenomena, an influence exerted by them as a result of the interaction of ions with the solvent. Cf. *Hofmeister series*.

lypes (*Mining*). Bad or dangerous roof in a mine.

ly'ra (*Zool*.). Any lyre-shaped structure; as a lyra pattern on a bone.

ly'rate (*Bot*., *Zool*.). Shaped like a lyre.—(*Bot*.) Said of a leaf which is pinnately lobed, and has a terminal lobe which is much larger than the lateral lobes.

lyr'iform organs (*Zool*.). Patches, consisting of well-innervated ridges of chitin, occurring on the legs, palpi, chelicerae, and body of various *Arachnida*; believed to be olfactory in function.

Lysholm-Smith torque converter (*Eng*.). A variable-ratio hydraulic gear of the Föttinger type, but in which multi-stage turbine blading gives high efficiency of transmission over a wide range; used in road and rail vehicles.

lysigenic, lysigenetic, lysigenous (*Bot*., *Zool*.). Said of a space formed by the breakdown and dissolution of cells. Also LYSOGENOUS.

ly'sin (*Zool*.). A substance which will cause dissolution of cells.

ly'sine (*Chem*.). $H_2N{\cdot}CH_2{\cdot}(CH_2)_3{\cdot}CH(NH_2)COOH$, a diamino-caproic acid, obtained from albuminous substances by decomposition with acids; casein yields 8%. Lysine is essential for animal growth.

Lysol (*Chem*.). A trade-name for a solution of cresols in soft soap. It is a well-known disinfectant.

ly'sozyme (*Bot*.). A substance of obscure nature, present in some plants; it has the power of killing bacteria, resembles an enzyme in some respects, but appears to be able to multiply itself

lys'sa (*Zool*.). In some Vertebrates, a cylindrical mass of muscle, cartilage, and connective-tissue, lying in the ventral part of the tongue.

lyssopho'bia (*Med*.) Morbid fear of contracting rabies, leading to the appearance of symptoms of this disease.

lyt'ta (*Zool*.) In *Carnivora*, a rod of cartilage or fibrous tissue embedded in the mass of the tongue.

M, μ

m- (*Chem.*). An abbrev. for (1) *meta-*, i.e. containing a benzene nucleus substituted in the 1.3 positions; (2) *meso-*, i.e. optically inactive by intramolecular compensation.

m-derived network or **filter** (*Elec. Comm.*). An electric wave filter element which is derived from a normal element by transformation, the aim being to obtain more desirable impedance characteristics than is possible in the prototype.

μ (*Chem.*). A symbol for (1) chemical potential; (2) dipole moment.

μ- (*Chem.*). A symbol signifying (1) *meso-*, i.e. substituted on a carbon atom situated between two hetero-atoms in a ring; (2) *meso-*, i.e. substituted on a carbon atom forming part of an intramolecular bridge.

μ (*Phys.*). The symbol for (1) index of refraction; (2) magnetic permeability; (3) the *micron* (q.v.).

μ (*Thermionics*). A symbol for *amplification factor* (q.v.).

M (*Chem.*). A general symbol for a metal or an electropositive radical.

M. or **M-** (*Chem.*). An abbrev. for *molar* (*concentration*).

M (*Chem.*). A symbol for *molecular weight.*

Ma (*Chem.*). The symbol for *masurium.*

macad'amised road (*Civ. Eng.*). A road whose surface is formed with broken stones of fairly uniform size rolled into a 6-10 in. layer, with gravel to fill the interstices.

maceration (*Zool.*). The process of soaking a specimen in a reagent in order to destroy some parts of it and to isolate other parts (as soaking the mouth-parts of an Insect in caustic potash solution in order to dissolve the fleshy parts and isolate the chitinous structures), or in order to soften it for dissection or section-cutting.

machicola'tions, match-i— (*Build.*). Apertures between the corbels of a projecting parapet, used in ancient castles to allow defenders to throw down missiles on attackers, and retained for reasons of ornament in some Gothic timbered houses.

machine (*Mech.*). A device for overcoming a resistance at one point by the application of a force at some other point. Typical simple machines are the inclined plane, the lever, the pulley, and the screw. See also **mechanical advantage, velocity ratio.**

machine, electric (*Elec. Eng.*). See **electric motor, electromagnetic generator, electrostatic generator.**

machine-finish(ed) (*Paper*). See **M.F., printing papers.**

machine-gun (*Small Arms*). An automatic weapon capable of sustained fire. It is fired from a mounting.

machine mining (*Mining*). Mechanised mining.

machine moulding (*Eng.*). The process of making moulds and cores by mechanical means, as, for example, by replacing hand-ramming by power-squeezing of the sand, or by the jolting of the box on a vibrating table. See **jolt-** (or **jar-**)**ramming machine, jolt-squeeze machine, sand slinger, squeezer.**

machine paper (*Paper*). A continuous web of paper made on the fourdrinier machine, the mould of which consists of a wire-cloth belt.

machine points (*Print.*). Iron pins used for obtaining correct register when printing sheets with uneven edges.

machine ringing (*Teleph.*). The normal ringing current which is placed on a subscriber's line to attract his attention. The currents are generated by a machine and interrupted by a suitable commutator.

machine riveting (*Eng.*). Clenching rivets by the use of compressed-air hammers or hydraulic riveters. See also **hydraulic riveter, pneumatic riveter.**

machine-room (*Print.*). That department of a printing establishment where the actual process of printing (by machine) is carried out.

machine switching (*Auto. Teleph.*). The same as *automatic telephone* (q.v.) system.

machine tools (*Eng.*).

See **drilling machine**
key-way tool
lathe
milling machine
planing machine
shaping machine
slotting machine.

machinery oils (*Lubricants*). Pale or red oils suitable for lubricating bearings, shafting, and cylinders (not steam). See also **cylinder oils, lubricant.**

machining (*Print.*). The operation of printing by machine.

machopol'yp (*Zool.*). See **nematophore.**

mackerel sky (*Meteor.*). Cirro-cumulus or alto-cumulus cloud arranged in regular patterns suggesting the markings on mackerel.

mackle (*Typog.*). A defective printed sheet, having a blurred appearance due to incorrect impression.—*adj.* **mackled.**

macle, makl (*Min.*). The French term for a *twin crystal*; in the diamond industry, more commonly used than *twin*, especially for twinned octahedra.

macr-, macro- (Greek *makros*, large). A prefix used in the construction of compound terms; e g. *macroglossate*, having a large tongue.

macramoe'ba (*Zool.*). In certain *Sarcodina*, a large amoebula stage probably representing a female gamete. Cf. *micramoeba*.

macran'er (*Zool.*). An abnormally large male ant.

macrer'gate (*Zool.*). An abnormally large worker ant.

macro-axis (*Crystal.*). The long axis in orthorhombic and triclinic crystals.

macroceph'aly, macrocepha'lia (*Med.*). Abnormal largeness of the head.

macrochae'tae (*Zool.*). In *Diptera*, the differentiated bristles.

macrocheil'ia (*Med.*). Abnormal increase in the size of the lips.

macrocheir'ia (*Med.*). Abnormally large hands.

macrochem'istry (*Chem.*). The study of the composition and chemical properties of matter in bulk.

macrocon'jugant (*Zool.*). In certain *Mastigophora*, the larger of a pair of conjugants.

mac'rocyte (*Zool.*). A large uninuclear leucocyte with great powers of mobility and phagocytosis.

macrodac'tyly, macrodactyl'ia (*Med.*). Congenital hypertrophy of a finger or fingers.

macrogam'ete (*Zool.*). The larger of a pair of conjugating gametes, generally considered to be the female gamete.

macrogame'tocyte (*Zool.*). In *Protozoa*, a stage developing from a trophozoite and giving rise to female gametes.

macrog'amy (*Zool.*). In *Protozoa*, syngamy between two full-grown individuals of the species.

macrogen'itoso'mia prae'cox (*Med.*). Excessive growth of the body, associated with precocious sexual development.

macrogloss'ia (*Med.*). Abnormal enlargement of the tongue.

macrogonid'ia (*Zool.*). In some *Mastigophora* (as *Volvox*), a gametocyte which will give rise to macrogametes.

mac'rogyne (*Zool.*). An abnormally large queen ant.

macrolecithal (*Zool.*). See **megalecithal.**

macrolym'phocyte (*Zool.*). A large type of lymphocyte occurring in bone-marrow.

mac'romere (*Zool.*). In a segmenting ovum, one of the large cells which are formed in the lower or vegetable hemisphere.

macrome'rozo'ite (*Zool.*). A stage in the life-cycle of certain *Haemosporidia*, arising by schizogony from a macroschizont.

macrono'tal (*Zool.*). Having a large thorax.

mac'ront (*Zool.*). In *Neosporidia*, a stage formed after schizogony which gives rise by fission to macrogametes.

macronu'cleus (*Zool*). In *Ciliophora*, the larger of the two nuclei which is composed of vegetative chromatin. Cf. *micronucleus.*

mac'rophage (*Zool.*). A *macrocyte* (q.v.): a large amoeboid phagocytic cell of the spleen pulp.

macro-photography (*Photog.*). The normal process of making enlarged prints from negatives.

macrophyll'ine (*Bot.*). Divided into, or having, large lobes.

macrophyr'ic, macroporphyrit'ic (*Geol.*). A textural term descriptive of medium to fine-grained igneous rocks containing phenocrysts more than 2 mm. in length. Cf. *microphyric.*

macrop'sia (*Med.*). The condition in which objects appear to the observer larger than they are, a symptom of hysteria or due to retinal disease.

macroschi'zont (*Zool.*). A stage in the life-cycle of certain *Haemosporidia.*

macroscop'ic. Visible to the naked eye.

macrosmat'ic (*Zool.*). Having a highly developed sense of smell.

mac'rosome (*Zool.*). A large protoplasmic granule or globule.

macrospher'ic (*Zool.*). See **megalospheric.**

macrosplanch'nic (*Zool.*). Having a large body and short legs; as a Tick.

mac'rospore (*Bot.*, *Zool.*). See **megaspore.**

macrospor'ophyll (*Bot.*). See **megasporophyll.**

macrosto'ma (*Med.*). Abnormal width of the mouth due to a defect in development.

mac'rostructure (*Met.*). The general arrangement of crystals in a solid metal (e.g. an ingot) as seen by the naked eye or at low magnification. The term is also applied to the general distribution of impurities in a mass of metal as seen by the naked eye after certain methods of etching.

macro'tous (*Zool.*). Having large ears.

macrotrich'ia (*Zool.*). Large setae occurring on the wings of certain Insects. Cf. *microtrichia.*

mac'ula, macule (*Bot.*, *Zool.*). A blotch or spot of colour: a small tubercle: a small shallow pit. —(*Med.*) A small discoloured spot on the skin, not raised above the surface.—*adjs.* **macular, mac'ulate, maculif'erous, macu'liform, mac'ulose.**

macula acu'stica (*Zool.*). The point in the sacculus and utriculus of the ear at which the nerve-fibres enter.

macula lu'tea (*Zool.*). See **yellow spot.**

Madagascar aquamarine (*Min.*). A strongly dichroic variety of blue beryl obtained, as gemstone material, from Madagascar.

Madagascar topaz (*Min.*). See **citrine.**

made ground (*Build.*). Ground formed by filling in natural or artificial pits with hardcore or rubbish.

Madeira topaz (*Min.*). A form of *Spanish topaz* (q.v.).

Madras muslin (*Textiles*). A woven fabric with opaque figuring on a plain gauze ground; used mainly for window curtains.

madrepor'ic canal (*Zool.*). See **stone canal.**

madreporic vesicle (*Zool.*). In *Echinodermata*, a small cavity which represents the right anterior coelomic sac of the larva.

madrepo'rite (*Zool.*). In *Echinodermata*, a calcareous plate with a grooved surface, perforated by numerous fine canaliculi and situated in an interambulacral position, through which water passes to the axial sinus.—*adj.* **madrepo'ric.**

Madura foot (*Med.*). Mycetoma. A disease, endemic in India and occurring also in other parts of the world, in which nodular, ulcerated swellings appear on the foot, due to infection with a fungus.

Maentwrog Beds, min-too'rog (*Geol.*). Flaggy slates forming the lowest division of the Lingula Flags in the Upper Cambrian rocks of N. Wales.

maestro, mī'strō (*Meteor.*). A fine-weather, non-autumn north-west wind in the Adriatic.

mafic (*Min.*). A mnemonic term for the ferromagnesian and other nonfelsic minerals actually present in an igneous rock.

Maftex (*Build.*). Trade-name for a building-board having good thermal insulation properties.

magazine (*Photog.*). The light-tight enclosure for retaining exposed or unexposed film; it is generally detachable from the camera proper, so that the latter need not be taken into the dark-room for loading and unloading.

magazine arc lamp (*Illum.*). A form of electric arc lamp having a number of carbons which are automatically brought into operation as the others burn away, so that the lamp can burn for long periods without attention.

magazine valve (*Cinema.*). The same as *fire-trap* (q.v.).

Magbestic (*Build.*). A jointless flooring composition made from magnesite.

Magellanic Clouds (*Astron.*). Two striking clusters of stars in the southern hemisphere, called respectively the *Larger* and the *Lesser Magellanic Cloud*; they have the appearance of being detached portions of the Milky Way, and are known to be very distant.

Magen'die's foramen (*Zool.*). In Vertebrates, an aperture in the roof of the fourth ventricle of the brain, through which the cerebro-spinal fluid communicates with the fluid in the spaces enclosed by the meningeal membranes.

magenta (*Chem.*). *Fuchsine* (q.v.).

magenta wax test (*Cables*). The paper tapes are unrolled and the oil extracted with petrol. A magenta water-dye then colours the papers except where wax has been formed. Traces of wax, ordinarily invisible, are shown up very clearly.

maggot (*Zool.*). An acephalous, apodous, eruciform larva such as that of certain *Diptera.*

magic lantern (*Photog.*). Obsolete name for a projection-lantern using lantern-slides.

magilp', magilph' (*Dec.*). A preparation of mastic varnish which has been diluted with linseed oil; used as a medium in the mixing of paints for fine work.

magma (*Geol.*). A comprehensive term given to the molten fluids and gaseous fractions which have been generated within the earth, and from which igneous rocks are considered to have been derived.

magmatic cycle (*Geol.*). See **igneous cycle.**

magna'lium (*Met.*). An aluminium-base alloy. Contains 1·75% copper and 1·75% magnesium. Tensile strength, 16-20 tons per sq. in., cold-worked 24-28 tons, resistant to corrosion, malleable, sp. gr. less than that of aluminium.

Magnascope (*Cinema.*). A projection arrangement whereby the projected picture can be altered in size while remaining in focus, the mechanism providing for the synchronous operation of the lenses with the movement of the mask surrounding the screen.

magnesia. See **magnesium oxide, periclase.**

magnesia alba (*Chem.*). Commercial basic magnesium carbonate.

magnesia-alum (*Min*) See **pickeringite.**

magnesia cement (*Chem.*). See **Sorel's cement.**

magnesia glass (*Glass*). Glass containing usually 3-4% of magnesium oxide. Electric-lamp bulbs have been mainly made from this type of glass since fully automatic methods of production were adopted.

magnesia mixture (*Chem*). A mixture of magnesium chloride, ammonium chloride, and ammonia solution used in chemical analysis for the estimation of phosphorus.

magnesia usta (*Chem.*). Commercial name for magnesium carbonate calcined at a low temperature for a long period.

Magnesian Limestone (*Geol.*). The major division of the English Permian System of N.E. England; consists of several hundred feet of dolomitic limestones and dolomites where best developed in Durham, whence they outcrop continuously southwards to near Nottingham. Feebly represented also locally west of the Pennines.

magnesian spinel (*Min.*). See **spinel.**

mag'nesite (*Met.*). Carbonate of magnesium, crystallising in the trigonal system. Magnesite is a basic refractory used in open-hearth and other high-temperature furnaces; it is resistant to attack by basic slag. It is obtained from natural deposits (mostly magnesium carbonate, $MgCO_3$), which is calcined at high temperature to drive off moisture and carbon dioxide, before being used as a refractory.—(*Photog.*) Magnesium carbonate is the substance adopted for a standard white surface.

magnesite flooring (*Build.*). A composition of calcined magnesite and magnesium chloride solution with a filler of sawdust, wood flour, ground silica, or quartz; used as a covering for concrete floors on which it is floated in a layer about 1½ in. thick. Also called JOINTLESS FLOORING.

magne'sium (*Chem.*). Symbol, Mg. A metallic element in the second group of the periodic system. At. no. 12, at wt. 24·32, m.p. 649° C., specific electrical resistivity 4·46 microhms per c.c., b.p. 1120° C. at 760 mm., density 1·75 grams per c.c., latent heat of fusion 46·5 cal. per gram at 644°. Only found in nature as compounds. The metal is a brilliant white in colour, and magnesium ribbon burns in air, giving an intense white light, rich in ultra-violet rays.—(*Met.*) Magnesium is used as a deoxidiser for copper, brass, and nickel alloys, and added to several aluminium-base alloys. A basis metal in strong light alloys (e.g. *Elektron*, q.v.) which are used in aircraft and automobile construction and for reciprocating parts.

magnesium carbonate (*Chem.*). $MgCO_3$. See **magnesite.**

magnesium nitride (*Chem.*). Mg_3N_2. Formed by the direct combination of the elements or by heating magnesium in gaseous ammonia.

magnesium orthodisilicate (*Chem.*). Occurs in nature as *serpentine* (q.v., *Min.*).

magnesium oxide (*Chem.*). MgO. Obtained by igniting the metal in air. In the form of calcined magnesite and dolomite it is used as a refractory material. See also **periclase.**

magnesium oxychloride cement (*Chem.*). See **Sorel's cement.**

magnesium silicide (*Chem.*). Mg_2Si. Sometimes used for the preparation of impure silicomethane or silicane.

magnet. A mass of iron or other material which possesses the property of attracting or repelling other masses of iron, and which also exerts a force on a current-carrying conductor placed in its vicinity. See **electromagnet, permanent magnet.**

magnet coil (*Elec. Eng.*). See **magnetising coil.**

magnet core. The iron core within the coil of an electromagnet.

magnet frame (*Elec. Eng*). The portion of a rotating-armature electric machine which supports the magnet poles and also forms part of the magnetic circuit. Also called MAGNET YOKE.

magnet pole (*Elec Eng.*). See **pole piece.**

magnet steel (*Met.*). A steel from which permanent magnets are made. It must have a high remanence and coercive force. Steels for this purpose contain high percentages of tungsten (up to 10%) or cobalt (up to 35%).

magnet yoke (*Elec. Eng.*). See **magnet frame.**

magnetic alloys (*Met.*). See **Permalloy, Mu-metal, silicon-iron.**

magnetic axis. A line through the effective centres of the poles of a magnet.

magnetic bearing (*Surv.*). The horizontal angle between any survey line and the direction of magnetic north.

magnetic blow-out (*Elec. Eng.*). A special magnet coil fitted to circuit-breakers or other similar apparatus in order to produce a magnetic field at the point of opening the circuit, so that any arc which is formed is deflected in such a direction as to be lengthened or brought into contact with a cool surface and is rapidly extinguished. Also called BLOW-OUT COIL.

magnetic braking (*Elec. Eng.*). A method of braking a moving system in which a brake is applied and released by means of an electromagnet.

magnetic chuck (*Eng.*). A chuck having a surface in which alternate steel elements, separated by insulating material, are polarised by electromagnets, so as to hold light flat work securely on the table of a grinding machine or other machine tool.

magnetic circuit (*Elec. Eng.*). The closed path taken by the magnetic flux in an electric machine or other piece of apparatus.

magnetic clutch (*Elec. Eng.*). A clutch in which the necessary force to hold the two parts together is provided by means of an electromagnet.

magnetic compass. A compass consisting of a magnetic needle which sets itself along the lines of the earth's magnetic field.

magnetic component (*Radio*). That component of an electromagnetic wave which is at right-angles to the direction of propagation and to the force which the wave exerts on an electric charge in its path.

magnetic creeping (*Elec. Eng.*). A gradual increase in the intensity of magnetisation of a piece of magnetic material, after a continued application of the magnetising force.

magnetic damping (*Elec. Eng.*). The process of checking the oscillations of a moving system by means of eddy currents set up by the movement of the system in a magnetic field.

magnetic declination (*Surv.*). See **declination.**

magnetic deflection (*Cathode Ray Tubes*). Deflection of the path of a cathode ray beam by a magnetic field produced by current-carrying coils close to the tube.

magnetic delay (*Elec. Comm.*). Delay in the transmission of a signal introduced by recording the signal magnetically on a moving tape and reproducing it at a point further along the tape, the delay being determined by the time of travel of the tape between the recording and reproducing points.

magnetic detector (*Radio*). A generic name for those early forms of detectors of high-frequency currents which depended on the demagnetising effect of an alternating magnetic field upon a magnetised iron core.

magnetic difference of potential (*Elec. Eng.*). A difference in the magnetic conditions at two points which gives rise to a magnetic flux between the points.

magnetic dip. See **dip.**

magnetic discontinuity (*Elec. Eng.*). An air gap, or a layer of non-magnetic material, in a magnetic circuit.

magnetic elongation (*Elec. Eng.*). The slight increase in length of a wire of magnetic material when it is magnetised. See **magneto-striction.**

magnetic field. The region in the neighbourhood of a permanent magnet or a current-carrying conductor in which magnetic forces can be detected.

magnetic-field strength. See **magnetising force.**

magnetic flux (*Elec. Eng.*). The surface integral of the magnetic field intensity normal to the surface. The magnetic flux is conceived, for theoretical purposes, as starting from a positive fictitious north-pole and ending on a fictitious south-pole, without loss. In practice, a complete circuit, the *magnetic circuit*, is envisaged, the quantity of magnetic flux being sustained by a magnetomotive force, *m.m.f.* (co-existent with ampere-turns linked with the said circuit, or derived from the molecular m.m.f. of a so-called permanent magnet), in a continuity made up of materials or space contributing reluctance, in analogy with the electric conducting circuit. Measured in *lines* (or *megalines*) or *maxwells.*

magnetic flux density (*Elec. Eng.*). The normal magnetic flux per unit area. Symbol B, measured in lines per sq. cm. or gauss, it being postulated that each fictitious unit north-pole emanates 4π lines, so that the mechanical force on the said pole, when placed in a field of unit flux density, is one dyne. See **intensity of field.**

magnetic focusing (*Cathode Ray Tubes*). Concentration of the stream of electrons emitted from the cathode into a narrow pencil, by means of a steady magnetic field directed axially along the direction of flow of the electrons. Cf. *electrostatic focusing.*

magnetic force. See **magnetising force.**

magnetic hysteresis (*Elec. Eng.*). A lagging of the magnetic flux in a magnetic material behind the magnetising force which is producing it.

magnetic hysteresis loop (*Elec. Eng.*). A closed figure formed by plotting magnetising force against flux density for a magnetic material when the magnetising force is taken through a complete cycle of increasing and decreasing values. The area of the figure is proportional to the magnetic hysteresis loss. Also called B/H LOOP.

magnetic hysteresis loss (*Elec. Eng.*). The energy expended in taking a piece of magnetic material through a complete cycle of magnetisation. The magnitude of the loss per cycle is proportional to the area of the magnetic hysteresis loop.

magnetic induction. See **magnetic flux density.**

magnetic iron-ore (*Min.*). See **magnetite.**

magnetic leakage (*Elec. Eng.*). See **leakage flux.**

magnetic link (*Elec. Eng.*). A small piece of magnet steel placed in the immediate vicinity of a conductor carrying a heavy surge current, e.g. a transmission line tower carrying a lightning stroke current. The magnetisation of the link affords a means of estimating the value of the current.

magnetic lock. A locking device, used chiefly on miners' lamps, which can be released only by a magnet.

magnetic map. A map showing the distribution of the earth's magnetic field.

magnetic mine (*Armaments*). A submarine mine for resting on the bottom in shallow water (e.g. an estuary). Detonation is achieved by an electrical delay circuit which is actuated by a delicately pivoted strong permanent magnet. The magnet is rendered ineffective until the mine is resting on the sea-bed; thereafter it is affected by the distortion of the earth's field by the presence of any large mass of magnetic material, such as a ship. Magnetic mines are countered by **degaussing** (q.v.).

magnetic modulation (*Radio*). A form of modulation sometimes used for keying continuous-wave transmitters, and formerly for radiotelephony; in it the inductance of an iron-cored coil is varied by control of a unidirectional polarising flux.

magnetic moment. The ratio of the torque exerted in a vacuum on a magnet to the magnetising force of the uniform field in which it is situated, the magnet being in the position giving the maximum torque. Also called MOMENT OF A MAGNET.

Magnetic North. The direction in which the north pole of a pivoted magnet will point. It differs from the Geographical North by an angle called the *declination* (q.v.).

magnetic oxide of iron. See **magnetite.**

magnetic polarisation (*Chem.*). The production of optical activity by placing an inactive substance in a magnetic field.

magnetic pole (*Elec. Eng.*). A convenient conception, which cannot exist, deduced from the experimental indication of the direction of the magnetic field arising from a permanent magnet. If the latter is long in comparison with its cross-section and the ends are provided with soft-iron balls, the direction of the magnetic field, as indicated by iron-filings, appears to radiate from the centres of such spheres, called *poles*. Experimentally, such poles appear as magnetic charges, from which are deduced the magnitude of magnetic poles, magnetic field-strength, magnetic flux, magnetic potential, and electrical units.

magnetic pyrite (*Min.*). See **pyrrhotite.**

magnetic reaction (*Radio*). See **electromagnetic reaction.**

magnetic recorder (*Acous.*). A machine which records and reproduces speech and music on a magnetic tape, pulling it with a steady velocity through recording, reproducing, and saturating (wash-out) pole-tips. See **Blattnerphone** and **Stille machine.**

magnetic recording (*Acous.*). Recording of speech or music by modulation of the residual magnetisation along a steel tape. Magnetisation of the tape is effected by coil-excited pole-tips. Reproduction is obtained by passing the tape through similar pole-tips, the residual magnetisation producing a varying flux in the coils and hence a modulation electromotive force.

magnetic screen (*Elec. Eng.*). A screen of soft iron used to surround certain electrical instruments, in order to protect them from the effect of stray magnetic fields.

magnetic separator. A device for separating, by means of an electromagnet, any magnetic particles in a mixture from the remainder of the mixture; e.g., for separating iron-filings from brass-filings, or magnetic particles of ore from non-magnetic particles.

magnetic shell. A thin sheet of magnetic material magnetised so that one face is a north pole and the other face is a south pole. Such a concept is often used in theoretical work on magnetism.

magnetic shunt (*Elec. Eng.*). A piece of magnetic material in parallel with a portion of a magnetic circuit, so arranged as to vary the amount of magnetic flux in that portion of the circuit.

magnetic slot-wedge (*Elec. Eng*). A slot-wedge of magnetic material which gives the same effect as a closed slot.

Magnetic South. The direction in which the South pole of a pivoted magnet will point. It differs from the Geographical South by an angle called the *declination* (q.v).

magnetic squeezer (*Moulding*). See **squeezer.**

magnetic stability. A term used to denote the power of permanent magnets to retain their magnetism in spite of the influence of external magnetic fields, vibration, etc.

magnetic storms (*Meteor.*). Widespread disturbances in the magnetic field of the earth which may last for periods varying from a few hours to a few days. Such storms are often accompanied by brilliant aurorae and by earth-currents of such magnitude as to interfere with electrical communications. There is evidence to show that terrestrial magnetic storms accompany the appearance of large sunspots.

magnetic tube of force. The space enclosed by all the lines of magnetic force drawn through the boundary of an area in a magnetic field. A unit *tube of force* corresponds to a line of force, and the term is often preferred to the latter.

magnetic variation (*Surv.*). See **declination.**

magnetic variations (*Meteor.*). Both diurnal and annual variations of the magnetic elements (dip, declination, etc.) occur, the former having by far the greater range. In the northern hemisphere the declination moves to the west during the morning and then gradually back, the extreme range being nowhere more than 1°. The dip varies by a few minutes during the day. It is thought that these effects are caused by varying electric currents in the ionised upper atmosphere.

magnetisation. The process of rendering iron, steel, or similar substances magnetic.

See **lamellar—** **solenoidal—**

magnetisation curve. A curve showing the relation between the flux density and the magnetising force for a sample of magnetic material. It also denotes the relation between the total m.m.f. and the total flux in a magnetic circuit, such as that of an electric machine. Since m.m.f. is proportional to exciting current and flux is proportional to the e.m.f. generated in a machine, a curve between exciting current and e.m.f. is also called a *magnetisation curve.*

magnetising coil (*Elec. Eng.*). A current-carrying coil used to magnetise an electromagnet, such as the field coil of an electric generator or motor. Also called FIELD COIL, MAGNET COIL.

magnetising current (*Elec. Eng.*). The current required to produce the magnetic flux in an electric machine; used particularly in connexion with transformers and alternating-current motors.

magnetising force. The force which produces magnetic flux density at a point; measured by considering the force which would be exerted on a unit magnetic pole placed at that point. Also called MAGNETIC FIELD STRENGTH, MAGNETIC FORCE.

magnetism. A general term used to denote either a magnetic field or the whole science associated with the behaviour of such fields. See **residual magnetism.**

magnetite or **magnetic iron-ore** (*Min.*). An oxide of iron, ferrosoferric oxide, Fe_3O_4, probably consisting of iron sesquioxide and ferrous oxide, which crystallises in the cubic system. It has the power of being attracted by a magnet, but it has no power to attract particles of iron to itself, except in the form of lodestone.

magne'to (*Elec. Eng.*). A small permanent-magnet electric generator capable of producing periodic high-voltage impulses; used for providing the ignition of internal-combustion engines, firing of explosives, etc.

See **high-tension—** **low-tension—**

magneto bell (*Teleph.*). An audible bell actuated by alternating current, which causes an armature to vibrate and hit two gongs alternately.

magneto generator (*Elec. Eng.*). An electric generator in which the exciting flux is obtained from permanent magnets.

magneto ignition (*Elec. Eng.*). An ignition system for I.C. engines, in which the voltage necessary to produce the spark is generated by a magneto.

magneto system (*Teleph.*). A telephone system in which the exchange operators are called by turning the handle of a magneto generator, line-current from which operates a relay at the exchange.

magnetochemistry (*Chem.*). The study of the magnetic changes accompanying chemical reactions.

magnetom'eter. A pivoted magnetic needle used for measuring the strength of magnetic fields; the deflection, when the needle is placed in such a field, indicates the strength. See **Kew-pattern magnetometer.**

magnetomotive force. The force, produced usually by a current-carrying coil, which produces a magnetic flux in a magnetic circuit. It is equal to the line integral of the magnetising force around the circuit.

magneto-optic rotation (*Chem.*). See **magnetic polarisation.**

magneto-optical rotation (*Television, etc.*). The rotation of the plane of polarisation of a ray of polarised light on reflection from the surface of a magnet, or on passing through a thin film of magnetised iron. The effect has been utilised for light modulation, in place of a Kerr cell.

magneto-striction. The change in dimensions produced in a magnetic material (e.g. iron or steel) when it is magnetised; most marked in nickel.

magneto-striction oscillator (*Elec. Comm.*). A thermionic oscillator based on the principle that when a bar of magnetic material conducts a magnetic flux it lengthens or contracts longitudinally. The mechanical oscillating system can therefore be coupled magnetically to a valve, the latter supplying power for sustaining oscillation.

mag'netron (*Thermionics*). A thermionic tube in which the inter-electrode space is traversed by a magnetic field acting transversely to the cathode to anode path, causing deflection of the electrons in their flight. Used for the generation of very high frequency oscillations.

magnetron effect (*Thermionics*). The deflection of the electrons emitted from a thermionic filament by the magnetic field produced by the filament-heating current.

magnetron rectifier (*Thermionics*). A thermionic rectifier in which use is made of the magnetron effect.

magnification. See **magnifying power.**

magnification factor (*Radio*). See **Q.**

magnifier (*Photog.*). See **focusing glass.**

magnifier (*Radio*). Any thermionic amplifier; especially one used for the amplification of audio-frequencies.

magnifier, Heurtley hot-wire (*Teleg.*). See **Heurtley hot-wire magnifier.**

magnifying power (*Light*). The ratio of the apparent size of the image of an object formed by an optical instrument to that of the object seen by the naked eye. For a microscope it is necessary to assume that the object would be examined by the naked eye at the least distance of distinct vision, 25 cm Unless otherwise stated, the *linear* magnification is assumed to be indicated. See also **longitudinal magnification*.**

magnitudes (*Astron*) The scale by which the brightness of stars is measured: (1) *apparent magnitude* is the measure of the brightness on Pogson's logarithmic scale, in which each step of one whole magnitude represents a light ratio of 2·512, and this increases numerically with decreasing brightness; (2) *absolute magnitude* is the apparent magnitude a given star would have at the standard distance of 10 parsecs.

magnolia metal (*Met.*). A lead-base alloy, containing 78-84% lead; remainder is mainly antimony, but small amounts of iron and tin are present. Used for bearings.

Magnus' green salt (*Chem.*). A platinum-ammonia compound obtained by adding ammonia to a solution of platinum tetrachloride in hydrochloric acid, when a green precipitate is formed.

mahlstick (*Paint*) See **maulstick.**

maidismus, maidism (*Med.*). See **pellagra.**

main (*Civ. Eng.*). A principal water or gas pipe, having branch pipes leading supplies to consumers.

main and tail (*Mining*). Rope haulage by means of a main rope to draw out the full wagons and a tail rope to draw back the empties.

main beam (*Struct.*). In floor construction, one of the principal beams transmitting loads direct to the columns.

main circuit (*Elec. Eng*). See **current circuit.**

main contacts (*Elec. Eng.*). The contacts of a switch which normally carry the current; cf. *arcing contacts*, which carry the current at the instant when the circuit is being interrupted.

main couple (*Carp.*). The principal truss in a timber roof.

main deck (*Ship Constr.*). A term used to signify a full-length deck below the weather deck. It has no legal-definition status, and is in use only on capital ships and large liners. It is derived from the sailing ship's deck on which the main-mast was stepped.

main distribution frame (*Teleph*). A frame for rearranging the incoming lines to a telephone exchange into the numerical order required in the exchange. Abbrev. **M.D.F.**

main exchange (*Teleph.*). An exchange which has other exchanges, such as satellites, dependent on it for extension from them to other exchanges.

main field (*Elec. Eng.*). The chief exciting field in an electric machine, as opposed to an auxiliary field, such as that produced by the compoles.

main planes (*Aero.*). See **plane.**

main rope (*Mining*). See **main and tail.**

main sequence (*Astron.*). See **Harvard classification.**

mainspring (*Horol.*). The spring in a watch or spring-driven clock which provides the motive power.

mainspring hook (*Horol.*). The means by which a mainspring is attached to its barrel.

mainspring winder (*Horol.*). A tool for coiling a mainspring prior to its insertion or withdrawal from the barrel.

main switchboard (*Elec. Eng.*). A large switchboard which controls the whole power of a particular installation (e.g. a generating station or the supply to a factory), and splits it up amongst a number of feeders supplying distribution switchboards.

main tanks (*Aero.*). See under **fuel tanks.**

main tie (*Struct.*). The lower tensional members of a roof-truss, connecting the feet of the principal rafters.

main transformer (*Elec. Eng.*). A term sometimes used in connexion with the Scott transformer connexion to indicate the transformer which is connected across two of the phases on the 3-phase side.

main wheel (*Horol*). The first wheel in the train; the great wheel. In a going-barrel it is integral with the barrel.

mains (*Elec. Eng.*). A general term used in connexion with electric power distribution to denote current-carrying conductors, such as feeders or distributors.

See **rising—** **theatre—**

mains antenna (*Radio*). Electric-supply mains used as a receiving antenna by connexion to the antenna terminal of the receiver through a condenser, which passes the radio-frequency currents but not those of the supply frequency.

mains receiver (*Radio*). A receiver which derives its operating power (i.e. for the cathode heating, etc.) from the public supply mains.

maintained tuning-fork (*Acous.*). A tuning-fork associated with a thermionic valve so that the latter supplies energy continuously to maintain the fork in steady oscillation. The frequency of the oscillation is substantially that of the free fork, the method being standard for establishing frequencies with great accuracy.

maintaining power (*Horol.*). A device which permits of power being transmitted to the train while winding is in progress.

maize oil (*Chem.*). See **corn oil.**

majol'ica (*Pot.*). Earthenware decorated with opaque white and coloured glazes.

majus'cule (*Palaeography*). A capital letter, originally written separately on manuscripts or cut on monuments. Cf. *minuscule.*

make (*Teleph.*). The operation, partial or complete, of a telephone relay, when current is passed through its windings.

make-before-break contact (*Teleph.*). The group of contacts in a relay assembly so arranged that the one which moves makes contact with a front contact before it separates from a back contact, and so is never free, whether the relay is operated or not.

make-contact (*Teleph.*). A pair of contacts in a relay assembly which are brought together on operation of the relay and so close a circuit.

make even (*Typog.*). To arrange type so that the last word of a portion or 'take' of copy ends a full line.

make impulse (*Elec. Comm.*). An electrical impulse arising when a circuit is made, i.e. closed.

make-ready (*Typog.*). See **making-ready.**

make-up (*Typog.*). The arrangement of type-matter and blocks into pages.

make-up (*Cinema., Photog.*). The application of substances (usually powders held on by greases) over the flesh, in order to give good photographic texture and simplified features.

making-capacity (*Elec. Eng.*). A term used in connexion with the rating of switchgear to denote the capability of a switch to make a circuit under certain specified conditions.

making-current (*Elec. Eng.*). A term used in connexion with switchgear to denote the maximum peak of current which occurs at the instant of closing the switch.

making department (*Boots and Shoes*). The department that makes boots and shoes from the shaped parts passed to it from the bottom-stock department.

making-ready or **make-ready** (*Typog.*). The process of preparing a forme for printing by adding or cutting away paper on the impression cylinder, and by underlaying or interlaying blocks.

making-up (*Textiles*). The examination, packing, and ticketing of fabrics before dispatch from the mills.

mal de caderas (*Vet.*). See **caderas (mal de).**

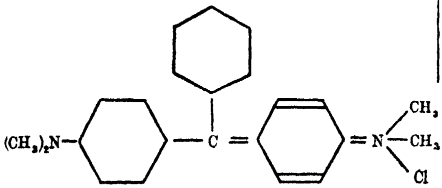
mal de los pintos (*Med.*). See **pinta.**

mal du coit (*Vet.*). See **dourine.**

mal'a (*Zool.*). In some Insects (as many coleopterous larvae), a single lobe borne by the maxilla and possibly representing the galea.

mal'achite (*Min.*). Basic cupric carbonate $[CuCO_3 \cdot Cu(OH)_2]$, crystallising in the monoclinic system. It is a common ore of copper, and occurs typically in the oxidation zone of copper deposits.

malachite green (*Chem.*). A triphenylmethane dyestuff of the rosaniline group. It has the formula:



It is obtained by the condensation of benzaldehyde with dimethylaniline in the presence of $ZnCl_2$, HCl, or H_2SO_4, and by the oxidation of the resulting leuco-base with PbO_2.

mala'cia (*Med.*). Pathological softening of any organ or tissue.

Mal'acocot'yle'a (*Zool.*). An order of *Trematoda* in which the ventral sucker may be absent, or, if present, is generally anterior in position; the position of the genital pore is variable; the life-history is complex and includes more than one host; the sexual form occurs in connexion with the gut of Vertebrates, the asexual generations in Invertebrates mainly.

mal'acophi'ly (*Bot.*). Pollination by snails.

malacophyl'lous (*Bot.*). Xerophytic, and having fleshy leaves containing much water-storing tissue.

malacopla'kia (*Med.*). The occurrence of soft, rounded, pale plaques in the wall of the bladder, in chronic inflammation of the bladder.

malacop'terous (*Zool.*). Having soft fin-rays.

Malacos'traca (*Zool.*). A group of *Crustacea* having fourteen or fifteen trunk somites, all bearing appendages; the trunk is clearly divided into a thorax, with walking legs and maxillipedes, and an abdomen with swimming legs; the antennules are usually biramous; caudal furca rarely occur. Crabs, Lobsters, Prawns, Crayfish, Shrimps.

malacos'tracous (*Zool.*). Having a soft shell.

mal'ar (*Zool.*). Pertaining to the *mala* (q.v.): pertaining to, or situated in, the cheek region of Vertebrates: the *jugal* (q.v.).

malaria (*Med.*). Ague; paludism; intermittent fever. A febrile disease caused by infection with various species of the protozoal parasite *Plasmodium*, transmitted to man by the bite of the female anopheline mosquito; characterised by intermittent paroxysms of fever. See also **quartan** and **tertian.**

malaria, animal (*Vet.*). See **piroplasmosis.**

malarial catarrhal fever of sheep (*Vet.*). A catarrhal fever of sheep in South Africa, due to infection by a filterable virus; probably transmitted by insects. Also known as BLUE-TONGUE.

malarial fever of horses (*Vet.*). See **anaemia (infectious).**

malaxa'tion (*Zool.*). A process adopted by certain Wasps after stinging their prey, which consists in the repeated compression of the neck by the mandibles.

mal'chite (*Geol.*). A term applied to rocks which have been described as microdiorite or dioritic lamprophyre.

male (*Zool.*). An individual of which the gonads produce spermatozoa or some corresponding form of gamete.

male and female (*Eng.*). Trade terms applied to inner and outer members respectively of pipe-fittings, threaded pieces, etc. See also **external screw-thread, internal screw-thread.**

male flower (*Bot.*). A flower containing stamens but no carpels.

male'ic acid (*Chem.*). $HOOC \cdot CH:CH \cdot COOH$, large prisms or plates, m.p. 130° C., b.p. 160° C. with decomposition into its anhydride and water, readily soluble in water. The *cis*-configuration is ascribed to this acid, whereas its isomer, *fumaric acid* (q.v.), has the *trans*-configuration.

ma'lic acid (*Chem.*). $HOOC \cdot CH_2 \cdot CH(OH) \cdot COOH$, hygroscopic needles, m.p. 100° C., found in unripe fruit; it also occurs in wines. When attacked by certain ferments, butyric, lactic, and propionic acids are produced. Heat causes the loss of a molecule of water, producing maleic and fumaric acids. It has been synthesised by various methods.

malignant (*Med.*). Tending to go from bad to worse: especially, cancerous (see **tumour**).

malignant disease (*Med.*). A common synonym for cancer and for sarcoma.

malignant endocarditis (*Med.*). Septic endocarditis, infective endocarditis. A progressive bacterial infection of one or more of the valves of the heart.

malignant oedema of animals (*Vet.*). An acute toxaemia of animals due to infection by bacteria of the genus *Clostridium*; characterised usually by crepitant swelling and gangrene of the infected part.

mall (*Tools*). A *beetle* (q.v.).

malleabil'ity, mal'e-a— (*Met.*). (Applied to metals) the property of being able to be mechanically deformed by rolling, forging, extrusion, etc., without rupture and without pronounced increase in resistance to deformation (as in case of ductility). Exhibited by lead, tin, and zinc at room temperature, and by other common metals at elevated temperature.

malleable cast-iron, mal'e-abl (*Met.*). A variety of cast-iron which is cast white, and then annealed at about 850° C. to remove carbon (*white-heart process*) or to convert the cementite to rosettes of graphite (*black-heart process*). Distinguished from grey and white cast-iron by exhibiting some elongation and reduction in area in tensile test.

malleable iron (*Met.*). Now usually means malleable cast-iron, but the term is sometimes applied to wrought-iron.

malleable nickel (*Met.*). Nickel obtained by re-melting and deoxidising electrolytic nickel and casting into ingot moulds. Can be rolled into sheet and used in equipment for handling food, for coinage, condensers, and other purposes where resistance to corrosion, particularly by organic acids, is required.

malleableising (*Met.*). A process used in the production of malleable cast-iron.

mal'leate (*Zool.*). Hammer-shaped.

mallein, mal'e-in (*Vet.*). The concentrated filtrate of broth cultures of *Pfeifferella mallei* which have been killed by heat; used as an inoculum for the diagnosis of glanders in horses.

malleo'lar (*Zool.*). Pertaining to, or situated near, the malleolus: in *Ungulata*, the reduced fibula.

malleo'lus (*Zool.*). A process of the lower end of the tibia or fibula.

mallet (*Tools*). A wooden hammer, or one made of raw-hide or rubber.

mallet-finger (*Med.*). Permanent flexion of the end-joint of a finger or thumb.

mal'leus (*Zool.*). In *Mammals*, one of the ear ossicles: in *Rotifera*, one of the masticatory ossicles of the mastax: more generally, any hammer-shaped structure.

malm, mahm (*Build.*). An artificial imitation of natural marl made by mixing clay and chalk in a wash mill; the product is used as a clay for the manufacture of bricks. Also called WASHED CLAY.

malm bricks (*Build.*). Bricks made from marl or *malm* (q.v.).

malm rubber (*Build.*). A soft form of malm brick, capable of being cut or rubbed to special shapes.

Malmstone (*Geol.*). A grey-green glauconitic sandstone containing much colloidal silica and many sponge spicules, forming part of the Upper Greensand of Hampshire.

malo'nic acid (*Chem.*). HOOC CH_2 COOH, large plates, soluble in water, alcohol, ether; m.p. 132° C.; it decomposes when heated to a slightly higher temperature, giving acetic acid; it occurs in beetroot as its calcium salt and can be obtained from malic acid by oxidation with chromic acid.

malonic ester (*Chem.*). Diethyl malonate, a liquid of aromatic odour, b p. 198° C., $CH_2(CO{\cdot}OC_2H_5)_2$. The hydrogen of the methylene group is replaceable by sodium which in turn can be exchanged for an alkyl group. In this way malonic ester is important for the synthesis of higher dibasic acids.

Malpighian body (or **corpuscle**), mal-pig'i-an (*Zool.*). In the Vertebrate kidney, the expanded end of a uriniferous tubule surrounding a glomerulus of convoluted capillaries: in the Vertebrate spleen, one of the globular or cylindrical masses of lymphoid tissue enveloping the smaller arteries.

Malpighian cell (*Bot.*). One cell of a layer of closely packed, radially directed thick-walled cells occurring in the testas of some seeds.

Malpighian layer (*Zool.*). In Vertebrates, the deep protoplasmic layer of the epidermis which is in contact with the dermis; rete mucosum.

Malpighian pyramids (*Zool.*). In many Mammals, the conical portions into which the kidney is divided.

Malpighian tubes (*Zool.*). In *Insecta*, *Arachnida*, and *Myriapoda*, tubular glands of excretory function opening into the alimentary canal, near the junction of the mid-gut and hind-gut.

malpresentation (*Med.*). Abnormal posture of the foetus during birth.

malt (*Brew.*). Grain, such as barley, oats, wheat, that has been germinated artificially by means of moisture, and then dried slowly in a kiln. The rate and the temperature of drying produce *malt* classed as amber, brown, black, and pale.

malt-sugar (*Chem.*). *Maltose* (q.v.).

Malta fever (*Med.*). See **undulant fever.**

malt'ase (*Chem.*). An enzyme effecting the hydrolysis of maltose and other *a*-glucosides. It is present in many yeasts, in the liver, kidney, pancreas and other organs, and the digestive juices of many animals.

maltese cross (*Cinema.*). A basic mechanism for feeding the film forward intermittently in a cinematograph projector, obviating the use of claws.

malting (*Brew.*). The processes by which barley, a hard vitreous grain, is converted into malt. See **couching, flooring, steeping, withering.**

maltobiose (*Chem.*). *Maltose* (q.v.).

maltose (*Chem.*). Malt-sugar, maltobiose. $C_{12}H_{22}O_{11}+H_2O$, a disaccharose, a white crystalline mass, dextro-rotatory, formed by the action of diastase upon starch during the germination of cereals. It reduces Fehling's solution, and when hydrolysed is converted into *d*-glucose.*

Malvern Quartzite (*Geol.*). A quartzite which occurs at the base of the Cambrian rocks in the Malvern Hills.

Malvernian direction (*Geol.*). The name assigned to structures, resulting from earth-movements, having a direction predominantly north-south, after the trend of the Armorican structures in the Malvern Hills.

mamil'la (*Zool.*). A nipple.

mam'illar (*Bot*). Having the form of a hemisphere bearing a projecting papilla.

mamil'lary body (*Zool.*). *Corpus mamillare* (q.v.).

mam'illate (*Bot.*, *Zool.*). Having a rounded outgrowth ending in an abrupt point.

mamil'liform (*Bot.*). Shaped like a papilla.

mamma (*Anat*, *Zool.*). In female Mammals, the milk gland; the *breast* (q.v.).—*adj.* **mam'mary.**

Mamma'lia (*Zool*). A class of *Craniata* having a hairy integument, warm blood, a left aortic arch only, a double heart and circulation, and mammary glands with which they suckle the young; respiration is pulmonary; there is a double occipital condyle, the lower jaw articulates with the squamosal; the limbs are pentadactyl.

mamma'to-cumulus (*Meteor.*). Clouds with rounded protuberances on their lower surfaces, something like inverted cumulus. They often occur in thunder-clouds.

Man (*Zool*) The human race, all varieties of which are included in the single species *Homo sapiens*, belonging to the order *Primates* (q.v.). Man's principal distinction from his nearest allies, the anthropoid apes, is the very high degree of cerebral development correlated with the power of sustained thought. Among structural peculiarities may be mentioned the erect posture, reduction of body hair, relatively short arms and long legs, non-opposable hallux, large forehead and small cheek-bones, uniform series of teeth without conspicuous canines, twelve ribs and seventeen dorsolumbar vertebrae. Man probably arose from an ancestral stock common also to the anthropoid apes during the Miocene ages, although no fossil remains are known until the Pleistocene.

manhole (*Eng.*). (1) An elliptical inspection-opening in a tank or boiler, large enough to admit a man, and closed by a cover fastened by bolts or clamps.—(2) Any similar opening into the inspection pits of underground electric cable ducts or sewers, closed by water-tight covers.

man lock (*Civ. Eng.*). An air-lock enabling workmen to pass into, and out of, spaces filled with compressed air.

mandel'ic acid (*Chem.*). $C_6H_5{\cdot}CH(OH){\cdot}COOH$, phenyl-glycollic acid; glistening crystals; m.p. 133° C.; soluble in water. It occurs naturally in the form of its glucoside, *amygdalin* (q.v.), and can be synthesised by the hydrolysis of benzaldehyde cyanhydrin. Mandelic acid possesses an asymmetric carbon atom, and exists in a *d*- and an *l*- form and as the racemic compound.

mandible (*Zool.*). In *Vertebrata*, the lower jaw: in *Arthropoda*, a masticatory appendage of the oral somite: in *Polychaeta* and *Cephalopoda*, one of a pair of chitinous jaws lying within the buccal cavity.—*adjs.* **mandib'ular, mandib'ulate.**

mandib'ulo- (Latin *mandibulum*, jaw). A prefix used in the construction of compound terms; e.g. *mandibulomaxillary*, pertaining to the mandibles and the maxillae.

mandrel or **mandril** (*Eng.*). (1) An accurately turned shaft on which work already bored is mounted for turning, milling, etc.; if partially split and capable of expansion by a tapered plug it is called an *expanding mandrel*.—(2) The headstock spindle of a lathe.

mandrel (*Horol.*). A special face-plate lathe, usually hand driven, for turning or recessing watch plates or similar operations.

mandrel (*Met.*). A rod used to retain the cavity in hollow metal products during working. Thus hollow forgings are made on a mandrel, pierced billets are rolled on one to form tubes, and the internal dimensions of tubes are maintained during cold drawing by drawing over one.

manduca'tion (*Zool.*). See **mastication.**

maneton or **maneton bolt** (*I.C. Engs.*). A heavy pinch-bolt used to grip the split end of the separate rear crank web of a radial aero engine on to the crank-pin.

mangan-blende (*Min.*). See **alabandite.**

mangan-epidote (*Min.*). See **piedmontite.**

manganese (*Met.*). A hard, brittle metallic element, in the seventh group of the periodic system, which exists in three polymorphic forms, α, β, and γ, and has a complicated crystal structure. It is brilliant white in colour, with reddish tinge. Chemical symbol, Mn; at. wt. 54·93, at. no. 25, valency 2, 3, 4, or 7, sp. gr. at 20° C. 7·2, m.p. 1245° C., b.p. 1900° C., specific electrical resistivity 5·0 microhms per cu. cm., hardness in Mohs' scale 6. Mainly used in steel manufacture, as a deoxidising and desulphurising agent.

manganese alloys (*Met.*). Manganese is not used as the basis of alloys, but is a common constituent in those based on other metals. It is present in all steel and cast-iron, and in larger amount in special varieties of these, e.g. manganese steel, silico-manganese steel, etc. It is also present in many varieties of brass, in aluminium-bronze, and in aluminium and nickel base alloys.

manganese bronze (*Met.*). Originally an alpha-beta brass containing about 1% of manganese; the term is now applied generally to *high-strength brass* (q.v.).

manganese carbide (*Chem.*). Mn_3C. Formed by direct combination of the two elements.

manganese dioxide (*Chem.*). MnO_2. Basic and acidic. Forms manganites.

manganese epidote (*Min.*). See **piedmontite.**

manganese-garnet (*Min.*). See **spessartite.**

manganese heptoxide (*Chem.*). Mn_2O_7. Acidic. Forms permanganates.

manganese nitride (*Chem.*). Mn_5N_2. Formed when manganese is heated in nitrogen.

manganese sesquioxide (*Chem.*). Mn_2O_3. Basic. Forms manganic salts.

Manganese Shale Group (*Geol.*). A group of shales and grits containing silicate, carbonate, and oxide of manganese. It occurs in the Harlech Series of N. Wales.

manganese spar (*Min.*). See **rhodochrosite.**

manganese steel (*Met.*). A term sometimes applied to any steel containing more manganese than is usually present in carbon steel (i.e. 0·3-0·8%), but generally to *austenitic* (*Hadfield's*) *manganese steel*, which contains 11-14%. This steel is very resistant to shock and wear, and is used for railway crossings and switches, rock crusher parts, dredger buckets, etc.

manganese trioxide (*Chem.*). MnO_3. Acidic. Forms manganates.

man'ganin (*Met.*). A copper-base alloy, containing 17-18% of manganese and 1·5-2% of nickel. The electrical resistance is high (about 38 microhms per cu. cm.), and the temperature coefficient low; the alloy is therefore suitable for resistances.

man'ganite (*Min.*). A hydrated oxide of manganese, crystallising in the orthorhombic system. It is a minor ore of manganese.

man'gano-mangan'ic oxide (*Chem.*). Mn_3O_4. Neutral or mixed oxide.

manganophyll'ite (*Min.*). A biotite containing manganese; it occurs in aggregations of thin scales and has a colour ranging from bronze to copper-red.

mangan'osite (*Min.*). The protoxide of manganese which crystallises in the cubic system.

manganous oxide (*Chem.*). MnO. Basic. Forms manganous salts.

mange (*Vet.*). Inflammation of the skin of animals due to infection by certain species of acari or mites. Also called SCABIES, SCAB.—CHORIOPTIC MANGE, mange of horses and cattle due to acari of the genus *Chorioptes*.—DEMODECTIC or FOLLICULAR MANGE, see **folliculitis (demodectic).**—FOOT MANGE, see **scaly leg.**—NOTOEDRIC MANGE, mange of cats due to *Notoedres cati*.—OTODECTIC MANGE, mange of the ears of animals, due to acari of the genus *Otodectes*.—PSOROPTIC MANGE, mange of animals due to acari of the genus *Psoroptes*.—SARCOPTIC MANGE, mange of animals due to acari of the genus *Sarcoptes*.

Manger's soap (*Paint.*). A proprietary cleansing preparation for paints.

mania (*Psychiatry*). The elated phase of manic depressive psychosis; characterised by euphoric excitement, exaggerated will-power, and flight of ideas of a grandiose nature. See **manic-depressive psychosis.**

manic-depressive psychosis (*Psychiatry*). A type of insanity shown by Kraepelin to be characterised by disorders of affect, either of elation or of depression, with intermediate mixed states. The depressed phase (melancholia) may exist by itself, and be repeated after an interval of normal health, or it may alternate with a phase of elation (mania). General characteristics include irritability, suspicion, and, in some cases, a clouding of consciousness, delusions, hallucinations, and disorientations. Also CYCLOTHYMIA.

manifold (*Eng.*). See **induction manifold.**

manifold (*Paper*). A term which describes thin paper used in duplicating; may be waxed. Also, carbon paper (obsolete).

manilla paper (*Paper*). A strong paper made from sulphite wood-pulp, but containing some hemp fibre and manilla (about 40% at most). Used for wrappings, and impregnated with wax, oil, or varnish, as a dielectric for cables. Also called CARTRIDGE PAPER.

manna (*Zool.*). See **honey-dew.**

mannans (*Chem.*). The anhydrides of mannose.

Mann'esmann process (*Met.*). A process for making seamless metal tubing from a solid bar of metal by the action of two eccentrically mounted rolls which simultaneously rotate the bar and force it over a mandrel.

Manning's formula (*Hyd.*). An expression giving the value of the coefficient *C* in *Chezy's formula* (q.v.). It states that

$$C=\frac{1{\cdot}49}{N}\cdot m^{\frac{1}{6}},$$

where m = the hydraulic mean depth, and N = a factor depending on the nature of the surface of the channel.

man'nitol (*Chem.*). $HO{\cdot}CH_2{\cdot}(CH{\cdot}OH)_4{\cdot}CH_2{\cdot}OH$; a hexahydric alcohol, fine needles or rhombic prisms, soluble in water and in hot alcohol, m.p. 166° C. It is found in many plants, and several stereo-isomers are known.

man'nosans (*Chem.*). See **mannans.**

mannose (*Chem.*). A hexose. *d*-Mannose can be obtained by the oxidation of *mannitol* (q.v.), and is a stereo-isomer of *d*-glucose.

man'ocyst (*Bot.*). The receptive papilla in some *Oömycetes*.

manom'eter (*Phys.*). An instrument used to measure the pressure of a gas. The usual form of manometer consists of a U-tube containing a liquid (water, oil, or mercury), one limb being connected to the enclosure whose pressure is to be measured, while the other limb is either open to the atmosphere or is closed. The open pattern reads the difference between the required pressure and atmospheric pressure as the difference in level of the liquid in the two limbs.

manomet'ric flame (*Phys.*). A small gas flame so arranged as to oscillate by the variations of pressure due to sound-waves impinging on a diaphragm forming one wall of a small gas chamber. The oscillations of the flame are detected by viewing it in a rotating mirror.

manoxylic wood, —zī'lik (*Bot.*). Wood of somewhat loose texture, containing a good deal of parenchyma.

mansard roof (*Build.*). A double-sloped pitched roof rising steeply from the eaves, and having a summit of flatter slope on both sides of the ridge. Also called CURB ROOF, FRENCH ROOF, GAMBREL ROOF.

Mansbridge condenser (*Elec. Comm.*). A paper condenser in which a pinhole discharge oxidises the foil electrodes and restores the insulation after a breakdown.

Mansfeld method (*Chem.*). A method for the valuation of copper ores.

Mansfield Sandstone (*Geol.*). The transgressive basal member of the Pennsylvanian succession in parts of N. America, e.g. Indiana and Illinois.

mantel (*Build.*). An ornamental front and shelf to a fireplace.

mantel-piece, mantel-shelf (*Build.*). The shelf of a mantel.

mantel tree (*Build.*). The lintel of a fireplace.

mantle (*Build.*). The outer covering of a wall when this is of different material from the inner part.

mantle (*Illum.*). See **gas mantle.**

mantle (*Zool.*). In *Urochorda*, the true body-wall lying below the test and enclosing the atrial cavity: in *Mollusca, Brachiopoda*, and *Cirripedia*, a soft fold of integument enclosing the trunk and responsible for the secretion of the shell or carapace.

mantle cavity (*Zool.*). In *Urochorda*, the atrial cavity: in *Mollusca, Brachiopoda*, and *Cirripedia*, the space enclosed between the mantle and the trunk.

mantle lobes (*Zool.*). The mantle flaps in *Pelecypoda.*

Manu-marble (*Build.*). Trade-name for an artificial marble.

manual. (1) The finger-operated key in an organ console.—(2) The row of keys normally played by the hand, the thumb pistons being below.

manuals (*Zool.*). See **primaries.**

manual exchange (*Teleph.*). An exchange in which all the operations for connecting subscribers to other subscribers, or to other exchanges, are effected manually by operators.

manual hold (*Auto. Teleph.*). The holding of the connexion from a subscriber on an automatic exchange by an operator in a manual exchange who is about to complete the call.*

manual ringing (*Teleph.*). The application of ringing current to a line by the manual throwing of a key, as performed, for example, by A-operators in an exchange and by P.B.X. operators.

manual switchboard (*Teleph.*). A manually operated switchboard in a manual exchange.

manual telephone system (*Teleph.*). A system of telephone connexion in which the temporary connexions are made by operators located in front of multiple switchboards.

manu'brium (*Zool.*). Any handle-like structure: the basal part of the furcula in *Collembola*: the presternum in Mammals: part of the malleus of the ear in Mammals: the pendant oral portion of a medusa: part of the malleus in *Rotifera.*

manure distributor (*Agric. Mach.*). A machine for distributing artificial manures. It operates in a manner similar to the *broadcast sower* (q.v.).

manus (*Zool.*). The podium of the fore limb in land Vertebrates.

Manx Slates (*Geol.*). A thick mass of slate rocks, possibly Cambro-Ordovician in age, found in the Isle of Man.

man'yplies (*Zool.*). See **psalterium.**

map. A representation on paper of part of the earth's surface.

map measurer (*Surv.*). An instrument used to find the length of a route on a map. It consists of a small wheel which is made to roll over the route, in so doing actuating a needle which records the distance traversed. Also called OPISOMETER.

map varnish. Colourless gums dissolved in spirit; used for protecting maps, engravings, etc.

maple syrup and **maple sugar** (*Chem.*). Syrup and sugar made from the maple tree. The delicate flavour is probably due to the small protein content.

Maplewell Beds (*Geol.*). A series of rocks, largely pyroclastic and of intermediate composition, found in the middle division of the Pre-Cambrian rocks of Charnwood Forest in Leicestershire.

M.A.R. (*Chem.*). An abbrev. for *microanalytical reagent*, a standard of purity which indicates that a reagent is suitable for use in *microanalysis* (q.v.).

maras'mus (*Med.*). Progressive wasting, especially in infants.—*adj.* **maras'mic.**

Marb-l-cote (*Paint.*). A paint, in powder form, which on being mixed with water and applied to a surface sets in 24 hours and presents the appearance of marble.

marble (*Geol.*). The term strictly applies to a granular crystalline limestone, but in a loose sense it includes any calcareous or other rock of similar hardness that can be polished for decorative purposes.—(*Diel.*) Used for switchboard panels. Electric strength 50-100 kV per inch for an inch thickness.

marble bones (*Med.*). See **osteopetrosis.**

marbled (*Bot.*). Marked by irregular streaks of colour.

marbled ware (*Pot.*). Articles decorated in the unbaked state with opaque slips and coloured transparent glazes to represent marble, and then fired in the kiln.

marbling (*Bind.*). The operation of decorating book-edges, etc., with a variegated 'marble' effect. Carried out in a trough containing gum (made from carragheen moss), on the surface of which pigments (containing ox-gall) are worked in fantastic patterns.

marbling (*Paint.*). The process of painting a surface to make it resemble marble.

mar'casite (*Min.*). (1) White iron pyrite. A disulphide of iron which crystallises in the orthorhombic system. It resembles iron pyrite, but has a lower specific gravity, is less stable, and is paler in colour when in a fresh condition.—(2) In the gemstone trade *marcasite* is either pyrite, polished steel (widely used at present in ornamental jewellery in the form of small 'brilliants'), or even white metal.

Marcellus Shale (*Geol.*). A highly bituminous black shale, of Middle Devonian age, occurring at the top of the Ulsterian Division in eastern N. America; it is the source rock of the oil stored in the overlying Onondaga Limestone.

marces'cent (*Bot.*). Withered but remaining attached to the plant.

marchioness (*Build.*). A slate, 22 × 12 in.

Marconi beam antenna (*Radio*). A directional antenna array comprising a system of tuned vertical radiators and reflectors.

Marconi coherer (*Radio*). An evacuated glass tube containing two electrodes in contact with a mixture of iron and nickel filings. The resistance between the electrodes drops suddenly on the application of a high-frequency voltage between them.

Marconi detector (*Radio*). A form of magnetic detector comprising an endless iron or steel wire which is drawn continuously through a coil, connected to the antenna, and situated in the field of a permanent magnet. The arrival of a signal causes a current to be induced in a second coil, wound over the first, which is made audible in telephones connected thereto.

Marconi-Stille recorder (*Acous.*). See **Blattnerphone.**

marcus (*Tools*). A large hammer with an iron head.

mare, mar′ā (*Astron.*). See **maria.**

Marechal's test (*Chem.*). A test for the presence of bile acids based on the appearance of a green zone between the bile solution and a dilute solution of iodine.

marekan′ite (*Min.*). A rhyolitic perlite broken down into more or less rounded pebbles; named from the type locality, Marekana river, Eastern Siberia.

Marezzo marble, mar-et′so (*Build.*). An artificial marble made with Keene's cement.

margarine, marj′a-rēn *or* marg′— (*Foods*). A butter substitute made from (usually) vegetable fats, suitably treated by heating and cooling, churning with milk, colouring, and adding concentrates of vitamins A and D.

mar′garite (*Geol.*). An aggregate of minute sphere-like crystallites, arranged like beads, found as a texture in glassy igneous rocks.—(*Min.*) Hydrated silicate of calcium and aluminium, crystallising in the monoclinic system.

Margary's process (*Build.*). A process for preserving timber by soaking it in a solution of acetate or sulphate of copper.

margin (*Bot.*). (1) The edge of a growing fungal mycelium.—(2) The edge of a leaf or other flattened plant member.

margin (*Build.*). The exposed width of each slate in coursed work.

margin (*Civ. Eng.*). An open strip of land alongside a road, allowing for future widening.

margin (*Join.*). The flat surface of stiles or rails in panelled framing.

margin-draft (*Masonry*). A smooth face round a joint in ashlar work.

margin lights (*Build.*). Narrow panes of glass near the edges of a sash.

margin trowel (*Plast.*). A box-shaped float for finishing internal angles.

marginal (*Bot., etc.*). Situated on, or arising from, the edge of a member.

marginals (*Zool.*). In *Chelonia*, the plates forming the edge of the carapace.

marginal anchors (*Zool.*). In certain *Scyphozoa*, adhesive organs attached to the edge of the umbrella.

marginal bars (*Join.*). Glazing bars so arranged as to divide the glazed opening into a large central part bordered by narrow panes at the edges.

marginal community (*Bot.*). A plant community bordering on another community of slightly different character.

marginal current (*Auto. Teleph.*). The adjusted heavy or light, positive or negative, current which is used for coding impulses in a coder, to expedite the transmission of numericals by key-senders.

marginal ray cell (*Bot.*). A more or less specialised cell occurring with others of the same kind on the edge of a vascular ray.

marginal species (*Bot.*). A plant which grows along the edge of woodland.

marginate (*Bot.*). Having a well-marked border, which is often composed of cells or elements differing in form or colour from those making up the rest of the member.

mar′ia (*Astron.*). The Latin designation of the so-called 'seas' on the lunar surface, named before the modern telescope showed their dark areas to be dry planes. The *sing.* is *mare* (e g. *Mare Serenitatis, Mare Imbrium, Mare Fecunditates*, etc.).

mari′alite (*Min.*). Silicate of aluminium and sodium with sodium chloride, crystallising in the tetragonal system. It is one of the species in the isomorphous series of the Scaptolite Group.

mar′igold window (*Build.*). See **rose window.**

mar′igram (*Surv.*). The continuous record of height of tide given by a self-registering tide gauge.

mar′igraph (*Surv.*). A gauge registering the height of the tide at a given place.

marine boiler (*Eng.*). A cylindrical boiler, of large diameter and short length, provided with two or more furnaces in flue tubes leading to combustion chambers, surrounded by water, at the back. The gases pass through banks of fire tubes to the smoke-box or uptakes at the boiler front. Also called SCOTCH BOILER. See also **dry-back boiler, Yarrow boiler.**

marine chronometer (*Horol.*). A specially mounted chronometer for use on board ship in the determination of longitude.

marine compass. See **floating-card compass, gyro compass.**

marine denudation (*Geol.*). The erosive and sweeping action of the sea. See also **denudation.**

marine deposits (*Geol.*). Rock waste which is laid down under marine conditions.

marine engineering. That branch of mechanical engineering concerned with the design and production of propelling machinery and auxiliary equipment for use in ships.

marine engines (*Eng.*). Steam- or oil-engines used for ship propulsion, particularly triple or quadruple expansion vertical steam-engines, direct-coupled to the propeller.

marine glue (*Build.*). A form of glue resisting the action of water, and containing rubber, shellac, and oil.

marine screw propeller (*Eng.*). A boss, carrying two, three, or four blades of helical form, which produces the thrust to drive a ship by giving momentum to the column of water which it displaces in an astern direction.

marine surveying. Hydrographical surveying undertaken in tidal waters.

Marino′ni machine (*Print.*). A newspaper machine invented in France and introduced into England in 1872.

Mariotte's law. Boyle's law.

Mar′iotype (*Photog.*). A carbon printing process in which an exposed bichromated emulsion is brought into contact with a bichromated pigmented tissue, which can be developed with water.

Maripo′sa formation (*Geol.*). A series of much metamorphosed slates cut by gold-bearing lodes, occurring in the Sierra Nevada Mts.; of Upper Jurassic age.

maritime (*Bot., Zool.*). Living by the sea.

mark (*Surv.*). Any of the distinguishing tags attached at intervals to a lead-line to denote fathoms or feet.

mark contact (*Teleg.*). The contact which is made when a telegraph key is depressed and alters the current in a transmitting circuit. Cf. *space contact.*

mark of reference (*Typog.*). A sign which directs the reader to a footnote. The commonest marks of reference are * asterisk, † dagger, ‡ double dagger, § section, ‖ parallel, ¶ paragraph, in order of use. *Superior figures* (q.v.) are now more commonly used in general typography.

marker (*Cinema.*). See **camera marker.**

marking current (*Teleg.*). The current, which may be positive or negative, corresponding to the coding of the signals sent and the depressed position of the telegraphist's key; such signals may be machine-transmitted by a slip. See **spacing current.**

marking gauge (*Carp.*). A tool for marking lines on the work parallel to one edge of it. It consists of a wooden bar having a projecting steel marking pin near one end and a sliding block adjustable for position along the bar.

marking knife (*Join.*). A small steel tool having a chisel edge at one end and pointed at the other. It is used for setting out fine work.

marking-out (*Build., Surv., etc.*). Setting out boundaries and levels for a proposed piece of work.—(*Eng.*) Setting out centre lines and other dimensional marks on material, as a guide for subsequent machining operations. See also **laying-out.**

marking wave (*Radio*). The electromagnetic wave radiated from a radio-telegraph transmitting antenna when the key is depressed. Cf. *spacing wave.*

marl (*Geol.*). A general term for a very fine-grained rock, either clay or loam, with a variable admixture of calcium carbonate.—(*Build.*) A brick earth which contains a high percentage of carbonate of lime; it is the best clay for making bricks without addition of other substances. Also called CALCAREOUS CLAY. See also Supplement.

Marl Slate (*Geol.*). A thin but important datum plane in the Lower Magnesian Limestone of Notts, Yorks, and Durham, England. It is a fissile calcareous rock, yielding fish remains, but is not a true slate.

marlstone rock or **marlstone** (*Geol.*). Sandy clays, calcareous beds, and ironstone, found in the Middle Lias Series of the Jurassic System. The ironstone has been worked from Gloucestershire to Lincolnshire.

marl yarn (*Worsted Spinning*). Worsted yarn of two or more colours which have been combined in the drawing box or while the yarn is being spun.

Mar'marosch diamonds (*Min.*). A local name for *rock crystal.*

mar'matite (*Min.*). A ferruginous variety of *blende* (q.v.); it contains up to 20% of iron.

mar'morate (*Bot.*). Marked or coloured like marble.

marmoration (*Build.*). A marble casing for a building.

marmora'tum or **marmore'tum** (*Build.*). A cement containing pulverised marble and lime.

marmot (*Furs*). The dressed skin of the marmot, a burrowing rodent living in high altitudes. The fur is short and thick and is generally dyed.

mar'ocain (*Textiles*). A dress fabric with a fine cord, in appearance like a wavy rib, across the width; made from hard twisted yarns of silk, rayon, wool, or cotton.

mar'quetry, —ket-ri (*Furn.*). Decorative natural or stained wood inlay, with or without the addition of metal, mother-of-pearl, ivory, or tortoiseshell.

marquise, mar-kēz' (*Build.*). A projecting canopy over the entrance to a building.

marrow (*Zool.*). The vascular connective tissue which occupies the central cavities of the long bones in most Vertebrates, and also the spaces in certain types of cancellated bone.

marrying (*Build.*). The process of lashing poles together in scaffold erection, in order, for example, to increase the height of the standards.

marrying (*Cinema.*). The printing of the mute negative and the negative sound-track on the release print. For 'rushes,' the mute and sound-track are printed separately.

Mars (*Astron.*). The fourth planet from the sun in order of distance. Its mass is 0·108 that of the earth; it has two satellites; its sidereal period is 686·98 days.

Marsh's test (*Chem.*). A method used in chemical analysis for the estimation of arsenic. Largely superseded by the Gutzeit test.

Marshall valve gear (*Eng.*). A radial gear of the *Hackworth* (q.v.) type, in which the straight guide is replaced by a curved slot to correct inequalities in steam distribution.

Marsipobran'chii (*Zool.*). A class of aquatic *Craniata,* breathing by gills, having a suctorial funnel-shaped mouth without jaws, a naked scaleless skin, a continuous median fin but no paired fins, a primitive cartilaginous skeleton, and a persistent notochord. Lampreys and Hags.

Marsupia'lia (*Zool.*). The single order included in the Mammalian group *Metatheria* (q.v.), and having the characteristics of the subclass.

marsu'pium (*Zool.*). A pouch-like structure occupied by the immature young of an animal during the later stages of development; as the abdominal pouch of metatherian Mammals.—*adj.* **marsu'pial.**

marten (*Furs*). The dressed skin of one of various martens, a weasel-like animal of northern regions. The fur of the pine marten is brown and soft; that of the stone or beech marten bluish brown; the fisher marten has a black fur, with brown under-fur.

mar'tensite (*Met.*). A constituent formed in steel when it is cooled at a rate sufficiently rapid to suppress the change from austenite to pearlite. Results from the decomposition of austenite at low temperatures. Consists of a solid solution of carbon in α-iron, and is responsible for the hardness of quenched steel.

Martin's cement (*Plast.*). A quick-setting hard plaster, made by soaking plaster of Paris in a solution of potassium carbonate.

Martinez formation, mar-tē'nez (*Geol.*). A formation which, together with the Tejon, represents the Eocene along the Pacific coast of N. America. They consist of marine shales (13,000 ft.) and sandstones containing foraminifera, and are important in the Californian oil-fields.

martite (*Min.*). Sesquioxide of iron (Fe_2O_3), crystallising in the cubic system like magnetite (Fe_3O_4), and believed to be pseudomorphous after magnetite, and in part perhaps after iron pyrite.

marver (*Glass*). A flat cast-iron or stone (marble) block upon which glass is rolled during the hand method of working.

Marwood Beds (*Geol.*). Marine sands and shales which occur in rocks of Upper Devonian age in North Devon and West Somerset. See also **Baggy Beds.**

Marx rectifier (*Elec. Eng.*). See **atmospheric arc rectifier.**

mash (*Brew.*). A porridge-like mixture consisting of coarsely ground malt and hot water which have been mixed in the masher.

mash tun (*Brew.*). An insulated metal vessel in which the mash is mechanically mixed and kept at a temperature of about 150° F. for a period (about 2 hours), when the sweet wort is run off.

masher (*Brew.*). The receptacle in which ground malt is mixed with hot water before reaching the mash tun.

mashing (*Brew.*). The process of extracting the grist (ground malt) with water, at a temperature of 145-155° F., in a mash tun.

mask (*Photog.*). Any opaque paper or film which is used to limit the printing of a negative on a positive print, or, in a projector or printer, to confine or limit the size of the effective image. See **mat.**

mask (*Psycho-an.*). See **persona.**

mask (*Zool.*). A prehensile structure of the nymphs of certain Dragon-flies (*Libellulidae*).

masked valve (*I.C. Engs.*). A poppet valve the head of which is recessed into its seat, so that its outer diameter acts as a piston valve; it allows a lower valve acceleration to be used, and gives a more efficient *valve-opening diagram* (q.v.).

mas'kelynite (*Min.*). A mineral which occurs in colourless isotropic grains in meteorites and has a composition near labradorite. It probably represents re-fused feldspar.

masking (*Acous.*). The loss of sensitivity of the ear for specified sounds in the presence of other sounds, one sound *masking* sounds of higher frequency to a marked extent.

ma'sochism (*Psycho-path.*). Gratification obtained from the suffering of physical or mental pain, usually inflicted from without. Cf. *sadism.*

mason. A builder in stone.

mason's joint (*Build.*). Pointing finished with a projecting vee.

mason's level (*Masonry, etc.*). A *plummet level* (q.v.).

mason's mitre (*Build.*). The name given to an effect similar to the *mitre* (q.v.) but produced (particularly in stonework) by shaping the intersection out of the solid.

mason's putty (*Masonry*). A mixture of Portland cement, lime putty, and stone dust, usually in the proportions 2 : 5 : 7, with water. Used for making fine joints, especially in ashlar work.

mason's scaffold (*Build.*). A form of scaffold used in the erection of stone walls, when it is not convenient to leave holes for the support of one end of the putlogs; an inner set of standards and ledgers is used to provide this support.

mason's stop (*Build.*). A *mason's mitre.*

mason's trap (*Build.*). A form of trap in which a stone slab on edge dips below the water surface.

Ma'sonite (*Build.*). A form of building-board used as a lining because of its heat-insulation properties.

masonry. The craft of building in stone.

mass (*Phys.*). The quantity of matter in a body. Mass may also be considered as the equivalent of inertia, or the resistance offered by a body to change of motion (i.e. acceleration). Masses are compared by weighing them, which amounts to comparing the forces of gravitation acting on them. See also **force, gram, pound, weight.**

mass action (*Chem.*). See **law of mass action.**

mass concrete (*Civ. Eng.*). Concrete which is placed without reinforcement. Also called BULK CONCRETE.

mass-control (*Acous.*). Said of mechanical systems, particularly, those generating sound-waves, when the mass of the system is so large that the compliance and resistance of the system are ineffective in controlling motion.

mass effect (*Met.*). The tendency for hardened steel to decrease in hardness from the surface to the centre, as a result of the variation in the rate of cooling throughout the section. Becomes less marked as the rate of cooling required for hardening decreases, that is, as the content of alloying elements increases.

mass-haul curve (*Civ. Eng.*). A curve used in the design of earthworks involving cuttings and embankments, the abscissae representing chainage along the centre line, and the ordinates the excess of cutting over filling, i.e. the material requiring to be hauled to another position.

mass number (*Chem.*). The atomic weight of an isotope.

mass of the electron (*Phys.*). A result of the theory that mass can be ascribed to kinetic energy is that the effective mass of the electron should vary with its velocity according to the expression

$$m = \frac{m_0}{\sqrt{1-\left(\frac{v}{c}\right)^2}}$$

where m_0 is the mass for small velocities, c is the velocity of light, and v that of the electron. This has been confirmed experimentally.

mass provisioning (*Zool.*). In certain species of Insect, the provision by the mother (or in the case of social Insects by nurse individuals) of sufficient food to last the offspring through the whole of its larval life.

mass resistivity (*Elec. Eng.*). The product of the volume resistivity and the density of a given material at a given temperature.

mass spectra (*Phys.*). Positive ray spectra obtained by means of the mass spectrograph. In such spectra the images due to positive ray particles of different masses are spaced according to the masses of the particles, that is, according to their atomic weights. *Isotopes* (q.v.) were investigated by Aston by means of mass spectra.

mass spectrograph (*Phys.*). An instrument developed by Aston for the analysis of positive rays. By means of magnetic and electrostatic fields applied at right-angles to the positive ray beam, particles having the same value of e/m are brought to a focus on a photographic plate. From the resulting mass spectrum the atomic weights of the particles may be deduced. See also **positive rays, mass spectra.**

mass'eter (*Zool.*). An elevator muscle of the lower jaw in higher Vertebrates.—*adj.* **masseter'ic.**

massicot (*Min.*). Lead monoxide which crystallises in the orthorhombic system. It is a rare mineral of secondary origin, associated with galena.—(*Paint.*) A yellow pigment, the same chemically as litharge.

mast (*Bot.*). The fruit of the beech and related trees.

mast (*Struct.*). A slender vertical structure which is not self-supporting and requires to be held in position by guy-ropes. Cf. *pylon.*

mast antenna (*Radio*). An antenna in which the currents are carried by the metallic structure of the mast itself, instead of in conductors supported thereby.

mast cell (*Zool.*). See **basicyte.**

mastax (*Zool.*). In *Rotifera*, the gizzard or masticatory part of the alimentary canal, between the pharynx and the oesophagus.

mastec'tomy (*Surg.*). Surgical removal of the breast.

master (*Acous.*). In gramophone-record manufacture, the copper electroplate obtained by plating the original wax on which a record has been made.

master (*Eng.*). (1) The term applied to special tools, gauges, etc. used for checking the accuracy of others used in routine work.—(2) The chief or key member of a system, as the *master cylinder* of a hydraulic brake mechanism.

master clock (*Elec. Eng.*). A clock for use with certain forms of electrical timekeeping equipment. It sends out impulses at predetermined time-intervals for the operation of other clocks or similar equipment.

master connecting-rod (*I.C. Engs.*). A specially strengthened connecting-rod used on one cylinder of a radial aero engine. It carries wrist pins to which the other rods are articulated, and so transmits the total thrust of all cylinders to the crank-pin.

master controller (*Elec. Eng.*). A controller for electrical equipment the operation of which energises or de-energises the contactors which perform the actual switching operations.

master factor (*Bot.*). Any powerfully acting ecological factor which plays the main part in determining the occurrence in a given area of a plant community of major rank.

master frequency meter (*Elec. Eng.*). See **integrating frequency meter.**

master gauge (*Eng.*). A standard gauge made to specially fine limits; used for checking the accuracy of limit gauges in routine use.

master haulier (*Mining*). See **pusher-on.**

master key (*Build.*). A special key operating a number of locks the keys for which are not interchangeable.

master oscillator (*Radio*). A thermionic valve oscillator, usually of low power, which controls the frequency of the currents radiated from a transmitter using independent drive.

master switch (*Elec. Eng.*). A switch for controlling the effect of a number of other switches or contactors; for instance, if the master switch is open, none of the other switches is operative.

master tap (*Eng.*). A sub-standard screw-tap, sometimes used after the plug-tap when great accuracy is required.

master telephone transmission reference system (*Teleph.*). The C.C.I.F. reference system for telephonic transmission measurements, located in the C.C.I. laboratory in Paris, and identical with the corresponding system maintained in the Bell Telephone Laboratories in New York.

mastic. A pale-yellow resin for the preparation of fine varnishes.

mastic (*Build.*). A term applied to bituminous preparations used for bedding and pointing window frames, bedding wood-block flooring, and repairing flat roofs.

mastic asphalt (*Build.*). A mixture of bitumen with stone chippings or sand, used for roofing, paving, and damp-proof courses.

mastication (*Zool.*). The act of reducing solid food to a fine state of subdivision or to a pulp.

masticator (*Chem.*). An apparatus consisting of two revolving and heated cylinders studded with teeth or knives; used for converting rubber into a homogeneous mass.

mas'ticatory (*Zool.*). Pertaining to the trituration of food by the mandibles, teeth, or gnathobases, prior to swallowing.

masticatory stomach (*Zool.*). See **gastric mill.**

mastid'ion (*Zool.*). In certain Spiders, a small nipple-like tubercle on the inner side of the paturon.

Mastigoph'ora (*Zool.*). A class of *Protozoa* comprising forms generally of small size, having in the principal phase one or more flagella, and lacking a meganucleus.

masti'tis (*Med., Vet.*). Inflammation of the mammary gland.

mas'todyn'ia (*Med.*). Pain in the breast.

mas'toid (*Bot., Zool.*). Resembling a nipple; as a posterior process of the otic capsule in the Mammalian skull.

mastoidec'tomy (*Surg.*). Excision of the (infected) air-cells of the mastoid bone.

mastoidi'tis (*Med.*). Inflammation of the air-cells of the mastoid bone.

masu'rium (*Chem.*). Symbol, Ma. An element in the seventh group of the periodic system, whose discovery was reported some years ago. At. no. 43. It is very rare, and exists only in small quantities in columbite, gadolinite, zircon, and certain other minerals.

mat (*Cinema.*). In cinematograph-film printing, a colloquial term for *mask.*

match-boarding or **match-lining** (*Carp.*). *Matched boards* (q.v.).

match, colour (*Photog.*). See **colour match.**

match planes (*Carp.*). A pair of planes used to cut the tongue and the groove, respectively, on matched boards. Also MATCHING PLANES.

matched boards (*Carp.*). Boards specially cut at the edges to enable close joints to be made, either by tongue and groove or by rebated edge.

matched lenses (*Photog.*). (1) A pair of substantially equal lenses in a normal camera or a television camera; used in parallel, one for focusing and framing, the other to focus the image on the emulsion or mosaic, which cannot be seen.—(2) The pair of lenses in a stereoscopic camera or viewer.

matching (*Carp.*). *Matched boards* (q.v.).

matchings (*Textiles*). Wool from different fleeces that has been sorted to one quality.

matching impedances (*Elec. Comm.*). The adjustment of a load to a source so that the maximum power is accepted, i.e. so that there is no reflection loss due to mis-match.

matching transformer (*Elec. Comm.*). A transformer expressly inserted into a communication circuit to avoid reflection losses because the load impedance differs from the source impedance. In designing for optimum matching, the ratio of the impedances equals the square of the ratio of the turns on the windings.

matelassé (*Textiles*). A compound cloth with a brocade face and, usually, a plain weave back; made from different materials and used for fancy vestings, etc.

material lock (*Civ. Eng.*). An air-lock enabling materials, tools, etc. to be passed into or taken out from spaces filled with compressed air.

material system (*Chem.*). See **system.**

materialism, dialectic. The philosophical principle which states that new phenomena arise through internal contradiction between phases of a process, e.g. mind from matter, ideologies from material social conditions.

mate'ries mor'bi (*Med.*). The stuff, substance, or organism which causes disease.

mating (*Build., etc.*). Said of surfaces or pieces which come into contact or interlock with others.

matlockite (*Min.*). Oxychloride of lead ($PbO \cdot PbCl_2$) which occurs in tabular tetragonal crystals.

ma'trix (*Biol.*). An outer layer of stainable material in a chromosome.—(*Bot.*) Any substratum, living or dead, in which a fungus grows.—(*Zool.*) The intercellular ground-substance of connective tissues.

matrix (*Build.*). The lime or cement constituting the cementing material that binds together the aggregate in a mortar or concrete.

matrix (*Print.*). The mould from which type is cast, produced by an impression from a punch: also, the mould made from a page of type in stereotyping or electrotyping.

mat'rocli'nous (*Biol.*). Exhibiting the characteristics of the female parent more prominently than those of the male parent. Cf. *patroclinous.*

matromor'phic (*Biol.*). Resembling the mother.

matt or **matte.** Smooth but dull; tending to diffuse light; said, e.g., of a surface painted or varnished so as to be dull or flat.

matte (*Met.*). A solution of mixed sulphides produced in the smelting of sulphide ores. In the smelting of copper, for example, a slag containing the gangue oxides and a matte consisting of copper and iron sulphides are produced. The copper is subsequently obtained by blowing air through the matte, to oxidise the iron and sulphur.

matter (*Med.*). See **pus.**

matter (*Phys.*). The substances of which the physical universe is composed. Matter is characterised by gravitational properties (on the earth by weight) and by its indestructibility under normal conditions.

Matthiesens standard (*Elec. Eng.*). A standard used for expressing the conductivity of copper. A length of wire of 1 metre, weighing 1 gram, should have a resistance of 0·1539 ohm if hard drawn, and 0·1508 if annealed; the value for any other wire can then be expressed as a percentage of this.

matting (*Cinema.*). Closing the width of the effective variable-density sound-track during recording so that the corresponding area prints black. The reduced area available for the modulation then requires extra modulation in compensation, but the result is an improved speech/noise ratio in sequences where the modulation is low.

mattress (*Civ. Eng.*). Sheet expanded metal for reinforcement of concrete roads.

Mat'ura diamonds (*Min.*). Colourless zircons from Ceylon, which on account of their brilliancy are useful as gemstones.

maturation (*Bot., Zool.*). The final stages in the development of the germ cells.

maturation divisions (*Zool.*). The divisions by which the germ cells are produced from the primary spermatocyte or oöcyte, during which the number of chromosomes is reduced from the diploid to the haploid number.

Mauch Chunk Beds, mawk— (*Geol.*). A group of red beds of continental origin, partly of Middle, partly of Upper Mississippian age, occurring in Pennsylvania.

Mauchline Lavas, mawhh'lin (*Geol.*). A series of lava flows and tuffs in Ayrshire, Scotland, which are followed above by red sandstones. The whole is possibly of Permian age.

maude (*Textiles*). A striped woollen plaid of greyish colour.

maul (*Tools*). See **beetle.**

maulstick (*Paint.*). A slender stick padded at one end with cloth or leather; used as a support for the hand guiding the brush. Also spelt MAHLSTICK.

maw-bound (*Vet.*). A term implying impaction of the rumen of cattle.

maxill-, maxil'lo- (Latin *maxilla*, jaw). A prefix used in the construction of compound terms; e.g. *maxillodental*, pertaining to the jaws and the teeth.

maxil'la (*Zool.*). In *Vertebrata*, the upper jaw: a bone of the upper jaw: in *Arthropoda*, an appendage lying close behind the mouth and modified in connexion with feeding.—*pl.* **maxil'lae** —*adjs.* **maxil'lary, maxillif'erous, maxil'liform.**

maxil'lary (*Zool.*). Pertaining to a maxilla: pertaining to the upper jaw: a paired membrane bone of the Vertebrate skull which forms the posterior part of the upper jaw.

maxillary glands (*Zool.*). In some *Crustacea*, excretory glandular organs in the region of the maxillae.

maxil'liped (*Zool.*). In *Arthropoda*, especially *Crustacea*, an appendage behind the mouth, adapted to assist in the transference of food to the mouth.

maxil'lotur'binal (*Zool.*). In Vertebrates, a paired bone or cartilage of the nose which supports the folds of the olfactory mucous membrane.

maxillu'la (*Zool.*). In *Arthropoda*, one of the first pair of maxillae, if there is more than one pair.

maximum and minimum thermometer (*Meteor.*). An instrument for recording the maximum and minimum temperatures of the air between two inspections, usually a period of 24 hours. A type widely used is *Six's thermometer* (q.v.).

maximum demand (*Elec. Eng.*). The maximum load taken by an electrical installation during a given period. It may be expressed in kW, kVA, or amperes.

maximum-demand indicator (*Elec. Eng.*). An instrument for indicating the maximum demand which has occurred on a circuit within a given period.

maximum-demand tariff (*Elec. Eng.*). A form of charging for electrical energy in which a fixed charge is made, depending on the consumer's maximum demand, together with a charge for each unit (kWh) consumed.

maximum equivalent conductance (*Elec. Eng.*). The value of the equivalent conductance of an electrolytic solution at infinite dilution with its own solvent.

maximum tensile stress (*Met.*). See **ultimate tensile stress.**

maximum traction truck (*Elec. Eng.*). A special form of bogie or truck often used on trams and arranged so that the greater part of the weight comes on the driving wheels, thereby enabling the maximum tractive effort to be obtained.

maximum value (*Elec. Eng.*). See **peak value.**

Maxweld (*Build.*). A metallic fabric providing a key for concrete.

maxwell (*Elec. Eng.*). The unit of magnetic flux; equivalent to one *line of force*.

Maxwell bridge (*Elec. Eng.*). An a.c. bridge devised by Maxwell for the measurement of self-inductance.

Maxwell experiment (*Photog.*). The demonstration of three-colour additive synthesis, using three black-and-white negatives.

Maxwell primaries (*Photog.*). The colours red, green, and blue-violet, used in Maxwell's experiment.

Maxwell's rule (*Elec. Eng.*). A law stating that every part of an electric circuit is acted upon by a force tending to move it in such a direction as to enclose the maximum amount of magnetic flux.

Maxwell's theorem (*Struct.*). See **reciprocal theorem.**

May Hill Sandstone (*Geol.*). A group of sandstones, conglomeratic at the base, belonging to the Llandovery Series in the Welsh Borderlands.

Maycous'tic (*Build.*). Trade-name for a pre-cast stone having good acoustic properties.

Mayo twill (*Textiles*). See **Campbell twill.**

M.C., m.c. Abbrev. for *metric carat* (see **carat**).

McBurney's point (*Med.*). A point situated on a line joining the umbilicus to the bony prominence of the hip-bone at the upper end of the groin, and 1½ in. from the latter; a point of maximum tenderness in appendicitis.

McColl protective system (*Elec. Eng.*). A form of protective system used on electric power networks; it operates on the balanced principle embodying biased beam relays.

McLeod gauge (*Chem.*). A device for the measurement of low pressures, based on an application of Boyle's law.

MC.P.S., mcps, or **mc/s** (*Elec. Comm.*). Abbrevs. for *megacycles per second.*

M.D.F. (*Elec. Comm.*). Abbrev. for *main distribution frame* (q.v.).

Me (*Chem.*). (1) A symbol for the methyl radical $-CH_3$. (2) A general symbol for a metal.

Meadfoot Beds (*Geol.*). A series of sandstones and grits which comprise the middle division of the Lower Devonian Rocks of Cornwall and South Devon.

Meadowtown Beds (*Geol.*). A group of limestones and flags belonging to the Llandeilian Series of the Ordovician System in Shropshire.

mealy (*Bot.*). Covered by a scurfy powder; farinose.

mean (*Maths.*). The *mean* of a set of quantities is their sum divided by the number of quantities. Distinction is made between the algebraic mean, which takes into account the signs (positive or negative) of the quantities, and the arithmetic mean, which takes all the signs as positive.

mean calorie (*Heat*). See **calorie.**

mean daily motion (*Astron.*). The term applied to the change in position of a heavenly body in some spherical co-ordinate, which is obtained by dividing the 360° of the complete cycle by the number of days taken to accomplish it; the amount a body would move in one day were its motion uniform.

mean effective pressure (*Eng.*).
See **brake—** **indicated—**

mean establishment (*Surv.*). The average value of the lunitidal interval at a place.

mean free path (*Acous.*). The average distance travelled by a sound-wave between successive reflections within an interior.

mean free path (*Phys.*). The mean distance traversed by a molecule of a gas between successive collisions. The following expressions for the mean free path L are derived from the kinetic theory:

$$L=\frac{\eta}{0{\cdot}31\rho U}; \quad L=\frac{2{\cdot}02\eta}{\sqrt{p\rho}},$$

where η is the viscosity, ρ the density, p the pressure, and U the mean molecular velocity. See also **gases (kinetic theory of).**

mean-hemispherical candle-power (*Illum.*) The average value of the candle-power in all directions above or below a horizontal plane passing through the source; called the *upper* or *lower* mean-hemispherical candle-power according as the candle-power is measured above or below the horizontal plane through the source.

mean-horizontal candle-power (*Illum.*). The average value of the candle-power of a light source in all directions in a horizontal plane through the source.

mean noon (*Astron.*). The instant at which the mean sun crosses the meridian at upper culmination at any place; unless otherwise specified, the meridian of Greenwich is generally meant.

mean pitch, experimental (*Aero.*). See **experimental mean pitch.**

mean solar day (*Astron.*). See **day (mean solar).**

mean solar time (*Astron.*). The hour angle of the *mean sun* (q.v.) at any moment. Referred to the meridian of Greenwich, this angle is Greenwich Mean Time. Before 1925 this was the time used in civil life in England. It is agreed by international convention that civil time should be counted from Greenwich Mean Midnight, so that it now differs from G.M.T. by twelve hours.

mean-spherical candle-power (*Illum.*). The average value of the candle-power of a light source taken in all directions.

mean-spherical response (*Acous.*). The response of a microphone or loudspeaker taken over a complete sphere the radius of which is large in comparison with the size of the apparatus. For a loudspeaker, this response (total response) determines the total output of sound-power, and therefore, in conjunction with the acoustic properties of an enclosure, the average reverberation intensity in the enclosure. For a microphone, this response is substantially equal to the response for reverberant sound. See also **reverberation response, total response.**

mean-square error (*Maths.*). The square-root of the mean of the squares of the deviations from the mean value when a number of observations are made of a quantity, all known errors having been eliminated, the residual errors being accidental. If n observations provide readings x_1, $x_2 \ldots x_n$, the mean of which is y, the mean-square error is taken as

$$\sqrt{\frac{\Sigma(x-y)^2}{n-1}}.$$

Cf. *probable error*, and *error (normal law of)*.

mean stress (*Met.*). The mid-point of a range of stress. When it is zero, the upper and lower limits of the range have the same value but are in tension and compression respectively.

mean sun (*Astron.*). A fictitious point imagined to describe the celestial equator at the same average rate as the true sun's completion of the ecliptic, but uniformly, so that the length of a mean solar day throughout the year is constant.

mean-zonal candle-power (*Illum.*). The average value of the candle-power of a light source taken in a given zone, the angular limits of the zone being stated.

measles (*Med.*). Morbilli. An acute infectious fever due, it is thought, to infection with a filter-passing organism; characterised by catarrh of the respiratory passages, *Koplik's spots* (q.v.), and a distinctive rash.

measles of beef (*Vet.*). Infection of beef by the bladderworm *Cysticercus bovis.*

measles of pork (*Vet.*). Infection of pork by the bladderworm *Cysticercus cellulosae.* Hence **measly pork.**

measure and a half (*Join.*). Joinery work which is square on one side and moulded on the other.

measuring chain (*Build., Surv.*). See **chain.**

measuring frame (*Build.*). A wooden box without top or bottom used as a measure for aggregates in mixing concrete.

measuring instrument (*Elec. Eng.*). A device serving to indicate or record one or more of the electrical conditions in an electrical circuit. Literally the term also includes integrating meters, but it is not generally used in this connexion.

measuring machine (*Eng.*). A machine for the precise measurement of standard gauges to an accuracy of the order 0·00001 in. It consists of a bed supporting slidable head and tail stocks, the former carrying a micrometer spindle.

measuring tape (*Build., Surv.*). See **tape.**

measuring wheel (*Surv.*). See **perambulator.**

me'atot'omy (*Surg.*). Incision of the urinary meatus in order to widen it.

mea'tus (*Zool.*). A duct or channel, as the external auditory *meatus* leading from the external ear to the tympanum.

mechanical advantage (*Mech.*). The ratio of the resistance (or load) to the applied force (or effort) in a *machine* (q.v.).

mechanical bias (*Teleg.*). In a polarised relay, the displacement of the tongue so that unequal marking and spacing currents are required for operation.

mechanical bond (*Civ. Eng.*). A bond used in reinforced concrete construction because the natural bond between the concrete and its reinforcing steel is generally inadequate from a strength point of view. Mechanical bond, independent of adhesion, is introduced by the use of plain bars bent into hooks at their ends, or of specially rolled bars with projecting ribs of various forms.

mechanical characteristic (*Elec. Eng.*). See **speed-torque characteristic.**

mechanical depolarisation (*Elec. Eng.*). Dissipation, by mechanical means, of the hydrogen bubbles causing polarisation of an electrolytic cell.

mechanical deposits (*Geol.*). Those deposits of sediment which owe their accumulation to mechanical or physical processes.

mechanical efficiency (*Eng.*). (Of an engine) the ratio of the brake or useful horse-power to the indicated horse-power developed in the cylinders, i.e. the efficiency of the engine regarded as a machine.

mechanical engineering. That branch of engineering concerned primarily with the design and production of all purely mechanical contrivances, including all types of prime-movers, vehicles, and general engineering products.

mechanical equivalent of heat (*Phys.*). The ratio of the mechanical energy transformed into heat to the resulting quantity of heat generated. Its value is $4 \cdot 18 \times 10^7$ ergs per calorie. Also called JOULE'S EQUIVALENT (symbol J).

mechanical equivalent of light (*Light*). The ratio of the radiant flux, in watts, to the luminous flux, in lumens, at the wavelength for which the *relative visibility factor* (q.v.) is a maximum. Its value is about ·0016 watt per lumen.

mechanical filter (*Cinema., etc.*). An arrangement of springs and masses interposed in a drive, particularly in sound-cameras, to smooth out variations in the required constant speed.

mechanical impedance (*Acous.*). The ratio of the total force required to move a body to the velocity resulting, for a specified frequency of motion. It consists of the real part, mechanical resistance, which represents the transmission of mechanical power, and the imaginary part, which is purely reactive.

mechanical line (*Acous.*). The adjustment of the elements in an acoustic system, such as a sound-box or electrical recorder, so that they form the elements of a wave-filter, in analogy with electrical filters.

mechanical rectifier (*Elec. Eng.*). A rectifier in which a rotating or oscillating commutator, operating synchronously with the a.c. supply, is used to rectify alternate half-waves of this supply.

mechanical refrigerator (*Eng.*). A plant comprising a compressor for raising the pressure of the refrigerant, a condenser for removing its latent heat, a regulating valve for lowering its pressure and temperature by throttling, and an evaporator in which it absorbs heat at a low temperature.

mechanical resonance (*Acous.*). Enhanced response to a constant-magnitude disturbing force as the frequency of this force is increased through a resonant frequency, at which the reactance of the inertia (or moment of inertia) balances the reactance of the supporting stiffness (or torque constant) of the system.

mechanical scanning (*Television*). Any system of scanning in which use is made of moving apertures, mirrors, lenses, or other like devices, as opposed to one in which there are no moving parts other than electron beams, as in cathode ray systems.

mechanical shovel (*Civ. Eng.*). An excavating machine.

mechanical stipple (tint) (*Print.*). A *stipple* (q.v.) executed on the block as opposed to one drawn by the artist on the original (*hand stipple*).

mechanical (or automatic) stoker (*Eng.*). A device for stoking or firing a steam boiler by automatic means. It receives fuel continuously by gravity, carries it progressively through the furnace, and deposits or discharges the ash. See **chain grate stoker, overfeed stoker, underfeed stoker.**

mechanical tissue (*Bot.*). Tissues, usually made up of thick-walled cells, which give support to the plant body.

mechanical wood-pulp (*Paper*). A low grade of wood-pulp prepared by grinding.

mechanics. The study of the action of forces on bodies and of the motions they produce. One branch of the subject, *statics*, deals with forces in equilibrium; another branch, *dynamics*, is concerned with motion in its relation to force; a third branch, *kinematics*, deals with the theory of motion without reference to forces.

Meckel's diverticulum (*Med.*). A diverticular outgrowth from the lower end of the small intestine, as a result of the persistence in the adult of the vitelline or yolk-sac duct of the embryo.

Mecke'lian cartilage (*Zool.*). In some Fish, the cartilaginous bar which forms each ramus of the lower jaw.

meco'nium (*Zool.*). In certain Insects, liquid expelled from the anus immediately after the emergence of the imago; it represents the pupal excreta.

medi-, medio- (Latin *medius*, middle). A prefix used in the construction of compound terms; e.g. *mediopectoral*, in the middle of the sternum.

me'dia (*Zool.*). In Insects, one of the primary veins of the wing: in Vertebrates, the middle tissue layer of the wall of a blood-vessel.

me'diad (*Zool.*). Situated near, or tending towards, the median axis.

median plane (*Bot.*). The plane passing through the middle of a leaf or a flower.

me'diastini'tis (*Med.*). Inflammation of the tissues of the mediastinum.

mediasti'num (*Zool.*). In higher Vertebrates, the mesentery-like membrane which separates the pleural cavities of the two sides ventrally: in Mammals, a mass of fibrous tissue representing an internal prolongation of the capsule of the testis.

mediator, potential (*Chem.*). See **potential mediator.**

medical electrolysis. See **galvanism.**

Medi'na cement (*Build., Civ. Eng.*). A quick-setting natural hydraulic cement made by calcining certain nodules found in the Isle of Wight, the bed of the Solent, and Hampshire.

Medina Sandstones and **Shales** (*Geol.*). A subdivision of the Silurian of N. America, typically exposed in the Niagara Gorge section, and comprising a basal quartzite followed by green and red shales and sandstones capped by another quartzite. These beds constitute the Medina Group of the Niagaran Series in some classifications; but in others they are given the status of a Series.

Mediterranean fever (*Med.*). See **undulant fever.**

medium (*Bot., Zool.*). A nutritive substance, usually of a paste-like or liquid consistency, on or in which tissues or cultures of micro-organisms may be reared; the all-pervading substance in which an animal has its being, as an *aqueous medium*.

medium (*Paint.*). A liquid or a semi-liquid vehicle, such as water, oil, spirit, wax, which makes pigment and other components of paint workable.

medium (*Paper*). A standard size of printing paper, 18½×23½ in.; U.S., 18×23 in.

medium Edison screw-cap (*Elec. Eng.*). An Edison screw-cap having a diameter of approximately 1 in. and approximately 7 threads per inch.

medium-grained (*Geol.*). See **grain-size classification.**

medium shot (*Cinema.*). A shot in motion-picture production which is normally used for a room or a group of people. See also **close shot, long shot.**

medium waves (*Radio*). Electromagnetic waves whose wavelength lies between 200 and 1000 metres.

medul'la (*Bot.*). (1) See **pith.**—(2) A tangle of loose or moderately loose hyphae in a sclerotium, rhizomorph, or other massive fungal structure.—(3) A loose hyphal layer in a thallus of a lichen.

medulla (*Zool.*). The central portion of an organ or tissue, as the *medulla* of the Mammalian kidney: bone-marrow.—*adj.* **medul'lary.**

medulla oblonga'ta (*Zool.*). The hind brain in Vertebrates, excluding the cerebellum.

medul'lary (*Bot*). Relating to, or belonging to, the pith

medullary bundle (*Bot.*). A vascular bundle running in the pith.

medullary canal (*Zool.*). The cavity of the central nervous system in Vertebrates; the central marrow cavity of a shaft-bone.

medullary folds (*Zool.*). In a developing Vertebrate, the lateral folds of the medullary plate, by the upgrowth and union of which the tubular central nervous system is formed.

medullary groove (*Zool.*). In a developing Vertebrate, a groove on the surface of the medullary plate which will later become converted into the medullary canal.

medullary plate (*Zool.*). In a developing Vertebrate, the dorsal plate-like area of ectoderm which will later give rise to the central nervous system.

medullary ray (*Bot.*). See **vascular ray.**

medullary rays (*Zool.*). Bundles of straight uriniferous tubules passing through the medulla of the Mammalian kidney.

medullary sheath (*Bot.*). The peripheral layers of cells of the pith. The cells are usually small, sometimes thick-walled, and sometimes more or less lignified.—(*Zool*) A layer of peculiar white fatty substance (myelin) which, in Vertebrates, surrounds the axons of the central nervous system and acts as an insulating coat.

medullary stele (*Bot.*). A meristele lying in the central tissues of a fern stem.

medullary velum (*Zool.*). See **Vieussens' valve.**

medul'late (*Bot.*). (1) Having pith.—(2) See **stuffed.**

med'ullated nerve fibres (*Zool.*). Axons of the central nervous system which are provided with a *medullary sheath* (q v.).

medul'loblasto'ma (*Med*). A malignant and rapidly growing tumour occurring in the cerebellum.

Medu'sa (*Build.*). Trade-name for a preparation used to waterproof cement surfaces.

medusa (*Zool.*). In metagenetic *Coelenterata*, a free-swimming sexual individual.

medu'soid (*Zool.*). In metagenetic *Coelenterata*, an imperfectly developed sexual individual which remains attached to the parent hydroid colony.

medusoid person (*Zool.*). An individual of the sexual stage in *Coelenterata* which show alternation of generations.

meerschaum, mär'showm (*Min.*). A hydrated silicate of magnesium. It is clay-like, and is shown microscopically to be a mixture of a fibrous mineral called parasepiolite and an amorphous mineral β-sepiolite. It is used for making pipes, and formerly was used in Morocco as a soap. Also called SEPIOLITE.

meeting post (*Hyd. Eng.*). The vertical post at the outer side of a lock-gate, which is chamfered so as to fit against the corresponding edge of the other gate of a pair when the gates are shut. Also called MITRE POST.

meeting rail (*Join.*). The top rail of the lower sash, or the bottom rail of the upper sash, of a double-hung window.

meeting stile (*Join.*). See **shutting stile.**

mega-, meg-. Prefix denoting a million, e.g. 1 megawatt = 1 million watts.

meg'a-, megal-, megalo- (Greek *megas*, gen. *megalou*, large). A prefix used in the construction of compound terms; e.g. *megacephalic*, with an abnormally large head.

megachro'mosomes (*Zool.*). In some *Ciliophora*, the outer set of chromosomes at mitosis, representing the meganucleus.

megaco'lon (*Med.*). Abnormally large colon.

meg'acycle (*Elec. Comm.*). One million cycles.

megacycles per second (*Elec. Comm.*). The unit of frequency in which there are one million complete cycles of alternation per second. Used in preference to wavelength when the latter attribute of a wave or oscillation is very short. Abbrevs. **MC.P.S., mc/s, mcps.**

Megadril'i (*Zool.*). An order of *Oligochaeta*, comprising mainly terrestrial forms in which the clitellum never commences before the twelfth somite (except in one family).

megagam'ete (*Zool.*). See **macrogamete.**

megakar'yocyte (*Zool.*). A uninucleate myeloplax possessing a central group of centrioles.

megal-, megalo-. Prefix. See **mega-.**

megalaes'thete (*Zool.*). In *Amphineura*, the larger type of sense-organ occurring in canals traversing the shell, resembling an eye in structure but not proved to be sensitive to light. Cf. *micraesthete.*

megalecithal, —les'i-thal (*Zool.*). Said of eggs which contain a large quantity of yolk.

meg'aline (*Elec. Eng.*). A unit often used in connexion with electrical machinery to denote a magnetic flux of 1 million lines or maxwells.

meg'aloblast (*Zool.*). An embryonic cell which has a large spherical nucleus and of which the cytoplasm contains haemoglobin, which will later give rise to *erythroblasts* (q.v.) by mitotic division within the blood-vessels.

meg'alocyte (*Med.*). An abnormally large red cell in the blood.

megalocyto'sis (*Med.*). The presence of many abnormally large red cells in the blood.

megaloma'nia (*Psychiatry*). Delusion of grandeur Delusional ideas of the possession of great wealth or of great power or of high position, as, for example, in general paralysis of the insane.

megalo'pa (*Zool*). See **megalops.**

meg'alopore (*Zool.*). One of the large apertures in the shell of an amphineuran Mollusc containing a megalaesthete.

meg'alops (*Zool.*). In brachyurous *Decapoda* (Crabs), the last larval stage intervening between the zoëa stages and the adult; characterised by the possession of a broad crab-like cephalothorax and a macrurous tail.—*adj.* **megalop'ic.**

Megalop'tera (*Zool.*). An order of *Endopterygota* in which there are usually two pairs of similar, transparent, net-veined wings; the mouth-parts are adapted for biting; the larva is active and predaceous and possesses biting mouth-parts. Alder Flies, Snake Flies.

megalospher'ic (*Zool.*). (In certain dimorphic species of *Foraminifera*) said of a form in which the initial chamber of the shell is large; cf. *microspheric.*—*n.* **meg'alosphere.**

meg'amere (*Zool.*). See **macromere.**

meganephrid'ia (*Zool.*). In *Chaetopoda*, the typical nephridia, of which one pair occurs in each somite. Cf. *micronephridia.*

meganu'cleus (*Zool.*). See **macronucleus.**

megaphan'erophyte (*Bot.*). A large tree over 30 metres in height.

megaphyl'lous (*Bot.*). Having very large leaves.

megasporan'gium (*Bot.*). A sporangium which contains megaspores.

meg'aspore (*Bot.*). A spore which gives rise to a female gametophyte, or its equivalent.—(*Zool.*) A large swarm-spore or anisogamete of *Sarcodina.*

megaspor'ophyll (*Bot.*). A leaf-like member which bears or subtends one or more megasporangia.

megger (*Elec. Eng.*). An instrument, operating on the ohmmeter principle, for measuring insulation resistance; it embodies a hand-driven electric generator to supply the e.m.f.

meg′ohm (*Elec. Eng.*). A unit of resistance used for very high resistance values; it is equal to 1 million ohms.

me′grims (*Vet.*). See **vertigo.**

Meibo′mian glands (*Zool*) In *Mammalia*, sebaceous glands of the eyelids.

mei′ocyte (*Cyt.*). Any cell in which meiosis is begun.

meiomer′ous (*Bot., Zool.*). Having a small number of parts.—*n.* **meiom′ery.**

mei′onite (*Min.*). Silicate of aluminium and calcium, together with calcium carbonate, which crystallises in the tetragonal system. It is a species of the isomorphous series forming the scapolite group. Cf. *feldspar group.*

meio′sis (*Cyt.*). The type of nuclear division by which the chromosomes are reduced from the diploid to the haploid number —*adj.* **meiot′ic.**

meiotax′y (*Bot.*). The failure of a whorl, or whorls, to develop.

meiot′ic euapogamy (*Bot.*) See **reduced apogamy.**

Meissner circuit, mis′ner (*Radio*). An oscillating thermionic valve circuit in which the resonant circuit is inductively coupled to two coils included in the anode and grid circuits respectively.

Meissner's corpuscles (*Zool.*). In Vertebrates, a type of sensory nerve-ending found in the skin, in which the nerve breaks up into numerous branches which surround a core of large cells in a connective-tissue capsule.

Meissner's plexus (*Zool.*). In Vertebrates, a gangliated plexus of non-medullated nerve-fibres in the submucous coat of the intestine.

melac′onite (*Min.*). Cupric oxide crystallising in the triclinic system. It is a black earthy material found as an oxidation product in copper veins. See also **tenorite.**

melae′na (*Med.*). The passage of black, pitch-like faeces due to the admixture of altered blood, the result of haemorrhage in the alimentary tract.

melan-, mel′ano- (Greek *melas*, gen. *melanos*, black). A prefix used in the construction of compound terms; e.g. *melanocratic* (q.v.).

melanae′mia (*Med*). The presence in the blood of the pigment melanin.

melancho′lia (*Psychiatry*). A condition seen in the depressive state of manic depressive psychosis, characterised by a state of extreme dejection and misery and a painful accent on all experiences; retardation of thought and depressive delusions may also be present. See **manic-depressive psychosis.**

melange, mă-lahn^{g}zh′ (*Textiles*). Worsted yarns made from printed tops.

mel′anin (*Chem.*). A dark-brown or black pigment occurring in hair and skin. Its empirical formula is $C_{17}H_{98}O_{33}N_{14}S$. It is soluble only in alkali, and is formed by the oxidation of tyrosine.

mel′anism (*Zool.*). An abnormal condition caused by overproduction of melanin.

mel′anite (*Min.*). Silicate of calcium and iron, crystallising in the cubic system. It is a black variety of garnet.

mel′anoblast (*Zool.*). A special connective tissue cell containing melanin.

melanocrat′ic (*Geol.*). A term applied to rocks which are abnormally rich in dark and heavy ferro-magnesium minerals (to the extent of 60% or more). See also **leucocratic, mesocratic.**

mel′anocyte (*Zool.*). A lymphocyte containing black pigment.

melanoder′mia or **melanoder′ma** (*Med.*). See **leucodermia.**

melanoglos′sia (*Med.*). Black hairy tongue. An overgrowth of the papillae of the tongue, which are stained black as the result either of bacterial action or of chemical action of certain food substances.

melano′ma (*Med.*). Strictly, any pigmented tumour; now commonly used as a synonym for *melanotic sarcoma.*

mel′anophore (*Zool.*). A chromatophore containing black pigment.

melano′sis (*Med.*). The abnormal deposit of the pigment melanin in the tissues of the body.

melanospor′ous (*Bot.*). Having black spores.

melanot′ic sarcoma (*Med.*). Melanoma. Malignant melanoma. A pigmented, malignant tumour arising in the skin or in the choroid of the eye.

mel′anotype (*Photog.*). Another name for *ferrotype.*

melan′terite (*Min.*). Hydrous ferrous sulphate which crystallises in the monoclinic system. It usually results from the decomposition of iron pyrite or marcasite. Also called COPPERAS.

melanu′ria (*Med.*). The presence in the urine of the pigment melanin.

mel′aphyre (*Geol.*). An obsolete general term for altered amygdaloidal rocks of basaltic or andesitic types.

Melbourn Rock (*Geol.*). A hard, white, often nodular bed of chalk, found at the base of the Turonian stage of the Chalk in the southern counties of England.

melena (*Med.*). See **melaena.**

melez′itose, melicitose (*Chem.*). A trisaccharose found in the juice of certain pines and in Persian manna.

mel′ilite (*Min.*). A complex mineral crystallising in the tetragonal system and consisting of a mixture of two minerals in isomorphous series—gehlenite (calcium aluminium silicate) and akermanite (calcium magnesium silicate). Melilite occurs as a component of certain recent basic eruptive rocks.

melliph′agous, melliv′orous (*Zool.*). Honey-eating.

mel′lisu′gent (*Zool.*). Honey-sucking.

mellowing (*Tanning*) A lessening of the astringency of a tan liquor by ageing.

melting-point (*Chem., etc.*). The temperature at which a solid begins to liquefy. Pure metals, eutectics, and some intermediate constituents melt at constant temperature. Alloys generally melt over a range. Also called FUSING-POINT.

melting-point test (*Build., Civ. Eng.*). A test for the determination of the melting-point of a bitumen for use in building or roadmaking. Also called SOFTENING-POINT TEST.

melting pot (*Glass*). A vessel of fireclay holding from a few pounds to 30-40 cwt., according to the type of manufacture; used to contain the glass whilst melting in the pot furnace. Such pots may be open or closed (i.e. provided with a hood to prevent furnace gases from acting on the glass).

melting pot (*Plumb*). The iron pot in which lead and solder are melted ready for use.

melton (*Textiles*). A strong heavily milled woollen fabric used for overcoatings.

member (*Bot.*). Any part of a plant considered from the standpoint of morphology.

member (*Build., Civ. Eng.*). (1) A constituent part of a structural framework.—(2) A division of a moulding.

member (*Zool.*). An organ of the body, especially an appendage.

membra′na (*Zool.*). A thin layer or film of tissue; a membrane.

membrana granulo′sa (*Zool.*). In a Graafian follicle, the inner layer which lines the cavity of the follicle.

membrana pro′pria (*Histol.*). See **basement membrane.**

membrana tecto′ria (*Zool.*). A soft fibrillated membrane overlying the organ of Corti.

membrana tym′pani (*Zool.*). A thin fibrous membrane forming the tympanum or ear-drum.

membrana'ceous, membranif'erous, mem'branous. *Adjs.* from *membrana, membrane.*

membrane (*Bot., Zool.*). A thin sheet-like structure, usually fibrous, connecting other structures or covering or lining a part or organ.—(*Entomol.*) The terminal portion of the hemi-elytrum of some hemipterous insects.

membrane bone (*Histol.*). Bone formed by the direct ossification of areolar connective tissue, without passing through a cartilaginous stage.

membranel'la (*Zool.*). In *Ciliophora,* an undulating membrane formed by the fusion of rows of cilia.

mem'branous labyrinth (*Zool.*). The soft tubular organ which forms the internal ear of Vertebrates, lining the tubular cavities of the bony labyrinth.

membranu'la (*Zool.*). An organelle of certain *Ciliophora,* formed by the concrescence of a number of cilia.

Menac'can Grit (*Geol.*). See **Grampound Grit.**

menac'canite (*Min.*). Sand composed of *ilmenite* (q.v.); found at Menaccan, Cornwall.

Mendel's law (*Gen.*). The offspring of parents that show contrasting characters, one dominant and one recessive, resemble the dominant parent in respect of such a character; in the second filial generation resulting from the crossing of these hybrid offspring 25% of the individuals will resemble the dominant grandparent, 25% will resemble the recessive grandparent, and 50% will resemble the hybrid individuals of the first filial generation.

Mendeleev's table, men-del-ā'yef (*Chem.*). See **periodic system.**

Mende'lian character (*Gen.*). A character which is inherited according to the generalisation known as *Mendel's law* (q.v.); an allelomorph.

Mendelian inheritance, Mendelism (*Gen.*). See **Mendel's law.**

Mendez Shales (*Geol.*). The impermeable cover to the oil-bearing Cretaceous limestones in Mexico; of Eocene age in the main.

mending (*Textiles*). Making good any imperfections caused during weaving by yarn breakages, etc.

mending (*Typog.*). A corrected piece inserted in a printing plate.

men'dipite (*Min.*). Oxychloride of lead, $2PbO \cdot PbCl_2$, which crystallises in the orthorhombic system; found in the Mendip Hills of Somerset.

Mene'vian Beds (*Geol.*). A series of dark flags and black slates which are of Middle Cambrian age; found typically in the St. Davids area in Pembrokeshire.

Ménière's disease, mā-nyār' (*Med.*). Labyrinthine vertigo. A disorder characterised by attacks of dizziness, buzzing noises in the ears, and progressive deafness; due to chronic disease of the labyrinth of the ear.

men'ilite (*Min.*). An alternative and more attractive name for *liver-opal*; it is a grey or brown variety of that mineral.

mening-, menin'go- (Greek *mēninx*, gen. *mēningos*, membrane). A prefix used in the construction of compound terms; e.g. *meningoencephalitis* (q.v.).

men'inges (*Zool.*). In Vertebrates, envelopes of connective tissue surrounding the brain and spinal cord.—*sing.* **meninx.**—*adj.* **menin'geal.**

meningio'ma (*Med.*). A tumour arising from the meninges of the brain, and, more rarely, of the spinal cord.

menin'gism, meningis'mus (*Med.*). The presence of the symptoms of meningitis in conditions in which the meninges are neither diseased nor inflamed.

meningi'tis (*Med.*). Inflammation of the meninges.

menin'gocele (*Med.*). The hernial protrusion of the meninges through some defective part of the skull or the spinal column.

meningo-encephali'tis (*Med.*). Inflammation of the meninges and of the brain substance.

meningo-enceph'alocele (*Med.*). A hernia of meninges and brain through some defect in the skull.

meningo-myeli'tis (*Med.*). Inflammation of the meninges and of the spinal cord.

meningo-myel'ocele (*Med.*). Hernial protrusion of meninges and spinal cord through a defect in the spinal column.

meningovas'cular (*Med.*). Pertaining to, or affecting, the meninges and the blood-vessels (especially of the nervous system).

menis'cus (*Chem.*). The surface of a liquid in a tube. It is usually curved, owing to surface tension effects.

meniscus (*Zool.*). A small interarticular plate of fibrocartilage which prevents violent concussion between two bones; as the intervertebral discs of *Mammalia.*

men'opause (*Med.*). The natural cessation of menstruation in women, usually between the ages of 45 and 50.

menorrha'gia (*Med.*). Excessive loss of blood owing to increased discharge during menstruation, the duration of the menstrual period being normal.

menostax'is (*Med.*). Excessive loss of menstrual blood due to an increase in the duration of the menstrual period (normally 4-5 days).

menotax'is (*Zool.*). The movements of an animal when it maintains a fixed direction in relation to a stimulus.

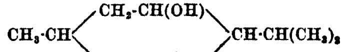
mensa (*Zool.*). The biting surface of a tooth.

men'strual (*Zool.*). Pertaining to menstruation.

menstrua'tion (*Zool.*). The periodical discharge from the uterus of a female Mammal. See also **xenomenia.**

mentalism. See **idealism.**

menthol (*Chem.*). $C_{10}H_{20}O$, a camphor compound of the formula



The *l*-modification is the chief constituent of peppermint oil. M.p. 43° C., b.p. 213° C. It is used as an antiseptic, and, externally, as a local analgesic.

mentomecke'lian (*Zool.*). In some Vertebrates, a cartilage bone of the lower jaw formed by the ossification of the tip of the Meckelian cartilage.

men'tum (*Zool.*). In higher Vertebrates, the chin: in some *Gastropoda,* a projection between the head and foot: in Insects, the distal sclerite forming the basal portion of the labium, situated between the submentum and the prementum.—*adj.* **mental.**

meral'gia paraesthet'ica (*Med.*). An affection of the nerve supplying the skin of the front and outer part of the thigh; characterised by pain, tingling, and/or numbness.

Mer'amec Group (*Geol.*). The general name for the Middle Mississippi Series, which includes the Warsaw Beds, Spergen Limestone, and St. Louis Limestone.

mercap'tals (*Chem.*). The condensation products of mercaptans with aldehydes.

mercap'tans (*Chem.*). Thio-alcohols. General formula, R·SH. They form salts with sodium, potassium, and mercury, and are formed by warming alkyl halides or sulphates with potassium hydrosulphide in concentrated alcoholic or aqueous solution, or by heating alcohol with P_2S_5.

mercaptan (*Chem.*). Ethyl mercaptan, C_2H_5SH; liquid of nauseous odour; b.p. 36° C.; readily oxidised to ethyl disulphide, $(C_2H_5)_2S_2$, by exposure to the air. It is an intermediate for *sulphonal* (q.v.) and for rubber accelerators.

mercap'tides (*Chem.*). The salts of mercaptans.

mercap'tols (*Chem.*). The condensation products of mercaptans with ketones.

mercerisa'tion (*Textiles*). A process which greatly increases the lustre of cotton yarns and fabrics. It consists of treating the material with concentrated caustic soda lye, which causes swelling and results in the fibres becoming transparent if the material is kept under tension.

merchant iron (*Met.*). Bar-iron made by re-piling and re-rolling puddled bar. All wrought-iron is treated in this way before being used for manufacture of chains, hooks, etc.

mercurial pendulum (*Horol.*) A compensation pendulum in which mercury is used as the compensating medium.

mercu'ric chloride (*Chem.*) See under **calomel.**

mercuric iodide (*Chem*). HgI_2. See also **Nessler's solution.**

mer'curous chloride (*Chem*). See **calomel.**

Mercury (*Astron.*). The first planet from the sun in order of distance; its mass is about $\frac{1}{25}$ that of the earth; its sidereal period is 88 days; it is not easily seen in non-tropical latitudes as, owing to its proximity to the sun, it can never attain a high altitude above the horizon, whether as an evening or morning star.

mercury (*Met.*) A white metallic element which is liquid at atmospheric temperature. Chemical symbol Hg, at. wt. 200·61, at. no. 80, sp. gr. at 20° C. 13·546, m.p. −38·5° C., b.p. 356 7° C., specific electrical resistivity 95·8 microhms per cu. cm. A solvent for most metals, the products being called *amalgams*. Its chief uses are in the manufacture of drugs and chemicals, fulminate, and vermilion. Used as metal in mercury-vapour lamps, arc rectifiers, power-control switches, and in many scientific and electrical instruments. Also called QUICKSILVER

mercury-arc convertor (*Elec. Eng.*). A convertor making use of the rectifying properties of the mercury arc.

mercury-arc rectifier (*Elec. Eng*). A type of rectifier in which use is made of the rectifying properties of an arc in mercury vapour between a hot cathode and a relatively cool anode at very low pressures. Also called MERCURY-VAPOUR RECTIFIER. See also **glass-bulb rectifier, steel-tank rectifier.**

mercury barometer (*Meteor.*, *Phys.*). An instrument used for measuring the pressure of the atmosphere in terms of the height of a column of mercury which exerts an equal pressure. In its simplest form it consists of a vertical glass tube about 80 cm. long, closed at the top and having its lower open end immersed in mercury in a dish. The tube contains no air, the space above the mercury column being known as a *Torricellian vacuum*.

mercury discharge lamp (*Illum.*). An electric discharge lamp in which the discharge takes place through mercury vapour. Also called MERCURY-VAPOUR LAMP.

mercury gauge (*Phys.*). A *manometer* (q.v.) containing mercury.

mercury motor meter (*Elec. Eng.*). A type of motor meter in which the moving part consists of a metal disc rotating in a bath of mercury. Current is led to the disc via the mercury, and interacts with permanent magnets or electromagnets to produce a torque on the disc, thus causing it to rotate.

mercury seal (*Chem.*). A device which ensures that the place of entry of a stirrer into a piece of apparatus is gas-tight, while allowing the free rotation of the stirrer.

mercury switch (*Elec. Eng.*). A switch in which the fixed contacts consist of mercury cups into which the moving contacts dip, or in which the mercury is contained in a tube which is made to tilt, thereby causing the mercury to bridge the contacts.

mercury-vapour lamp (*Illum.*). See **mercury discharge lamp.**

mercury-vapour pump (*Chem.*). A pump in which mercury is continuously vaporised and recondensed; its evacuating action results from the diffusion of gas into the mercury vapour.

mercury-vapour rectifier (*Elec. Eng.*). See **mercury-arc rectifier.**

mercury-vapour tube (*Thermionics*). Generally, any device in which an electric discharge takes place through mercury vapour. Specifically, a triode valve operating in an atmosphere of mercury vapour, which is ionised by the passage of electrons and reduces the space charge, and consequently the anode potential necessary to maintain a given current. The grid is only effective in controlling the start of the discharge. See also **thyratron.**

Merevale Shales (*Geol.*). The upper division of the Stockingford Shales found near Nuneaton; of Cambrian age.

mer'icarp (*Bot.*). A one-seeded portion of a fruit which splits up at maturity.

mericli'nal chimaera (*Bot.*). A chimaera in which one component does not completely surround the other; an incomplete *periclinal chimaera* (q.v.).

merid'ian (*Astron.*). That great circle passing through the poles of the celestial sphere which cuts the observer's horizon in the north and south points, and also passes through his zenith.

meridian (*Surv.*, *etc.*). The imaginary plane passing through the earth's axis and the point on the earth's surface to which the meridian refers. Called a *meridian of longitude*.

meridian altitude (*Astron.*). The altitude of a heavenly body at the position of upper transit.

meridian circle (*Astron.*). A telescope mounted on a horizontal axis pointing due east and west, so that the instrument itself moves in the meridian plane. It is used to determine the times at which stars cross the meridian, and is equipped with a graduated circle for deducing declinations. Also called TRANSIT CIRCLE.

meridian passage (*Astron.*). **See transit.**

meridian plane (*Surv.*). The vertical plane lying in the direction of true north-south.

merid'ional (*Zool.*). Extending from pole to pole; as a *meridional furrow* in a segmenting egg.

Merid'ogas'tra (*Zool.*). See **Ricinulei.**

Merino, me-rē'no (*Hosiery*). The term applied to yarn or knitted goods made from a mixture of Merino wool and cotton.

Merino wool (*Textiles*). Wool of fine quality from Merino sheep; used in Saxony quality woollens and Botany quality worsted cloths. The name is also used in the low woollen trade for waste obtained from fine worsted clothing.

mer'ism (*Bot.*). The development of more than one member of the same kind, usually in such a way that a symmetrical arrangement or pattern is formed.

mer'ispore (*Bot.*). One segment of a multiple spore.

mer'istele (*Bot.*). A strand of vascular tissue, enclosed in a sheath of endodermis, forming part of a dictyostele.

mer'istem (*Bot.*). A group of undifferentiated cells each of which is capable of division, giving rise to at least one daughter cell able to divide again, and so on.—*adj.* **meristemat'ic.**

meris'tic (*Zool.*). Segmented: divided up into parts: pertaining to the number of parts, as *meristic variation* (q.v.). See also **merome.**

meristic variation (*Bot.*, *Zool.*). Variation in the number of organs or parts; as variation in the number of body somites of a metameric animal.

mer′istogenet′ic (*Bot.*). Formed from, or by, a meristem.

Merkel's corpuscles (*Zool.*). See **Grandry's corpuscles.**

merlons (*Arch*). The projecting parts of a battlement.

mermaid's purse (*Zool*). A popular name applied to the horny purse-like capsule in which the eggs of certain Selachian fish (Sharks, Dogfish, Skates, Rays) are enclosed.

Mermis (*Zool.*). A genus of Nematode worms living parasitically in the bodies of ants.

mermithan′er (*Zool.*). A male ant having abnormal characters, as a result of being parasitised by Mermis.

mermither′gate (*Zool.*). A worker ant having abnormal characters as a result of its being parasitised by Mermis.

mer′mithogyne (*Zool.*). A queen ant having abnormal characters as a result of its being parasitised by Mermis.

mero- (Greek *meros*, part). A prefix used in the construction of compound terms; e.g. *merogastrula*, a gastrula formed by the segmentation of part of the ovum only.

meroblas′tic (*Zool*). Said of a type of ovum in which cleavage is restricted to a part of the ovum, i.e. is incomplete, usually due to the large amount of yolk.

merocerite, mer-os′— (*Zool.*). In *Crustacea*, the fourth segment of the antennae.

mer′ochrome (*Chem.*). A mixed crystal consisting of two differently coloured isomers.

merog′amy, *or* mer′ō-gam′i— (*Bot.*). The union of two individualised gametes.—(*Zool.*) The condition of having gametes which are smaller than the ordinary cells of the species and are produced by special fission; union of such gametes; cf. *hologamy*.—*n.* **merogam′etes.**

merogen′esis (*Zool.*). Segmentation: formation of parts.

merogen′ic (*Zool*) Said of induction in which a part only of the soma is affected primarily. Cf. *hologenic.*

merogna′thite (*Zool.*). The fourth joint of an oral appendage in *Crustacea.*

merog′ony (*Zool.*). The development of fertilised enucleate fragments of an ovum.

meroistic, mer-ō-is′tik (*Zool.*). Said of ovaries which produce yolk-forming cells as well as ova.

me′rome (*Zool.*). A body somite or segment of a metameric animal.

mer′on (*Zool.*). In Insects in which the coxa is divided, the posterior portion.

me′ront (*Zool.*). In some *Neosporidia*, a uninucleate phase succeeding the *planont* (q.v.) and multiplying by fission.

me′roplank′ton (*Zool.*). Plankton which is found at different depths at different times.

merop′odite (*Zool.*). In some *Crustacea*, the second joint of the endopodite of the walking-legs or maxillipeds.

me′ros (*Arch.*). The surfaces between the channels in a triglyph. Also called FEMUR.

meroso′matous (*Zool.*). Said of ascidiozooids which show division into thorax and abdomen.

me′rosome (*Zool*). See **merome.**

merosthen′ic (*Zool.*). Having the hind limbs exceptionally well developed, as Frogs, Kangaroos.

merox′ene (*Min.*). One of the classes into which *biotite* (q.v.) was divided by Tschermak. This class includes nearly all ordinary biotite.

Merozo′a (*Zool.*). An order of *Cestoda* in which the body is differentiated into a scolex and proglottides, and the genitalia are repeated in each proglottis; there is a complex life-history, the larval form usually occurring in herbivorous animals, the mature form in the gut of various carnivorous, omnivorous, and insectivorous Vertebrates.

merozo′ite (*Zool*). In *Protozoa*, a young trophozoite resulting from the division of the schizont.

merozo′on (*Zool.*). A fragment of a protozoon produced artificially, and containing a portion of the macronucleus.

Merrill-Crowe process (*Met.*). A process for precipitating gold from deoxygenated cyanide solution by means of zinc dust.

merrythought bone (*Zool.*). The furcula of Birds.

Meru′lius lac′rymans (*Build.*). The name of a fungus which commonly occasions *dry rot* (q.v.).

mer′ycism (*Med.*). Rumination. The return, after a meal, of gastric contents to the mouth; they are then chewed and swallowed once more.

Merz-Hunter protective system (*Elec. Eng.*). See **split-conductor protection.**

Merz-Price protective system (*Elec. Eng.*). A form of balanced protective system for electric power networks, in which the current entering a section of the network is balanced against that leaving it. If a fault occurs on the section this balance is upset, and a relay is caused to operate and trip circuit-breakers to clear the faulty section from the network.

mes-, meso- (Greek *mesos*, middle). A prefix used in the construction of compound terms; e.g. *mesothorax*, the middle segment of the thorax in Insects. This prefix is also used to indicate association with the mesothorax of Insects (e.g. *mesoscutum*, the scutum of the mesothorax), and in naming Vertebrate mesenteries (e.g. *mesohepar*, the mesentery supporting the liver).

mesade′nia (*Zool.*). In Insects, accessory glands of the genital system, of mesodermal origin. Cf. *ectadenia.*

mesaorti′tis (*Med.*). Inflammation of the middle coat of the aorta.

me′sarch (*Bot.*). Having the protoxylem surrounded by metaxylem.

mesec′toderm (*Zool.*). Parenchymatous tissue formed from ectoderm cells which have migrated inwards.

mesenceph′alon (*Zool.*). The mid-brain of Vertebrates.

mesen′chyma (*Zool.*). Parenchyma; embryonic mesodermal tissue of spongy appearance.—*adj.* **mesenchym′atous.**

mes′enchyme (*Zool.*). Mesodermal tissue, comprising cells which migrate from ectoderm, or endoderm, or mesothelium into the blastocoele. Cf. *mesothelium.*

mesen′doderm (*Zool.*). In ontogeny, endodermal cells which will later give rise to mesoderm.

mesenter′ic (*Zool.*). Pertaining to the mesenteron: pertaining to a mesentery.

mesenteric caeca (*Zool.*). Digestive diverticula of the mesenteron in many *Invertebrata* (e.g. in *Arachnida, Crustacea, Echinodermata, Insecta*).

mesenteric filament (*Zool.*). In *Anthozoa*, the enlarged free edge of a mesentery.

mesen′teron (*Zool.*). See **mid-gut.**

mes′entery (*Zool.*). In *Coelenterata*, a vertical fold of the body wall projecting into the enteron. More generally, a fold of tissue supporting part of the viscera.—*adjs.* **mesente′rial, mesenter′ic.**

meseth′moid (*Zool.*). A median cartilage bone of the Vertebrate skull, formed by ossification of the ethmoid plate.

mesh (*Build., Civ. Eng.*). Expanded metal used as a reinforcement for concrete.

mesh (*Elec. Comm.*). A combination of electrical elements forming a complete circuit.

mesh (*Lace*). A completed opening in a fabric, formed by the combination of two bobbin threads and two warp threads.

mesh connexion (*Elec. Eng.*). A method of connecting the windings of an a.c. electric machine; the windings are connected in series so that they may be represented diagrammatically by a polygon. The *delta connexion* (q.v.) is a particular example of this method.

mesh network (*Elec. Comm.*). A network formed from a number of impedances in series.

mesh structure (*Geol.*). A term applied to the mode of alteration of olivine to serpentine; this process begins round the margins of the crystal and along the irregular network of cracks which traverse it.

mesh voltage (*Elec. Eng.*). The voltage between any two lines of a symmetrical polyphase system which are consecutive as regards phase sequence. Called *delta voltage* in a three-phase system, and *hexagon voltage* in a six-phase system.

me'siad (*Zool.*). Situated near, or tending towards, the median plane.

me'sial, me'sian (*Zool.*). In the median vertical or longitudinal plane.

mes'itite (*Min.*). A variety of *magnesite* (q.v.) containing from 30-50% of iron carbonate.

mes'ityl oxide (*Chem.*). $(CH_3)_2C.CH{\cdot}CO{\cdot}CH_3$; a colourless liquid of peppermint-like odour; b.p. 122° C.

mesit'ylene (*Chem.*). $C_6H_3(CH_3)_3$, 1, 3, 5-trimethylbenzene; a colourless liquid, occurring in coal-tar; b.p. 164° C.

meso- (*Chem.*). (1) Optically inactive by intramolecular compensation.—(2) Substituted on a carbon atom situated between two hetero-atoms in a ring.—(3) Substituted on a carbon atom forming part of an intramolecular bridge.

meso-. Prefix. See **mes-**.

mesoben'thos (*Zool.*). Fauna and flora of the sea-floor, at depths ranging from 100 to 500 fathoms.

me'soblast (*Zool.*). The mesodermal or third germinal layer of an embryo, lying between the endoderm and ectoderm.—*adj.* **mesoblas'tic.**

mesoblastic somites (*Zool.*). In developing metameric animals, segmentally arranged blocks of mesoderm, the forerunners of the somites.

mesobron'chium (*Zool.*). In Birds, the continuation of the main bronchus through the lung to the abdominal air-sac.

me'socarp (*Bot.*). The middle layer of a pericarp.

mesocer'ebron (*Zool.*). See **deutocerebron.**

me'socoele, —sēl (*Zool.*). In *Craniata*, the cavity of the mid-brain; mid-ventricle; Sylvian aqueduct.

mesocol'loid (*Chem.*). A particle whose dimensions are 250-2500 A ($2{\cdot}5\times10^{-6}$-$2{\cdot}5\times10^{-5}$ cm.), containing 100-1000 molecules.

mesocrat'ic (*Geol.*). A term applied to igneous rocks which, in respect of their content of dark silicates, are intermediate between those of leucocratic and melanocratic type, and contain 30-60% of heavy, dark minerals.

me'soderm (*Zool.*). See **mesoblast.**

mesogas'ter (*Zool.*). In Vertebrates, the portion of the dorsal mesentery which supports the stomach.

mesogloe'a (*Zool.*). In *Coelenterata*, a structureless layer of gelatinous material intervening between the ectoderm and the endoderm.

mesohe'par (*Zool.*). In Vertebrates, the surviving portion of the ventral mesentery in the region of the liver.

me'solecithal, —les'i-thal (*Zool.*). Said of ova in which the yolk is aggregated in the centre.

me'solite (*Min.*). A mineral intermediate in composition between *natrolite* and *scolecite.* Crystallises in the monoclinic system, and occurs in amygdaloidal basalts and similar rocks.

me'somere (*Zool.*). The middle muscle-plate zone of the mesothelial wall of a developing Vertebrate, situated between the epimere and the hypomere.

mesom'erism (*Chem.*). (1) *Desmotropism* (q.v.).—(2) *Resonance* (q.v.).

mesomet'rium (*Zool.*). The mesentery which supports the uterus and related structures.

mesomito'sis (*Cyt.*). Mitosis which takes place within the nuclear membrane, without any co-operation from cytoplasmic elements. Cf. *metamitosis.*

mesomor'phous (*Chem.*). Existing in a state of aggregation midway between the true crystalline state and the completely irregular amorphous state. See also **liquid crystals.**

mesomyo'dian (*Zool.*). (Of Birds) having the syringeal muscles attached to the middle of the bronchial hemi-rings.

Me'sonemertin'i (*Zool.*). An order of *Dimyaria* in which the mouth is behind the brain, the proboscis lacks stylets, and the cerebral ganglia and lateral nerves are embedded in the muscles of the body-wall. Marine forms.

mesoneph'ros (*Zool.*). The Wolffian body or median portion of the Vertebrate kidney, arising after the pronephros, which it gradually replaces; in some forms it develops into the adult kidney, while in others it combines with, or is replaced by, the *metanephros* (q.v.) as an excretory organ; it frequently becomes associated with the genital system in male animals.

mesono'tum (*Zool.*). The notum of the mesothorax in Insects.—*adj.* **mesono'tal.**

mesophan'erophyte (*Bot.*). A tree having a height of 8-30 metres.

mesophi'lic bacteria (*Bot.*). Bacteria which grow best at temperatures of 10-40° C.

mesophrag'ma (*Zool.*). In *Insecta*, an apodeme arising from the postscutellum.

me'sophyll (*Bot.*). The parenchymatous tissue between the upper and lower epidermises of a leaf, chiefly concerned with photosynthesis.

me'sophyte (*Bot.*). A plant occurring in places where the water-supply is neither scanty nor excessive.—*adj.* **mesophyt'ic.**

mesophyt'ic environment (*Bot.*). An environment in which the water-supply is neither very scanty nor very abundant.

mesoplank'ton (*Zool.*). Plankton found below a depth of 100 fathoms.

mesoplas'tron (*Zool.*) In some *Chelonia*, a bone of the plastron intercalated between the hypoplastron and the hyoplastron.

mesopleu'ron (*Zool.*). In *Diptera*, a thoracic sclerite lying between the notopleural and sternopleural sutures and in front of the root of the wing.

me'sopod (*Bot.*). Said of the fruit body of a fungus which has a central stipe.

mesopo'dium (*Zool.*). (1) The metacarpus or metatarsus.—(2) In *Gastropoda*, that part of the foot between the propodium and the metapodium. —*adj.* **mesopo'dial.**

mesopterygium, mē-zō-pter-ij'— (*Zool.*). One of the three basal cartilages of the pectoral fin in *Selachii*, lying between the propterygium and the metapterygium.

mesopter'ygoid (*Zool.*). See **ectopterygoid.**

mesor'chium (*Zool.*). In Vertebrates, the mesentery supporting the testis.

mesosap'robe (*Bot.*). A plant living in somewhat foul water.

mesoso'ma (*Zool.*). In *Arachnida*, the anterior division of the 'abdomen,' being the middle tagma of the body, which always bears the genital opening on its first somite.—*adj.* **mesosomat'ic.**

me'sospore (*Bot.*). (1) A layer in the spore wall, developed inside the first-formed outer layer, and sometimes bearing ridges, pointed outgrowths, or other ornamentation.—(2) A teleutospore consisting of one cell.

me'sostate (*Zool.*). An intermediate stage in metabolism.

mesoster'num (*Zool.*). In Insects, the sternum of the mesothorax: in Vertebrates, the middle part of the sternum, connected with the ribs; the gladiolus.

mesosteth'ium (*Zool.*). See **mesosternum.**

mesotar'sal (*Zool.*). In Insects, the tarsus of the second walking leg: in land Vertebrates, the ankle joint or joint between the proximal and distal rows of tarsals.

mesothe'lium (*Zool.*). Mesodermal tissue comprising cells which form the wall of the cavity known as the coelom. Cf. *mesenchyme.*

mesotho'rax (*Zool.*). The second of the three somites composing the thorax in Insects.—*adj.* **mesothorac'ic.**

mesotho'rium (*Chem.*). A radioactive isotope of radium, with a half-life of 6·7 years.

mesot'ic (*Zool.*). In Birds, a paired cartilage of the chondrocranium, situated between the parachordal and the acrochordal.

mesotro'chal (*Zool.*). Having an equatorial band of cilia.

mesotympan'ic (*Zool.*). See **symplectic.**

me'sotype (*Min.*). A name given by Hauy to *natrolite*, because its form is intermediate between the forms of stilbite and analcite. S. J. Shand uses the same term as synonymous with *mesocratic.*

mesova'rium (*Zool.*). In Vertebrates, the mesentery supporting the ovary.

mesoxal'ic acid (*Chem.*). $CO(COOH)_2+H_2O$ or $C(OH)_2(COOH)_2$; a dibasic ketonic acid, forming deliquescent prisms; it is prepared from dibromomalonic acid by heating with caustic soda solution.

Mesozo'ic (*Geol.*). The name applied to the era of geological time which includes the periods during which rocks of Triassic, Jurassic, and Cretaceous age were deposited.

messenger wire (*Elec. Eng., etc.*). The strong suspension wire for holding aerial cables, the latter being suspended by leather thongs: a *bearer cable* (q.v.).

mes'suage (*Build.*). A dwelling-house and its adjacent land and buildings.

mes'tome (*Bot.*). Conducting tissue, with associated parenchyma, but without mechanical tissue.

meta- (Greek *meta*, after). A prefix used in the construction of compound terms; e.g. *metanauplius*, the stage in the life-cycle of some *Crustacea* which comes after the nauplius; *metathorax*, the posterior part of an Insect's thorax. This prefix is also used to indicate association with the metathorax of Insects (e.g. *metascutum*, the scutum of the metathorax).

meta- (*Chem.*). (1) Derived from an acid anhydride by combination with one molecule of water.—(2) A polymer of . . . —(3) A derivative of . . .

meta- (*Chem.*). See ***m-***.

meta-aldehyde (*Chem.*). See **metaldehyde.**

metabasip'odite (*Zool.*). See **preischiopodite.**

metabol'ic nucleus (*Cyt.*). A nucleus when it is not dividing, and when the chromatin is in the form of a network; the so-called *resting nucleus.*

metab'olism (*Biol.*). The sum-total of the chemical and physical changes constantly taking place in living matter.—*adj.* **metabol'ic.**

metab'olite (*Zool.*). A product of metabolism.

metab'oly (*Bot.*). The power possessed by some cells of altering their external form.

metaboly (*Zool.*). Euglenoid movement (see **euglenoid**).

metabo'ric acid (*Chem.*). See **boric acid.**

metacar'pal or **metacar'pale** (*Zool.*). One of the bones composing the *metacarpus* (q.v.) in Vertebrates.

metacar'pus (*Zool.*). In land Vertebrates, the region of the fore limb between the digits and the carpus.

met'acentre (*Hydrostatics*). If a vertical line is drawn through the centre of gravity of a body floating in equilibrium in a liquid, and a second vertical line is drawn through the centre of buoyancy (centre of gravity of the displaced liquid) when the body is slightly displaced from its equilibrium position, the two lines meet in a point called the *metacentre.* According to whether this is above or below the centre of gravity of the body, the equilibrium is stable or unstable.

metacen'tric height (*Hydrostatics*). The distance between the centre of gravity of a floating body and its *metacentre* (q.v.). Of ships, the measure of stability of a vessel at small angles of heel, indicative of its behaviour when rolling.

metacerca'ria (*Zool.*). An encysted cercaria.

metacer'ebron (*Zool.*). See **tritocerebron.**

metaces'tode (*Zool.*). The encysted larval stage of a Tapeworm (*Cestoda*).

metachemistry. The study of atomic and subatomic phenomena.

metachromat'ic (*Micros.*). Showing other than the basic colour constituent after staining.—*n.* **metachro'masy.**

metachromatic corpuscle or **metachromatic granule** (*Cyt.*). An inclusion in cytoplasm consisting of *metachromatin.*

metachro'matin (*Biol.*). A complicated substance, stated to be a compound of nucleic acid, occurring in granules in cytoplasm.

metachro'nal rhythm (*Zool.*). The rhythm shown by beating cilia, or the movements of the ctenes of *Ctenophora*, in which each cilium or ctene bends in immediate succession to its predecessor, giving the appearance of wave motion.

metachro'sis (*Zool.*). The ability, shown by some animals (as the Chameleon) to change colour by expansion or contraction of chromatophores.

metacin'nabarite (*Min.*). Mercuric sulphide. In composition similar to *cinnabar* (q.v.), but occurs in black tetrahedral (cubic) crystals (also massive).

metacneme, met'a-nēm (*Zool.*). In some *Anthozoa*, a secondary mesentery.

met'acoele (*Zool.*). In *Craniata*, the cavity of the hind brain; the fourth ventricle.

met'acone (*Zool.*) In Mammals, the postero-external cusp of an upper molar tooth.

metaco'nid (*Zool.*). In Mammals, the postero-external cusp of a lower molar tooth.

metacro'mion (*Zool.*). A process terminating the acromion in some *Rodentia.*

metadiscoi'dal placentation (*Zool.*). Having the villi at first scattered and then restricted to a disc, as in Primates.

Met'aform (*Build., Civ. Eng.*). Steel shuttering for the support of concrete while it is setting; side-by-side units are employed for large surfaces.

metagen'esis (*Zool.*). See **alternation of generations.**

metakine'sis (*Cyt.*). See **metaphase.**

metal. An element which readily forms positive ions. Metals are characterised by their opacity and high thermal and electrical conductivity.

metal (*Civ. Eng.*). See **road metal.**

metals (*Rail.*). A term applied to the rails of a railway.

metal-arc welding (*Elec. Eng.*). A type of electric welding in which the electrodes are of metal, and melt during the welding process to form filler metal for the weld.

metal-clad switchgear (*Elec. Eng.*). A type of switchgear in which each part is completely surrounded by an earthed metal casing. Cf. *metal-enclosed switchgear.*

metal-cored carbon (*Illum.*). An arc-lamp carbon having a core of metal, in order to improve its conductivity.

metal electrode (*Elec. Eng.*). A form of electrode used in *metal-arc welding* (q.v.).

metal-enclosed switchgear (*Elec. Eng.*). A type of switchgear in which the whole equipment is enclosed in an earthed metal casing. Cf. *metal-clad switchgear.*

metal filament (*Elec. Eng.*). A fine metal conductor heated to incandescence to provide illumination or to act as a source of electrons in a vacuum tube.

metal-filament lamp (*Illum.*). A filament lamp in which the light is produced by raising a fine wire or filament of metal to white heat.

metal lathing (*Build.*). *Expanded metal* (q.v.) used to cover surfaces to provide a basis for plaster.

metal pattern (*Foundry*). A *pattern* (q.v.) made in cast-iron, brass, or light alloy, in order to ensure durability and permanence of form when a large number of castings are required, as in repetition work on moulding machines.

metal rectifier (*Elec. Eng.*). A form of rectifier making use of the rectifying property of a layer of oxide on a metal disc, e.g. copper oxide on a copper disc. A number of such discs can be connected in series or in parallel to give high-voltage or high-current rectifiers. Also called DRY PLATE RECTIFIER.

metal rule (*Typog.*). See **em rule.**

metal spinning (*Eng.*). The shaping of thin sheet-metal discs into cup-shaped forms by the lateral pressure of a steel roller or a stick on the revolving disc, which is gradually pressed into contact with a former on the lathe face-plate.

metal trim (*Build.*). Architraves and other finishings made out of pressed metal sheeting clipped or screwed in position around door or window openings.

metal valley (*Plumb.*). A V-shaped gutter, lined with lead, zinc, or copper, between two roof-slopes.

metal V-ring or **metal V-collar** (*Elec. Eng.*). A metal ring used in commutator construction; it has a V-shaped cross-section, so that it will fit into a corresponding recess in the commutator segments.

metal'dehyde (*Chem.*). Meta-aldehyde. $(C_2H_4O)_3$; long glistening needles which sublime at 115° C. with partial decomposition into acetaldehyde. Acetaldehyde is polymerised to metaldehyde by the action of acids at temperatures below 0° C.

metallic circuit (*Teleg.*). Telegraph circuit in which there is a complete copper circuit, with no earth return.

metallic crystals (*Met.*). The crystals of which metals and alloys are composed. Three main types are recognised, viz. *pure metal* crystals, *primary solid solution* crystals, *intermediate constituent* crystals.

metallic lustre (*Min.*). A degree of lustre exhibited by certain opaque minerals, comparable with that of polished steel.

metallic mirror (*Photog.*). A mirror made from the surface of a highly polished metal.

metallic packing (*Eng.*). A *packing* (q.v.) consisting of a number of rings of soft metal, or a helix of metallic yarn, encircling the piston-rod and pressed into contact therewith by a gland nut.

metallic soap (*Acous.*). The soap-like wax material which is used for making the original record in gramophone-disc manufacture. The metallic character arises from the presence of lead or aluminium stearate.

metallif'erous veins (*Geol.*). Cracks and fissures in rocks which are found to contain, among other minerals, the ores of metals. See also **lodes.**

metalling (*Civ. Eng.*). See **road metal.**

metallisation (*Chem.*). The conversion of a substance, e.g. selenium, into a metallic form.

metallised filament (*Elec. Eng.*). A carbon lamp filament which has been given special heat treatment in order partially to convert it to graphite, thereby making it almost metallic in its properties. Also called GRAPHITISED FILAMENT.

metallised valve (*Thermionics*). A valve in which the exterior of the envelope is coated with a conducting metallic film which can be connected to cathode or earth, to provide electrostatic shielding of the interior of the valve from external disturbance. Also called SPRAY-SHIELDED VALVE.

metal'lochrome (*Chem.*). The tinting produced on a metal surface by means of metallic salts.

metallog'raphy. The branch of metallurgy which deals with the study of the structure and constitution of solid metals and alloys, and the relation of this to properties on the one hand and manufacture and treatment on the other.

met'alloid (*Chem.*). (1) An element having both metallic and non-metallic properties; e.g. arsenic. —(2) A non-metal.

metallurgy, met'— *or* met-al'—. Art and science applied to metals. The term covers extraction from ores, refining, alloying, shaping, treating, and the study of structure, constitution, and properties.

met'amere (*Zool.*). See **merome.**

metamer'ic segmentation (*Zool.*). See **metamerism.**

metam'erism (*Chem.*). A form of isomerism occasioned by the attachment of different radicals to the same central polyvalent atom or group, the general chemical behaviour of the compounds being the same.

metamerism (*Zool.*). Repetition of parts along the long axis of an animal.—*adj.* **metamer'ic.**

metamito'sis (*Cyt.*). Mitosis in which the nuclear membrane disappears and the karyokinetic figure lies free in the cytoplasm. Cf. **mesomitosis.**

metamor'phic aureole (*Geol.*). The zone which usually surrounds a large igneous intrusion; it consists of altered sedimentary or other rocks. See also **metamorphism.**

metamorphic rocks (*Geol.*). Rocks derived from pre-existing rocks by mineralogical, chemical, and structural alterations due to processes operating in the earth's crust. The change is sufficient to produce a new rock type.

metamor'phism (*Geol.*). The sum of the processes which can operate within the earth's crust and transform a rock into a well characterised new type.

metamorpho'sis (*Zool.*). Pronounced change of form and structure taking place within a comparatively short time, as the changes undergone by an animal in passing from the larval to the adult stage.—*adj.* **metamor'phic.**

metanau'plius (*Zool.*). A larval stage in some *Crustacea*, differing from the *nauplius* (q.v.) in having a fourth pair of appendages (representing the maxillae) developed behind the original three pairs.

Met'anemertin'i (*Zool.*). An order of *Dimyaria* in which the mouth is in front of the brain, the proboscis is generally armed with stylets, and the cerebral ganglia and lateral nerves lie within the muscles of the body-wall, embedded in the parenchyma. Marine, fresh-water, and terrestrial forms.

metaneph'ros (*Zool.*). In Vertebrates, that portion of the kidney which arises posterior to the mesonephros and in higher forms replaces it as the functional excretory organ, never having any connexion with the genital system in the male.—*adj.* **metaneph'ric.**

metanil'ic acid (*Chem.*). $C_6H_4(NH_2)(SO_3H)$, *meta*-aminobenzene-sulphonic acid; an intermediate for dyestuffs.

metano'tum (*Zool.*). The notum of the metathorax in Insects.—*adj.* **metano'tal.**

met'aphase (*Cyt.*). The stage in mitosis in which the chromosomes aggregated on the equator of the mitotic spindle divide longitudinally and the daughter chromosomes pass outwards towards the poles of the spindle.

metaphlo'em (*Bot.*). Completely developed primary phloem, consisting of sieve tubes (with or without companion cells), fibres, and parenchyma.

metaphosphor'ic acid (*Chem.*). HPO_3. Formed as a viscous solid when phosphorus pentoxide is left exposed to the air.

metaphrag'ma (*Zool.*). In *Insecta*, an apodeme situated in the metathorax.

metaph'ysis (*Med.*). The end of the shaft (diaphysis) of a long bone where it joins the epiphysis.

metapla'sia (*Zool.*). Tissue transformation, as in the ossification of cartilage.

metapla'sis (*Zool.*). The period of maturity in the life-cycle of an individual.

met'aplasm (*Biol.*). Any substance within the body of a cell which is not protoplasm; especially food material, as yolk or fat, within an ovum.—*adjs.* **metaplas'mic, metaplas'tic.**

met'apleure (*Zool.*). In some *Prochordata*, a ventrolateral fold of integument.—*adj.* **metapleu'ral.**

metapleu'ron (*Zool.*). In *Diptera*, a thoracic sclerite behind the pteropleuron and above the hypopleuron.

metapneus'tic (*Zool.*). (Of *Insecta*) having only the last pair of abdominal spiracles open, as in larval *Culicidae*.

metapo'dium (*Zool.*). (1) In *Vertebrata*, the second podial region; metacarpus or metatarsus; palm or instep.—(2) In *Insecta*, that portion of the abdomen posterior to the podeon.—(3) In *Gastropoda*, the posterior part of the foot.—*adj.* **metapo'dial.**

metapodoso'ma (*Zool.*). In *Acarina*, the segments of the third and fourth pairs of legs.

metapoph'ysis (*Zool.*). In some *Mammalia*, a process of the vertebrae above the prezygapophysis which strengthens the articulation.

metapro'teins (*Chem.*). *Infraproteins* (q.v.).

metapterygium, met'-a-ter-ij'—(*Zool.*). In *Selachii*, the innermost or most posterior of the three basal cartilages of the pectoral fin.

metapter'ygoid (*Zool.*). In some Fish, a paired ventral bone of the skull, lying above the quadrate.

metasitism (*Zool.*). Cannibalism.

metaso'ma (*Zool.*). In *Arachnida*, the posterior part of the abdomen, or hindermost tagma of the body, which is always devoid of appendages.—*adj.* **metasomat'ic.**

metaso'matism (*Geol.*). The processes by which one mineral is replaced by another of different chemical composition by the introduction of material from external sources. See also **metamorphism.**

Metasperm'ae (*Bot.*). See **Angiospermae.**

met'astable (*Chem.*). In a state which is apparently stable, often because of the slowness with which equilibrium is attained; said, for example, of a supersaturated solution.

metastable state (*Phys.*). An excited state of an atom from which it cannot pass directly to the normal state by emitting radiation. Atoms are found to remain in the metastable state for as long as a few seconds, and may therefore accumulate to a considerable concentration. Metastable states are of importance in many photochemical reactions. See also **Bohr theory.**

metasta'sic electron (*Chem.*). An electron which is transferred from one atom to another, or from one shell to another in the same atom.

metas'tasis (*Med.*). The transfer, by lymphatic channels or blood-vessels, of diseased tissue (especially cells of malignant tumours) from one part of the body to another: the diseased area arising from such transfer.

metastasis (*Zool.*). Transference of a function from one part or organ to another; metabolism.

metas'tasise (*Med.*). To form metastases.

metastat'ic (*Zool.*). A term used to describe the life-cycle of a parasite in which metamorphosis into the adult form takes place in the secondary host, which is then eaten by the primary host.

metaster'num (*Zool.*). In *Insecta*, the sternum of the metathorax. In *Vertebrata*, the posterior portion of the sternum; xiphisternum.

metastig'mate (*Zool.*). Having the tracheal openings situated posteriorly, as certain Mites.

metasto'ma (*Zool.*). In *Crustacea*, the lower lip.

metasyn'desis (*Cyt.*). See **telosynapsis.**

metatar'sal or **metatar'sale** (*Zool.*). One of the bones composing the *metatarsus* (q.v.) in Vertebrates.

metatarsal'gia (*Med.*). A painful neuralgic condition of the foot, felt in the ball of the foot and often spreading thence up the leg.

metatar'sus (*Zool.*). In *Insecta*, the first joint of the tarsus when it is markedly enlarged: in land *Vertebrata*, the region of the hind limb between the digits and the tarsus.

Metathe'ria (*Zool.*). A subclass of viviparous *Mammalia* in which the newly born young are carried in an abdominal pouch which encloses the teats of the mammary glands; an allantoic placenta is usually lacking; the scrotal sac is in front of the penis, the angle of the lower jaw is inflexed, and the palate shows vacuities.

metatho'rax (*Zool.*). The third or most posterior of the three somites composing the thorax in Insects.—*adj.* **metathorac'ic.**

metatra'cheal parenchy'ma (*Bot.*). Parenchyma occurring in wood scattered throughout the annual ring.

met'atroch (*Zool.*). A ciliated band encircling the body of a trochophore posterior to the mouth.

metatympan'ic (*Zool.*). See **entotympanic.**

metaxenia, —zē'ni-a (*Bot.*). Any effect that may be exerted by pollen on the tissues of the female organs.

metaxylem, —zī'lem (*Bot.*). Primary xylem in which the vessels have either reticulate thickening or pitted walls.

Metazo'a (*Zool.*). A subkingdom of the animal kingdom, comprising multicellular animals having two or more tissue layers, never possessing choanocytes, usually having a nervous system and enteric cavity, and always showing a high degree of co-ordination between the different cells composing the body. Cf. *Protozoa*, *Parazoa.*

metazoaea, —zō-ē'a (*Zool.*). A larval stage of decapod *Crustacea* which differs from the zoaea in showing the rudiments of the abdominal appendages.

metenceph'alon (*Zool.*). The cerebellum of Vertebrates.

meten'teron (*Zool.*). An inter-mesenteric space in a Coelenterate.

me'teor (*Astron.*). A 'shooting star.' A small body which enters the earth's atmosphere from interplanetary space and becomes incandescent by friction, flashing across the sky and generally ceasing to be visible before it falls to the earth. See also **bolide.**

meteoric shower (*Astron.*). A display of meteors in which the number seen per hour greatly exceeds the average. It occurs when the earth crosses the orbit of a meteor swarm and the swarm itself is in the neighbourhood of the point of section of the two orbits.

me'teorism (*Med., Vet.*). Excessive accumulation of gas in the intestines. See also **tympanites.**

meteorites (*Astron., Min.*). Mineral aggregates of cosmic origin which reach the earth from interplanetary space; cf. *meteor* and *bolide.* See achondrite, aerolites, chondrite, iron meteorites, pallasite, siderite.**

meteorit'ic hypothesis (*Astron.*). A theory that the so-called craters on the moon are due not to volcanic action but to the impact, in a relatively late stage of development, of planetesimal bodies or meteorites on the lunar surface.

me'teorograph (*Meteor.*). A collection of meteorological recording instruments, such as the barograph, thermograph, etc., which are attached to kites or small balloons and sent up to record conditions in the upper atmosphere.

meteorology. The study of the earth's atmosphere in its relation to weather and climate.

metepip'odite (*Zool.*). In *Crustacea,* an epipodite borne upon the coxopodite.

meter. A variant spelling of *metre.*

meter (*Elec. Eng.*). A general term for any electrical measuring instrument, but usually confined to integrating meters.

See **ampere-hour—**
Aron—
Bastian—
electrolytic—
frequency—
induction—
integrating—
motor—
power-factor—
prepayment—
reactive—
volt-ampere-hour—

meter (*Photog.*). A device which assists in calculating the exposure to be given to an emulsion under the conditions of its use.

See **exposure—**
extinction—
Harvey—
Heyde—
photo-electric exposure—
Photronic exposure—

meter (*Teleph.*). A counting mechanism which indicates the number of times it has been operated by passing a sufficient current through its windings.

See **analysis—**
call-counting—
congestion call—
congestion traffic-unit—
decibel—
director—
noise—
overflow—
subscriber's—
traffic—

meter, echo (*Acous.*). See **echo meter.**

meter loss (*Elec. Eng.*). The energy loss produced by the various iron and copper losses which occur in a meter.

methaemoglo'bin, met-hēm— (*Chem.*). A compound of haemoglobin and oxygen, more stable than oxyhaemoglobin, obtained by the action of oxidising agents on blood, as in cases of poisoning by nitrites or chlorates.

methaemoglobinae'mia (*Med.*). The presence of methaemoglobin in the blood, the result usually of the action of drugs derived from aniline.

methaemoglobinu'ria (*Med.*). The presence of methaemoglobin in the urine. See also **methaemoglobinaemia.**

me'thane (*Chem.*). CH_4; a gas, m.p. −186° C., b.p. −164° C.; occurs naturally in oil-wells, e.g. near Baku, at Pittsburgh, in the Crimea near Bulganak, and in many other places. *Fire-damp* (q.v.) is a mixture of methane and air; coal-gas contains a large proportion of methane. It can be synthesised from its elements, and prepared by various methods, as by catalytic reduction of CO or CO_2, or by passing CO and H_2O over heated metal oxides, or by the action of water on aluminium carbide.

meth'anides (*Chem.*). Carbides, such as aluminium and beryllium carbides, which give methane when decomposed by water.

meth'anol (*Chem.*). *Methyl alcohol* (q.v.). The term is nowadays preferred to *methyl alcohol,* particularly in its industrial application; e.g. methanol synthesis.

methemoglobin (*Chem.*). See **methaemoglobin.**

methemoglobinemia (*Med.*). See **methaemoglobinaemia.**

methemoglobinuria (*Med.*). See **methaemoglobinuria.**

methene (*Chem.*). *Methylene* (q.v.).

methine (*Chem.*). The trivalent radical $CH\equiv$.

methox'yl group (*Chem.*). The monovalent radical $-OCH_3$. In certain compounds the methoxy group can be estimated analytically by *Zeisel's method* (q.v.).

methyl group (*Chem.*). The monovalent radical CH_3-.

methyl alcohol (*Chem.*). *Methanol* (q.v.); CH_3OH; a colourless liquid, b.p. 66° C., sp. gr. 0·8. It used to be produced by the destructive distillation of wood; is nowadays synthesised from CO and H_2 in the presence of catalysts. It is an important intermediate for numerous chemicals, and is used as a solvent and for denaturing ethyl alcohol. Also called WOOD ALCOHOL.

methyl ethyl ketone (*Chem.*). $CH_3{\cdot}CO{\cdot}C_2H_5$; a colourless liquid of ethereal odour, b.p. 81° C.; prepared by the oxidation of secondary butyl alcohol; an important solvent.

methyl methacrylate resins (*Plastics*). See **acrylic resins.**

methyl orange (*Chem.*). The sodium salt of helianthine, $(CH_3)_2N\,C_6H_4{\cdot}N.N\,C_6H_4{\cdot}SO_3Na$. It is a chrysoidine dye, and is used as an indicator in volumetric analysis.

methyl-pyridines (*Chem.*). See **picolines.**

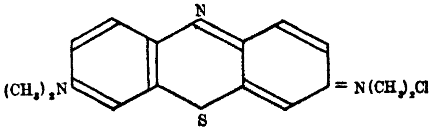
methyl-rubber (*Chem.*). The polymerisation product of βγ-dimethyl-butadiene, $CH_2{:}C(CH_3){\cdot}C(CH_3)\,CH_2$. It has different properties from natural rubber; it oxidises easily, and can be vulcanised only by the addition of organic catalysts (accelerators).

methyl sulphate (*Chem.*). $(CH_3)_2SO_4$; a colourless syrupy oil, very poisonous, b.p. 188° C.; used for introducing the methyl group into phenols, alcohols, and amines.

methyl violet (*Chem.*). A triphenylmethane dyestuff consisting of a mixture of the hydrochlorides of tetra-, penta-, and hexamethylpararosaniline.

meth'ylene (*Chem.*). The hypothetical compound CH_2. Numerous attempts have been made to obtain it by eliminating, for example, hydrogen and chlorine from methyl chloride, but the resulting CH_2 groups combine together in pairs, yielding ethylene, $H_2C{\cdot}CH_2$.

methylene blue (*Chem.*). A thiazine dyestuff of the formula



It is prepared by oxidising dimethyl-*p*-phenylenediamine and dimethylaniline in the presence of sodium thiosulphate and zinc chloride. It is a very important dye for cotton, upon which it is fixed with the aid of tannin.

Metlex plug (*Build.*). A split hollow plug of soft metal placed in a drilled hole to receive a screw, which opens out the plug against the walls of the hole, thus ensuring a firm fixing.

metochy, met-ŏ'ki (*Zool.*). The type of partnership exhibited by a neutral inquiline and the social insects in the nest of which it makes its home.

metoe'cious (*Bot., Zool.*). Heteroecious.

metoe'strus (*Zool.*). In Mammals, the recuperation period following oestrus.

me'tol (*Photog.*). A salt of methyl-amido-cresol, the basis of a rapid developer for negatives.

Meton'ic cycle (*Astron.*). A period of nineteen years, which is very nearly equal to 235 synodic months, this relationship having been introduced in Greece in 433 B.C. by the astronomer Meton; its effect is that after a full cycle the phases of the moon recur on the same days of the year.

metope, met'ō-pe (*Arch.*). A slab or tablet (generally of marble and ornamented) filling the space between the triglyphs in a Doric frieze.

meto'tic (*Zool.*). Posterior to the auditory vesicle.

meto'vum (*Zool.*). An ovum which is surrounded by nutritive material.

metox'enous, *or* **—zē'nus** (*Bot., Zool.*). Heteroecious.

metre. The unit of length in the metric system. Originally intended to represent 1/1000000 of the distance on the earth's surface between the North Pole and the Equator, it is governed by the standard metre, a bar of platino-iridium alloy deposited in Paris (copies being held in most other countries). For legal purposes the metre is 39·370113 in., though a redetermination in 1922 found the value to be 39 370147 in.

metre bridge (*Elec. Eng.*). A form of Wheatstone bridge in which two of the arms are in the form of a wire, one metre long, to which a sliding contact is made.

metre-candle (*Light*). See **lux.**

metre-kilogram-second (M-K-S.) system of units. The system of units, proposed by Giorgi, to replace the *centimetre-gram-second* (*c.g.s.*) units.

metric carat. See **carat.**

metric screw-thread (*Eng.*). A standard screw-thread in which the diameter and pitch are specified in millimetres. See **British Association (B.A.) screw-thread, international screw-thread, Swiss (Thury) screw-thread.**

metric system. A system of weights and measures depending upon the metre, the original factors being derived from the *metre*, the unit of length. The *are* is the unit of the measures of surface; the *litre* the unit of the measures of capacity; the *gram* the unit of weight. Ascending values are multiplied by ten and bear a Greek prefix; e.g. *decametre*, signifies 10 metres; *hectometre* 100 metres; *kilometre* 1000 metres. Descending values bear a Latin prefix; e.g. *decimetre*, 1/10 of a metre; *centimetre*, 1/100 of a metre; *millimetre*, 1/1000 of a metre. The prefix *mega-* denotes a multiple by one million, the prefix *micro-*, a millionth part. Abbreviations used in measures of length are *cm.* (centimetre), *dm.* (decimetre), *km.* (kilometre), *m.* (metre), *mm.* (millimetre); in measures of weights, *cg.* (centigram), *dg.* (decigram), *g.* (gram), *kg.* (kilogram), *mg.* (milligram), *q.* (quintal), *t.* (tonneau or millier).

metri'tis (*Med.*). Inflammation of the substance of the uterus.

metromor'phic (*Bot.*). Resembling the mother.

metropa'thia haemorrhag'ica (*Med.*). Essential uterine haemorrhage. A condition in which bleeding from the uterus is associated with thickening of the lining of the uterus and with the presence of cysts in the ovaries.

metrorrha'gia (*Med.*). Bleeding from the uterus between menstrual periods.

metrostax'is (*Med.*). See **metrorrhagia.**

-metry (*Chem., etc.*). A suffix denoting a method of analysis or measurement; e.g. acidimetry, iodimetry, nephelometry.

metu'liform (*Bot.*). Resembling a pyramid.

Mexican (*Textiles*). A coarse cotton cloth, grey or coloured, heavily sized. Usually of plain weave. Made for export.

Mexican onyx (*Min.*). A translucent, veined, and parti-coloured aragonite, found in Mexico and in the south-western U.S.A.

mez'zanine (*Build.*). An intermediate floor constructed between two other floors in a building.

mezzo-relievo, med'zo rē-lyā'vo (*Dec.*). Decoration in medium relief.

mezzotint, med'zō— (*Print.*). An intaglio process in which printing is done from a copper plate, grained by rocking a semicircular toothed knife over the surface, the lighter tones being produced by scraping or burnishing away the grain to reduce the ink-holding capacity.

mF., μF. (*Elec. Eng.*). Abbrev. for *micro-farad.*

M.F. (*Paper*). Machine-finished. Paper which has been surfaced while on the paper-making machine.

M.G. (*Build.*). Abbrev. for *make good.*

M.G. (*Paper*). Machine-glazed. A class of paper which is rough on one side and glazed on the other; used for wrapping, poster work, etc.

M.G. machine (*Paper*). See **single cylinder machine.**

Mg (*Chem.*). The symbol for *magnesium.*

mg. (*Phys.*). An abbrev. for *milligram.*

mho, mō (*Elec. Eng.*). The practical unit of conductance, being the conductance of a body having a resistance of 1 ohm.

miarolit'ic structure (*Geol.*). A structure found in an igneous rock, consisting of irregularly shaped cavities into which the constituent minerals may project as perfectly terminated crystals.

mica (*Min.*). A group of minerals which crystallise in the monoclinic system; they have similar chemical compositions and highly perfect basal cleavage. See also **biotite, lepidomelane, lithia mica, muscovite, phlogopite.**—(*Diel.*) Mica is one of the best electrical insulators (see **Glyptanite, Micafolium, Micanite, Micarta, Mycalex.**

mica cone (*Elec. Eng.*). See **mica V-ring.**

mica flap valve (*San. Eng.*). A sheet of mica hinged about one edge, so as to permit only uni-directional flow of air through ventilators.

mica-lamprophyre (*Geol.*). One of the commonest types of *lamprophyre* (q.v.), characterised by an abundant content of mica, originally biotite, but often bleached and altered. See also **kersantite, minette, mica-trap.**

mica-schist (*Geol.*). A schist composed essentially of micas and quartz, the foliation being mainly due to the parallel disposition of the mica flakes. See also **schist.**

mica-trap (*Geol.*). An obsolete name for *mica-lamprophyre.*

mica V-ring (*Elec. Eng.*). A ring of V-shaped cross-section made of a mica compound and used to insulate a metal V-ring from the bars of the commutator which it supports. Also called MICA CONE.

mica'ceous iron-ore (*Min.*). A variety of specular iron-ore (Fe_2O_3) which is foliated or which simulates mica in habit.

micaceous sandstone (*Geol.*). A sandstone containing a varying amount of mica flakes. See also **sandstones.**

Micafo'lium (*Diel.*). A composite insulating material consisting of a paper backing covered with mica flakes and varnish. Much used for insulating wire, machine coils, etc.

Mi'canite (*Diel.*). Mica splittings bonded by varnish or shellac into a large sheet; mechanically weak at high temperatures.

Micar'ta (*Diel.*). A synthetic insulating material made up very largely of mica.

micel'la (*Bot.*). A hypothetical crystalline structure too small to be seen, which may, with many other similar structures, form the foundation of cell walls, starch grains, etc.

micelle, mi-sel' (*Chem.*). A particle of colloidal size, especially a colloidal ion.

Michell bearing (*Eng.*). A thrust or journal bearing in which pivoted pads support the thrust collar or journal in such a way that they tilt slightly under the wedging action of the lubricant induced between the surfaces by their relative motion. The fluid lubrication conditions thus produced result in a very low friction coefficient and power loss in the bearing.

Michelson interferometer (*Light*). One of the earliest interferometers, by means of which much work was done on the fine structure of spectral lines and the evaluation of the standard metre in wavelengths of light. The principle of the instrument is similar to that of the *Fabry and Pérot interferometer* (q.v.).

Michelson-Morley experiment (*Phys.*). An attempt to detect and measure the relative velocity of the earth and the ether by observations of interference fringes with a form of apparatus which can be rotated bodily into different orientations. The very small velocity indicated by the results of the experiment is much less than was expected, and was probably due to accidental causes.

Michie sludge test (*Lubricants*). A test made to ascertain the tendency of an oil to form sludge during service; the oil is heated to 150° C. and a measured quantity of purified air is bubbled through for a number of hours, copper foil being used as a catalyst.

micraes'thete (*Zool.*). In *Amphineura*, the smaller type of sense-organ occurring in canals traversing the shell. Cf. *megalaesthete*.

micramoe'ba (*Zool.*). In certain *Sarcodina*, a small amoebula stage, probably representing a male gamete which fuses with a *macramoeba* (q.v.).

micran'er (*Zool.*). An abnormally small male ant.

micrer'gate (*Zool.*). An abnormally small worker ant.

micro- (Greek *mikros*, small). A prefix used in the construction of compound terms; e.g. *microparasite*, a very small parasite. Applied to names of units, the prefix indicates a related unit one-millionth part in magnitude of the basic unit, e.g. *microhm*.—(*Geol.*) Applied to names of rocks, it indicates the medium-grained form, e.g. *microdiorite*, *microsyenite*, *microtonalite*.

microaer'ophile (*Bot.*). An organism which does not grow well with ordinary concentrations of oxygen, but only when the oxygen concentration is low.—*adj.* **microaerophil'ic.**

microanal'ysis (*Chem.*). A special technique of both qualitative and quantitative analysis, by means of which very small amounts of substances may be analysed.

microanalytical reagent (*Chem.*). See **M.A.R.**

mi'crobe (*Bacteriol.*). A bacterium which can be seen with the aid of a microscope.

microceph'aly, microcepha'lia (*Med.*). Abnormally small size of the head.

microchro'mosome (*Zool.*). In some *Ciliophora*, the inner set of chromosomes at mitosis, representing the micronucleus.

mi'crocline (*Min.*). A silicate of potassium and aluminium which crystallises in the triclinic system. It resembles orthoclase, but is distinguished by its optical and other physical characters. See also **potash feldspar.**

microconid'ium (*Bot.*). A small conidium produced by some species of fungi, differing in form as well as in size from the larger conidia characteristic of the species.

microcon'jugant (*Zool.*). In certain *Mastigophora*, the smaller of a pair of conjugants.

microcos'mic salt (*Chem.*). Sodium ammonium hydrogen phosphate, $NaNH_4HPO_4$.

microcrystalline texture (*Geol.*). A term applied to a rock or groundmass in which the individual crystals can be seen as such only under the microscope.

Microcypri'ni (*Zool.*). An order of small *Neopterygii*, characterised by the flattened scaly head, protractile mouth, and absence of a distinct lateral line; fresh-water and estuarine forms of the tropics and subtropics, feeding on insects and other small organisms or organic matter in mud; mainly viviparous. Cyprinodonts or Toothed Carps, Killifishes, Four-eyed Fish, Millions Fish.

microdi'orite (*Geol.*). An intermediate igneous rock of medium grain-size. Often referred to as *porphyrite*.

Micro'drili (*Zool.*). An order of *Oligochaeta* comprising for the most part small forms living in fresh water, but a few forms are marine, or terrestrial, or parasitic; the clitellum usually commences not later than the tenth or eleventh somite.

micro-far'ad (*Elec. Eng.*). A unit of capacitance equal to one-millionth of a farad; more convenient for use than the farad. Abbrev. **mF., μF.**

micro-micro-farad (*Elec. Eng.*). The unit equal to one million-millionth of a farad, most convenient for the small capacitances used in radio circuits. Abbrevs. **mmF., μμF.; pf., pF.** (for pico-farad). One mmF. equals 0·9 cm. of capacitance. See **jar.**

microfelsit'ic texture (*Geol.*). A term applied to the cryptocrystalline texture seen, under the microscope, in the groundmass of quartz-felsites and similar rocks; due to the devitrification of an originally glassy matrix.

microfila'ria (*Zool.*). The early larval stage of certain parasitic *Nematoda*.

mi'crofilm (*Photog.*). A standard non-flam film on which documents, books, pamphlets, etc., are recorded; for viewing, the records are projected on a ground-glass screen by an enlarging machine.

microfun'gi (*Bot.*). The smaller fungi, which need the microscope for their adequate study.

microgametan'gium (*Bot.*, *Zool.*). A gametangium which produced microgametes.

microgam'ete (*Zool.*). The smaller of a pair of conjugating gametes, generally considered to be the male gamete.

microgame'tocyte (*Zool.*). In *Protozoa*, a stage developing from a trophozoite and giving rise to male gametes.

microg'amy (*Zool.*). In *Protozoa*, syngamy between two of the smallest individuals produced by fission or gemmation.

mi'croglia (*Zool.*). A small type of neuroglia cell (occurring more frequently in grey matter than in white matter) having an irregular body and freely branching processes which end in terminal spines.

microgonid'ium (*Zool.*). In some *Mastigophora* (as *Volvox*), a gametocyte which will give rise to microgametes.

microgran'ite (*Geol.*). A medium-grained, microcrystalline, acid igneous rock having the same mineral composition and texture as a granite.

micrograph'ic texture (*Geol.*). A distinctive rock texture in which the simultaneous crystallisation of quartz and feldspar has led to the former occurring as apparently isolated fragments, resembling runic hieroglyphs, set in a continuous matrix of the latter mineral.

mi'crogyne (*Zool.*). An abnormally small queen ant.

microgyr'ia (*Med.*). Abnormal smallness of the convolutions of the brain.

microlecithal, —les'i-thal (*Zool.*). Said of eggs containing very little yolk.

mi'crolite (*Geol.*). A general term for minute crystals of tabular or prismatic habit found in microcrystalline rocks. These give a reaction with polarised light.

microlite (*Min.*). A mineral which is essentially a pyrotantalate of calcium, but which frequently contains niobium, fluorine, and a variety of bases. It crystallises in the cubic system.

mi'crolux (*Photog.*). A unit for very weak illuminations, equal to one-millionth of a lux.

microma'zia (*Med.*). Failure of the female breast to develop after puberty.

mi'cromere (*Zool.*). In a segmenting ovum, one of the small cells which are formed in the upper or animal hemisphere.

micromerozo'ite (*Zool.*). A stage in the life-history of certain *Haemosporidia*, arising by schizogony from a microschizont.

microm'eter (*Instruments*). An instrument used mainly for measuring small angular separations visually. It consists of three frameworks carrying spider-webs for superposition; one of these is fixed, and the two others are movable by means of a pair of screws. The micrometer is mounted at the eye end of an equatorial telescope and furnished with an eye-piece; the separation is read from the two micrometer heads, and a graduated circle gives the position angle when the object is a double star.

micrometer gauge (*Eng.*). A U-shaped length gauge in which the gap between the measuring faces is adjustable by an accurate screw whose end forms one face. The gap is read off a scale uncovered by a thimble carried by the screw, and by a circular scale engraved on the thimble.

micrometer theodolite (*Surv.*). A theodolite equipped with micrometers instead of the usual verniers for reading the horizontal and vertical circles.

mi'cron. A unit of length equal to 10^{-3} mm; used for expressing small distances and wave-lengths of light. Denoted by μ. A *millimicron* ($m\mu$) is equal to 10^{-6} mm.

micronephrid'ia (*Zool.*). In some *Chaetopoda*, small nephridial tubes, with or without a nephrostome, present in large numbers in a single somite and believed to be derived from *meganephridia* (q.v.).

mi'cront (*Zool.*). In *Neosporidia*, a stage formed after schizogony which gives rise by fission to microgametes.

micronu'cleus (*Zool.*). In *Ciliophora*, the smaller of the two nuclei which is composed of reserve generative chromatin. Cf. *macronucleus*.

micropeg'matite (*Geol.*). A term applied to micrographic intergrowths of quartz and feldspar occurring in the groundmass in various igneous rocks. Synonymous with *micrographic texture*.

microperth'ite (*Geol.*). A feldspar which consists of interlaminations of orthoclase and albite on a microscopic scale.

mi'crophage (*Zool.*). A small phagocytic cell in blood or lymph.—*adj.* **microphagocyt'ic.**

microph'agous (*Zool.*). Feeding on micro-organisms.

microphan'erophyte (*Bot.*). A woody plant from 2-8 metres in height.

mi'crophone (*Acous.*). An acousti-electrical convertor of sound wave-forms, essential in all sound-reproducing systems. The excess pressure in the sound-wave is applied to a mechanical system, such as a ribbon or diaphragm, the motion of which generates an electromotive force, or modulates a current or voltage. See **transmitter.**

See also **carbon—**
condenser—
crystal—
diaphragmless—
directional—
electrodynamic—
electromagnetic—
electrostatic—
hot-wire—
lapel—
moving-coil—
moving-conductor—
moving-iron—
non-directional—
Olson—
piezo—
pressure—
pressure-gradient—
push-pull—
Reis—
Reisz—
ribbon—
Sykes—
thermal—
velocity—

microphone amplifier (*Elec. Comm.*). **See condenser-transmitter amplifier, pre-amplifier.**

microphone boom (*Elec. Comm.*). The mechanical arrangement for swinging the microphone clear of artists and cameras in sound-film and television studios.

microphone response (*Acous.*). The response of a microphone is the response measured over its operating frequency range, and in a particular direction. See also **response.**

microphon'ic noise (*Thermionics*). Noise in the output current of a thermionic valve caused by mechanical vibration of the electrode system.

microphotog'raphy (*Photog.*). The production of minute prints or transparencies from normal negatives.

microphyl'line (*Bot.*). Composed of small scales or lobes.

microphyl'lous (*Bot.*). Having very small leaves—a condition characterising many plants living in arid habitats.

microphyr'ic (*Geol.*). A textural term descriptive of medium- to fine-grained igneous rocks containing phenocrysts less than 2 mm. in length. Cf. *macrophyric*.

micropo'dous (*Zool.*). Having the foot, or feet, small or vestigial.

micropoecil'ic (or **mikropoikilit'ic) texture** (*Geol.*). A term applied to igneous rocks containing small granular crystals irregularly scattered without common orientation in larger crystals of another mineral as seen under the microscope.

mi'cropore (*Zool*). One of the small apertures in the shell of an amphineuran Mollusc containing a micraesthete.

microp'sia (*Med*). The condition in which objects appear to the observer smaller than they actually are; a symptom of hysteria, or it may be due to retinal disease.

microp'terous (*Zool.*). Having small or reduced fins: in Insects, having small hind wings, hidden by the fore wings when at rest.

mi'cropyle (*Bot.*). (1) A tiny opening in the integument at the apex of an ovule, through which the pollen tube usually enters.—(2) The corresponding opening in the testa of the seed.—(*Zool.*) An aperture in the chorion of an Insect egg through which a spermatozoon may gain admittance.

microschi'zont (*Zool.*). A stage in the life-cycle of certain *Haemosporidia*.

mi'croscope (*Optics*). An instrument used for obtaining magnified images of small objects. The simple microscope is a convex lens of short focal length, used to form a virtual image of an object placed just inside its principal focus. The *compound microscope* consists of two short-focus convex lenses, the objective and the eye-piece mounted at opposite ends of a tube. For most microscopes, the magnifying power is roughly equal to $\frac{450}{f_0 f_e}$, where f_0 and f_e are the focal lengths of objective and eye-piece in centimetres.*

mi'croseisms, —sizmz. The minute irregular motions of the surface of the earth, of periods of the order 6 seconds and amplitude 1μ, which are continuously recorded on sensitive seismographs; possibly due to fluctuations of pressure on the sea, or of waves on the shore.

microsmat'ic (*Zool.*). Having a poorly developed sense of smell.

mi'crosome (*Cyt.*). A granular or bladder-like inclusion in the cytoplasm, of very small size.

microspe'cies (*Bot.*). A variety of a species.

microspher'ic (*Zool.*). (In certain dimorphic species of *Foraminifera*) said of a form in which the initial chamber of the shell is small; cf. *megalospheric*.—*n.* **mi'crosphere.**

microspherulit'ic texture (*Geol.*). A texture in which spherulites on a microscopic scale are distributed through the groundmass of an igneous rock.

microsplanch′nic (*Zool.*). Having a small body and long legs, as a Harvestman.

microsporan′gium (*Bot.*). A sporangium which produces microspores.

mi′crospore (*Bot.*). A spore which gives rise to a male gametophyte, or its equivalent.—(*Zool.*) A small swarm-spore or anisogamete of *Sarcodina.*

microspor′ocyte (*Bot.*). A cell which divides to give microspores, i.e. a microspore mother cell.

microspor′ophyll (*Bot.*). A leaf-like organ, more or less modified, bearing or subtending one or more microsporangia.

microsto′ma, microsto′mia (*Med.*). An abnormally small mouth, due either to developmental defect or to contraction of scar tissue.

microstructural changes (*Met.*). Changes in solid alloys which involve alteration in the microstructure. Usually associated with constitutional changes, but may occur independently of these, as, for example, when crystals are deformed by working of the metal, or when deformed crystals recrystallise.

microstructure (*Met.*). A term referring to the size, shape, and arrangement with respect to each other (as seen under the microscope) of the crystals of the constituents present in a metal or alloy.

microsy′enite (*Geol.*). An intrusive rock of medium grain-size and syenitic composition.

microthor′ax (*Zool.*). The cervicum of Insects, according to certain authorities who regard it as belonging to the prothorax.

mi′crotome (*Bot., Zool.*). An instrument for cutting thin sections of specimens.

microtrich′ia (*Zool.*). Small bristles occurring on the wings of certain Insects. Cf. *macrotrichia.*

microwaves (*Radio*). Electromagnetic waves having wavelengths of less than 20 centimetres.

micturition (*Zool.*). In Mammals, the passing, to the exterior, of the contents of the urinary bladder.

mid-brain (*Zool.*). In Vertebrates, that part of the brain which is derived from the second or middle brain-vesicle of the embryo, comprising the optic lobes and the crura cerebri: the second or middle brain-vesicle itself.

mid-feather (*Build.*). A *withe* (q.v.).

mid-feather (*Join.*). (1) A *cross-tongue* (q.v.).—(2) A *parting slip* (q.v.).

mid-feather (*Paper*). The partition in the beater which induces circulation of the wet pulp.

mid (or middle) gear (*Eng.*). The position of a steam-engine link motion or valve gear when the valve motion is a minimum.

mid-gut (*Zool.*). That part of the alimentary canal of an animal which is derived from the archenteron of the embryo.

midland tariff (*Elec. Eng.*). A name sometimes given to that form of tariff for electrical energy in which a fixed charge per year per kVA of maximum demand is made, together with a charge per kWh.

midnight sun (*Astron.*). The term used in popular language for the phenomenon (seen only in the Arctic and Antarctic circles) of the sun's remaining above the horizon all night and being seen at midnight at lower culmination.

mid-point protective system (*Elec. Eng.*). A method of balanced protection used for protecting generators against faults between turns by balancing the voltage of one half of the winding against that of the other.

midrib (*Bot.*). The largest vein of a leaf, running longitudinally through the middle of the lamella.

mid-riff (*Zool.*). See **diaphragm.**

midsummer growth (*Bot.*). The second period of active growth shown by some trees.

midwater zone (*Ocean.*). The depths of the ocean between the surface waters and the abyss.

middle conductor (*Elec. Eng.*). See **neutral conductor.**

middle gear (*Eng.*). See **mid gear.**

middle gouge (*Carp., etc.*). A gouge intermediate between the *flat gouge* (q.v.) and the *quick gouge* (q.v.).

middle lamella (*Bot.*). A thin layer of primary wall forming the middle layer of the wall between two sister cells; it often consists largely of pectin, and stains differently from the cellulose wall layers on each side of it.

middle oils (*Chem.*). Carbolic oils, obtained from coal-tar distillation. Their boiling range is from about 210° C. to 240° C.

middle-post (*Carp.*). A *king-post* (q.v.).

middle rail (*Join.*). The rail next above the bottom rail in doors, framing, and panelling.

middle shore (*Carp.*). An inclined shore placed between the bottom and top shores in a set of raking shores.

middle-temperature error (*Horol.*). The error in the time of vibration of a compensation balance due to the fact that compensation for dimensional changes of the balance and the elastic properties of the spring is not complete over a range of temperature. A watch or chronometer regulated to be correct at the extremes of the temperature range over which it is to be used will show an error at temperatures between the extremes.

middle third (*Civ. Eng.*). The middle part of a brickwork or masonry structure, such as an arch or dam. It is equal in width, at any section, to one-third the width of the section, and is centrally disposed. The importance of the middle third is that, providing the line of resultant pressure lies wholly within it, no tensile forces come into play.

middle wire (*Elec. Eng.*). See **neutral conductor.**

Middleton Series (*Geol.*). An obsolete term formerly applied to part of the Ordovician System in Shropshire.

middling space (*Typog.*). A type space cast four to the em.

middlings (*Mining*). In ore dressing, a partially concentrated product left after the removal of clean concentrates and rejected tailings.

Miescher's tubes, mēsh′er (*Zool.*). Elongate cylindrical opaque whitish bodies occurring in muscles of domestic animals and representing encysted *Sarcosporidia.* See also **Rainey's corpuscles.**

migraine, mē-gren (*Med.*). Paroxysmal headache. A condition in which recurring headaches are often associated with vomiting and disturbances of vision. See also **teichopsia.**

migration (*Chem.*). The steady motion of particles, ions, etc., in a given direction under the influence of a force.

migration (*Zool.*). Removal from one habitat or region to another, generally of a large number of animals together: the passage from one part of the body to another of an endoparasite or a phagocytic cell.

migratory cell (*Zool.*). See **amoebocyte.**

migratory community (*Bot.*). A plant community which occupies a locality for a time and then seems to die out.

Mikulicz's disease, mik′oo-litsh (*Med.*). A chronic inflammation of the salivary and the lacrimal glands, the cause of which is unknown.

mild ale (*Brew.*). Ale of a dark-brown colour, often sweetened, and with less hop flavouring than pale ales; usually sold from the cask.

mild clay (*Build.*). See **loam.**

mile. A unit of length commonly used for distance measurement in the British Empire and the

U.S.A. A *statute mile* = 1760 yds. = 1609·3 m. See **geographical—, nautical—.**

mile of standard cable (M.S.C.) (*Elec. Comm.*). The unit of attenuation provided by one mile of an arbitrary type of telephone circuit at 800 cycles per second. Formerly used for estimating possibilities of transmission over circuits. Now displaced by the decibel and néper, which alone are accepted internationally.

milia'ria (*Med.*). Prickly heat. Inflammation of the sweat glands, accompanied by intense irritation of the skin.

mil'iary (*Med.*). Like a millet seed; said of lesions which are small, like millet seeds.

miliary tuberculosis (*Med.*). A form of tuberculosis in which small tuberculous lesions are found in various organs of the body, especially in the meninges and in the lungs.

milk fever (*Vet.*). An afebrile disease of parturient cows characterised by a generalised paresis and loss of consciousness.

milk glands (*Zool.*). The mammary glands of a female Mammal: in viviparous Tsetse flies, special uterine glands by which the larva is nourished until it is ready to pupate.

milk-leg (*Med.*). See **phlegmasia alba dolens.**

milk-sugar (*Chem.*). Lactobiose or *lactose* (q v.).

milk teeth (*Zool.*). In Mammals, the first or deciduous dentition, which is early replaced by the second or permanent dentition.

milking generator (*Elec. Eng.*). A low-voltage d.c. generator used for giving one or more cells of a battery a charge independently of the remainder of the cells. Sometimes called MILKER, MILKING BOOSTER.

milking machine (*Agric. Mach.*). A machine by which a cow is milked. It consists essentially of a vacuum pump, a *pulsator* (q.v.), metal teat cups lined with rubber, and milk pail with an air-tight lid.

Milky Way (*Astron.*). See **Galaxy.**

mill (*Eng.*). Generally, (1) a machine for grinding or crushing, as a *flour mill, paint mill*, etc.; (2) a factory fitted with machinery for manufacturing, as a cotton mill, saw-mill, etc.—(*Mining*) In Britain, a crushing and grinding plant. In America, the whole equipment for comminuting and concentrating an ore.

millboards (*Paper*). Boards manufactured from wood pulp, fibre refuse, etc.

mill-dam (*Hyd. Eng.*). A dam built across the current of a stream to raise its level and divert it into a mill-race.

mill engine (*Eng.*). A large low-speed horizontal steam-engine fitted with drop valves or Corliss valves, or an engine of the Unaflow type; often used in factories to drive machinery through ropes.

mill-fitting (*Illum.*). See **factory-fitting.**

mill-race (*Eng.*). The channel or *flume* (q.v.) by which water is led to a mill-wheel or water-wheel.

mill rugs (*Textiles*). The term used to describe creases that have been produced in woollen cloths during milling.

mill-tail (*Eng.*). The channel conveying water away from a mill-wheel.

mill-wheel (*Eng.*). A water-wheel driving the machinery in a mill.

Millburn Beds (*Geol.*). A group of slate rocks found in the Lake District of England; they belong to the Llanvirn Series of the Ordovician System.

mille (*Paper*). One thousand. The new standard unit for paper.

milled (*Eng.*). Having the edge grooved or fluted, as a coin or adjusting screw. See **knurling tools.**

milled cloth (*Textiles*). A woollen fabric in which, as the result of milling, the felting properties of wool fibres have caused them to interlock. The cloth has a fibrous surface, the individual threads and the weave being indistinguishable.

milled (or **knurled) head** (*Eng.*). The head of an adjusting screw, knurled or roughened to provide a good grip. See **knurling tools.**

milled lead (*Build.*). Sheet-lead formed from cast slabs by a rolling process.

millefio'ri glass. Glassware made by arranging a large number of sections of glass rods of various colours to form a pattern and fusing the whole together. Further manipulation of the shape is often carried out.

Mil'lepore Oölite Beds (*Geol.*). A thin bed of limestone belonging to the Middle Estuarine Series of the Jurassic System in Yorkshire. These beds are inaccurately named from the abundance of a polyzoan.

Miller effect (*Thermionics*). The change in the input admittance of a triode valve caused by variation of the impedance in the anode circuit, which is due to the capacitance between the anode and grid passing a portion of the alternating component of the anode current.

Millerian indices (*Crystal.*). See **indices of crystal faces.**

millerite (*Min.*). 'Capillary pyrite.' Sulphide of nickel, crystallising in the hexagonal system. It usually occurs in very slender crystals and often in delicately radiating groups.

millet-seed sand (*Geol.*). See **blown sand.**

millet-seed sandstone (*Geol*) A sandstone consisting essentially of small spheroidal grains of silica; typical of deposits accumulated under desert conditions.

milli- (Latin *mille*, thousand). A prefix used in the construction of compound terms; used of units in the metric system it means a thousandth part, as in the articles below.

milliam'meter (*Elec. Eng.*). An ammeter calibrated and scaled in milliamperes; used for measuring currents up to about 1 ampere.

milliammeter, differential (*Teleg.*). See **differential milliammeter.**

mil'libar (*Meteor.*). See **bar.**

mil'lilambert (*Illum.*). A unit of brightness equal to 0·001 lambert; more convenient magnitude than the lambert.

mil'lilitre (*Chem.*). A unit of volume, equal to 1·000028 c.c., used in volumetric analysis (particularly in America).

mil'lilux (*Photog.*). A unit of illumination intensity, equal to one-thousandth of a lux.

mil'limetre. The thousandth part of a metre.

millimetre pitch (*Eng.*). See **metric screw-thread.**

mil'limicron (*Phys.*). A unit of length, equal to 10^{-6} millimetre; frequently used for visual radiation and colorimetry. Denoted by **mμ.**

milling (*Eng.*). A machine process in which metal is removed by a revolving multiple-tooth cutter, to produce flat or profiled surfaces, grooves, and slots. See also **milling-cutter, milling-machine.**

milling (*Mining*). Dressing; removing valueless material and harmful constituents from an ore in order to render marketing most profitable.

milling (*Textiles*). A preliminary process in the finishing of woollen fabrics, carried out in a milling-machine by the agency of soap, alkali, or acid (depending on the nature of the fabric and the dye), pressure, and friction. The process decreases the surface area of a fabric and imparts a fibrous cover. Also called FULLING.

milling-cutter (*Eng.*). A hardened steel disc or cylinder on which cutting-teeth are formed by slots or grooves on the periphery and faces, or into which separate teeth are inserted; used in the milling-machine for grooving, slotting, surfacing, etc. See also **end mill, milling-machine.**

milling-machine (*Eng.*). A machine tool in which a horizontal arbor or a vertical spindle carries a rotating multi-tooth cutter, the work being supported and fed by an adjustable and power-driven horizontal table. See also **milling-cutter.**

milling-machine (*Textiles*). A machine used in preparing woollen fabrics for the subsequent finishing process. Rotary milling-machines, which have largely displaced the fulling stocks type, consist of squeezing-rollers, a box channel called the spout, etc., over a large trough, the whole being enclosed.

Millington reverberation formula (*Acous.*). A modified formula for calculating the period of reverberation, taking into account the random disposition of the reflecting and acoustically absorbing surfaces in an enclosure.

Millon's reaction, mē-yon^g (*Chem.*). A test for proteins, based on the formation of a pink or dark-red precipitate of coagulated proteins on heating with a solution of mercuric nitrate containing some nitrous acid.

Millstone Grit (*Geol.*). A deltaic facies of the rocks of Upper Carboniferous age, typically developed between the Carboniferous Limestone and the Coal Measures of the North Midlands of England; it consists of alternating grits and marine shales, to a maximum thickness of more than 5000 ft.

Milroy's disease (*Med.*). Hereditary oedema. A disorder in which persistent oedema (swelling) of the legs occurs in members of the same family in successive generations.

milt (*Zool.*). The spleen: in Fish, the testis or spermatozoa: to fertilise the eggs of the female.

mim'etite or **mimet'esite** (*Min.*). Arsenate of lead with chloride of lead, which crystallises in the hexagonal system. It is usually found in lead deposits which have undergone a secondary alteration.

mim'icry (*Zool.*). The adoption by one species of the colour, habits, or structure of another species. —*adjs.* **mim'ic, mimet'ic.**

min'aret (*Arch.*). A lofty slender tower rising from a mosque or similar building and surrounded by galleries.

mind (*Psycho-an.*). According to Freud, *mind* consists of a relatively small conscious part and a larger unconscious part, each of which consists of the processes of thinking, feeling, and wishing.

miner's dip needle (*Mining*). A portable form of dip needle used for indicating the presence of magnetic ores.

miner's inch (*Hyd., Mining*). An aperture 1 in. square the upper edge of which lies 6 in. below the surface of a stream; used to measure the rate of flow. The yield is about 90 cu. ft. (673·2 gallons) per hour.

miner's lamp (*Mining*). A portable lamp specially designed to be of robust construction and adequate safety for use in mines.

mineral (*Min.*). A body produced by processes of inorganic nature. It has usually a definite chemical composition, a certain characteristic atomic structure, which is expressed in its crystalline form, and other physical properties.

mineral alkali (*Chem.*). An old name for *sodium carbonate.*

mineral caoutchouc (*Min.*). See **elaterite.**

mineral flax (*Build.*). A fiberised form of asbestos much used in the manufacture of asbestos-cement sheeting.

mineral oils (*Chem.*). Petroleum and other hydrocarbon oils obtained from mineral sources. Cf. *vegetable oils.*

mineral vein (*Geol.*). A fissure or crack in a rock which has been subsequently lined or filled with minerals. See also **lode.**

mineral wool (*Met.*). See **slag wool.**

mineralisation (*Bot.*). The deposition of calcium salts, silica, and other inorganic substances on or in a cell wall.

mineralised carbon (*Illum.*). An arc-lamp carbon impregnated with metallic salts for use in a flame arc-lamp.

mineral'ogy. The scientific study of minerals.

minerva machine (*Print.*). A small platen machine used for jobbing work.

minette (*Geol.*). A lamprophyre composed essentially of biotite and orthoclase, occurring in dykes associated with major granitic intrusions. Originally the term was applied to the Jurassic ironstones of Briey and Lorraine, and it is still so used. See also **lamprophyre.**

miniature Edison screw-cap (*Illum.*). An Edison screw-cap for electric filament lamps, in which the screw-thread has a diameter of about ⅜ in. and about 14 threads per inch.

miniature valve (*Thermionics*). A valve in which all the dimensions are reduced to very small values, in order to keep down the inter-electrode capacities and the electronic transit time. Used in very short-wave circuits.

minimum blowing current (*Elec. Eng.*). The minimum current which will cause melting of a fuse link under certain specified conditions.

minimum clearing (*Radio*). Same as *zero clearing.*

minimum deviation (*Light*). See **angle of minimum deviation.**

minimum flying speed (*Aero.*). The minimum speed at which an aeroplane has sufficient lift to support itself in level flight in standard atmosphere.

minimum pause (*Auto. Teleph.*). The interval of lost time which is necessarily introduced into the operation of a dial to ensure that the selectors have time to complete their hunting.

minimum two-part prepayment meter (*Elec. Eng.*). A two-part prepayment meter in which the time element is arranged to collect a charge based upon a minimum yearly consumption as well as the usual fixed charge.

mining dial (*Mining, Surv.*). See **dial.**

mining engineering. That branch of engineering chiefly concerned with the sinking and equipment of mine shafts and workings, and all operations incidental to the winning and preparation of minerals.

minion (*Typog.*). The old name for a type-size now standardised as 7-point.

minium (*Chem.*). An alternative name, now seldom used, for *red-lead.*

mink (*Furs*). The dressed skin of the mink, an amphibious animal; the best skins, dark brown, short, and thick, come from Nova Scotia. The skins of several other animals are known commercially as mink.

min'nikin (*Typog.*). The old name for a small size of type, about 3-point.

minor intrusions (*Geol.*). The collective name for igneous intrusions of relatively small size, compared with *plutonic* (*major*) *intrusions.* They comprise dykes, sills, veins, and small laccoliths. The injection of the minor intrusions constitutes the dyke phase of a volcanic cycle.

minor planet (*Astron.*). See **asteroid.**

mint camphor (*Chem.*). *Menthol* (q.v.).

minus colour (*Photog.*). The complementary colour to a given colour, i.e. the colour which, when added to the given colour, produces white light.

minus strain (*Bot.*). One of the two distinct strains of a heterothallic mould; sometimes written (−) strain.

minus'cule (*Typog.*). A lower-case, or small, letter.

minute. (1) A sixtieth part of an hour of time.—(2) A sixtieth part of a degree.—(3) A sixtieth part of the lower diameter of a column.

minute hand (*Horol.*). The hand of a watch or clock which makes one turn per hour.

minute pinion (or **nut**) (*Horol.*). The pinion in the motion work that drives the hour wheel.

minute wheel (*Horol.*). The wheel in the motion work driven by the cannon.pinion.

minute-wheel pin (or **stud**) (*Horol*) A vertical pin in the plate on which the minute wheel revolves.

min'verite (*Geol.*). A basic intrusive rock, in essentials a dolerite, containing a brown, soda-rich hornblende; named from the type-locality, St. Minver, Cornwall.

Mi'ocene Period (*Geol.*). The period of geological time which ensued between the Oligocene and Pliocene Periods. In Britain this period was one of erosion and is not represented by any known deposits.

mio'sis (*Med.*). Contraction of the pupil of the eye.

Mipolam (*Plastics*). A proprietary plastic of the polyvinyl chloride type. Non-inflammable; of high value for its electrical and acid-resisting qualities.

mirab'ilite (*Min.*). *Glauber salt* (q.v).

miracid'ium (*Zool.*). The ciliated first-stage larva of a Trematode.

mirage, mir-azh' (*Meteor.*). An effect caused by total reflection of light at the upper surface of shallow layers of hot air in contact with the ground, the appearance being that of pools of water in which are seen inverted images of more distant objects. Other types of mirage are seen in polar regions, where there is a dense, cold layer of air near the ground. See **fata morgana.**

mirbane, oil of (*Chem.*). See **oil of mirbane.**

Mirrophon'ic (*Cinema.*). Trade-name of a sound-film system, manufactured by Western Electric, which provides for uniform high-quality reproduction over the entire area of an auditorium.

mirror (*Phys.*). A highly polished reflecting surface capable of reflecting light-rays without appreciable diffusion. The commonest forms are plane spherical (convex and concave), and paraboloidal (usually concave). The materials used are glass silvered on the back or front, speculum metal, or stainless steel. See **concave—, convex—, parabolic—**; also **anti-parallax—*.**

mirror arc (*Cinema.*). A projection arc in which the positive carbon is advanced towards the negative carbon, which is fed along the axis and through the centre of the parabolic metallic mirror; light from a greater radiation angle from the positive crater is thereby collected and focused on to the gate.

mirror drum (or **wheel**) (*Television*). A rotating drum having a number of mirrors arranged around its circumference; used in some forms of mechanical scanning.

mirror galvanometer (*Elec. Eng.*). A galvanometer having a mirror attached to the moving part, so that the deflection can be observed by directing a beam of light on to the mirror and observing the movement of the reflection of this over a suitable scale. Also called REFLECTING GALVANOMETER.

mirror plate (*Furn.*). (1) Plate glass for silvering.—(2) A fixing device in the form of a small metal plate, one end being screwed or nailed to the object to be held in position and the other fixed to the base.

mirror screw (*Television*). An arrangement of mirrors on a rotating shaft, used for mechanical scanning. The mirrors are set in line along the shaft, each inclined at a small angle to the next.

mirror wheel (*Television*). See **mirror drum.**

miscarriage (*Med.*) Expulsion of the foetus before the twenty-eighth week of pregnancy. Loosely, abortion.

miscibility (*Chem.*). The property enabling two or more liquids to mix when brought together and thus form one phase.

miscibility gap (*Chem.*). The region of composition and temperature in which two liquids form two layers or phases when brought together.

miser (*Civ. Eng.*). A large *auger* (q.v.) used for boring holes in the ground in wet situations.

misering (*Civ. Eng.*). The process of sinking borings with a miser.

misfiring (*I.C. Engs.*). The failure of the compressed charge to fire normally, generally due either to ignition failure or an over-rich or weak mixture.

mis'pickel (*Min.*). Sulpharsenide of iron, crystallising in the orthorhombic system. It is used as an ore of arsenic. Also called ARSENICAL PYRITE, ARSENOPYRITE.

Mississippian System (*Geol.*). Approximately equivalent to the Lower Carboniferous of N.W. Europe; comprises those members of the Carboniferous System which underlie the Coal Measures and are typically exposed in the Mississippi valley.

mist (*Chem.*). A suspension, often colloidal, of a liquid in a gas.—(*Meteor.*) A term applied to cloud in contact with the ground, as on a mountain, or thin fog where the visibility is not greatly reduced. See also **fog.**

mistake. Any difference from correct value, due to carelessness of observation and/or calculation. Cf. *error.*

mis'tral (*Meteor.*). A cold, dry, northerly wind of a katabatic nature, occurring along the Mediterranean coast of France during fine clear weather.

mitcheline (*Textiles*). See **patent satin.**

mites (*Zool*). See **Acarina.**

mitochon'dria (*Cyt.*). Protoplasmic inclusions of all living cells which take the form of filamentous or rod-like bodies and are believed to take an active part in the production of some types of secretion, as enzymes.

mitogenet'ic ray (*Bot.*). A form of radiant energy, possibly consisting of ultra-violet radiations of very low intensity, emitted by some actively growing parts of plants; said to influence development.

mito'sis (*Cyt.*). The series of changes through which the nucleus passes during ordinary cell division, and by which each of the daughter cells is provided with a set of chromosomes similar to that possessed by the parent cell.—*adj.* **mitotic.**

mito'tic index (*Cyt.*). The proportion in any tissue of dividing cells.

mi'tral (*Med.*). Pertaining to, or affecting, the mitral valve, or valves, of the heart.

mitral or **mitriform** (*Zool.*). Mitre-shaped; as the *mitral valve,* guarding the left auriculo-ventricular aperture of the heart in higher Vertebrates, or the *mitral layer* of the olfactory bulb, composed of mitre-shaped cells.

mitral stenosis (*Med.*). Narrowing of the communication between the left auricle and the left ventricle of the heart, as a result of disease of the mitral valves.

mi'trate (*Bot.*). Descriptive of a rounded, folded fungal fruit body which is somewhat bonnet-shaped.

mitre (*Join., etc.*). A joint between two pieces at an angle to one another, each jointing surface being cut at an angle to the piece on which it is formed.

mitre block (*Carp., etc.*). A block of wood rebated along one edge and having saw-cuts in the part above the rebate, with the kerfs inclined at 45° to the face of the rebate so as to guide the saw when cutting mouldings for a mitred joint.

mitre board (*Join., etc.*). See **mitre shoot.**

mitre box (*Carp., etc.*). An open-ended box having saw-cuts in the sides at 45° to the length of the box; used for the same purpose as the mitre block but capable of taking deeper mouldings.

mitre clamp (*Join., etc*). A *clamp* (q.v.) adapted for holding together temporarily the two parts of a mitre joint.

mitre-cut piston-ring (*Eng.*). A piston-ring in which the ends are mitred at the joint, as distinct from stepped or square ends.

mitre dovetail (*Join.*). See **secret dovetail.**

mitre joint (*Join.*). See **mitre.**

mitre plane (*Join.*). A plane specially adapted for use with a mitre shoot.

mitre post (*Hyd. Eng.*). See **meeting post.**

mitre saw (*Join.*). See **tenon saw.**

mitre-saw cut (*Carp., etc*) A device, such as a mitre block or box, for keeping the saw at the required angle to the work when cutting mouldings for a mitre joint. Also called MITRE-SAWING BOARD.

mitre-sawing board (*Carp., etc.*). See **mitre-saw cut.**

mitre shoot (*Join., etc.*). A block of wood rebated along one edge as a guide for a jointing plane, and having a pair of wood strips fixed to the top face of the part above the rebate, at 45° to the face of the rebate, so as to hold the mitre face of a moulding at the right angle to the plane while it is being shot. Also called MITRE BOARD.

mitre-sill (*Hyd. Eng.*). The raised part of the bed of a canal lock against which the lower parts of the gates abut in closing. Also called CLAP-SILL, LOCK-SILL.

mitre square (*Carp., etc.*). A tool similar to the bevel, but having the blade fixed at 45° to the stock.

mitre wheels (*Eng.*). See **bevel gear.**

mitred clamp (*Join.*). A wooden border mitred at its ends and fixed to a board at right-angles to the direction of its grain.

mitred valley (*Build.*). See **cut and mitred valley.**

mit'riform (*Bot.*). Split on two or more sides at the base, in symmetrical manner.

Mitsch'erlich's law of isomorphism (*Chem*). Salts having similar crystalline forms have similar chemical constitutions.

mix (*Build., Civ. Eng.*). A mixing of concrete.

mixed (*Zool.*). Said of nerve trunks containing motor and sensory fibres.

mixed bud (*Bot.*). A bud containing young foliage leaves and also the rudiments of flowers or of inflorescences.

mixed conductor (*Chem*). A conductor in which conduction is both electrolytic and electronic.

mixed coupling (*Radio*). Simultaneous inductive and capacitative coupling between two resonant circuits.

mixed crystal (*Crystal.*). A crystal in which certain atoms of one element are replaced by those of another.

mixed-flow (or **American**) **water turbine** (*Eng.*). An inward-flow reaction turbine in which the runner vanes are so curved as to be acted on by the water as it enters radially and as it leaves axially.

mixed inflorescence (*Bot.*). An inflorescence in which some of the branching is racemose and some is cymose.

mixed pith (*Bot.*). A pith consisting chiefly of parenchyma, but with isolated tracheides scattered in it.

mixed-pressure turbine (*Eng.*). A steam turbine operated from two or more sources of steam at different pressures, the low-pressure supply, from, for example, the exhaust of other engines, being admitted at the appropriate pressure stage.

mixed service (*Teleph.*). Service provided by a P.B.X. to the main exchange for a number of extension lines only.

mixer (*Build., Civ. Eng.*). See **concrete mixer.**

mixer (*Cinema.*). The man who regulates the outputs of several microphones when they are mixed during the recording of a shot.

mixer (*Elec. Comm.*). An arrangement of resistance potentiometers, controlled by sliders or knobs, to regulate the contribution of several channels (from microphones, land-lines, etc.) when they are added together (or mixed) to form the transmission into another channel. Each knob provides for regulation by indistinguishable steps, from the maximum output level to total loss.

mixer (*Met.*). (1) A large furnace used as a reservoir for molten pig-iron coming from the blast-furnace. The product of several furnaces is thus mixed, and the composition can be kept constant by making suitable additions. Used in connexion with hot-metal steel-making and direct casting of pig-iron —(2) See **agitator.**

mixer valve (*Thermionics*). A valve in which two currents having different frequencies are combined, generally for the purpose of modulation.

mixing (*Textiles*). The operation of blending cotton of different types, but of similar staple and colour, to obtain the most suitable material for spinning yarns economically.

See **direct—** **stack—**

mixipterygium, miks-i-pter-ij'i-um (*Zool.*). The clasper of *Selachii* (q.v.). Also MIXOPTERYGIUM.

mixo- (Greek *mixis*, a mingling). A prefix used in the construction of compound terms; e.g. *mixochimaera* (q.v.).

mixochimae'ra (*Bot.*). A chimaera in fungi, produced experimentally by mixing the contents of two hyphae of different strains of a species.

mixochro'mosome (*Cyt.*). In syndesis, the new chromosome formed by fusion of a pair of normal chromosomes.

mixotro'phic (*Zool.*). Combining two or more fundamental methods of nutrition, as certain *Mastigophora* which combine holophytic with saprophytic nutrition, or as a partial parasite.

mixture (*Acous.*). The fixed combination of a number of ranks of pipes, containing octaves and mutations, on one stop, which is therefore specially loud and brilliant.

mixture (*I.C. Engs.*). The combined inflammable gas and air constituting the explosive charge.

mixture (*Textiles*). (1) A mixture of different qualities of material, the combined material being termed the *blend*.—(2) A mixture of colours. —(3) A mixture of yarn.

mixture (*Typog.*). An extra charge for composition if three or more type faces are used.

mixture control (*Aero.*). An auxiliary control fitted to a carburettor to allow of a variation of mixture strength with altitude of flight. May be manually operated or automatic.

miz'zonite (*Min.*). One of the series of minerals forming the scapolite group, consisting of a mixture of the meionite and marialite molecules. It includes those minerals with 54-57% silica, and occurs in clear crystals in the ejected masses on Mte. Somma, Vesuvius. Also called DIPYRE, DIPYRITE.

M-K-S. units. See **metre-kilogram-second units.**

ml. An abbrev. for *millilitre.*

mm. An abbrev. for *millimetre.*

m.m.f. (*Elec. Eng.*). Abbrev. for *magnetomotive force.*

μμF. (*Elec. Eng.*). Abbrev. for *micro-micro-farad.*

Mn (*Chem.*). The symbol for *manganese.*

mnemic principle, nē'mik (*Zool.*). The principle which explains heredity, development, and evolution on the basis of the inherited memory of past generations.

mnemotax'is (*Zool.*). The movements of an animal dictated in whole or in part by memory.

mo. (*Build.*). An abbrev. for *moulded.*

Mo (*Chem.*). The symbol for *molybdenum.*

Mo (*Chem.*). A symbol for *morphine*, $C_{17}H_{19}O_3N$.

Mocha stone (*Min.*). See **moss agate.**

mock grandrelle (*Textiles*). A two-colour thread produced by spinning a single yarn in which two rovings of different colours are incorporated.

mock leno (*Textiles*). A fabric in which openwork effect is produced by a grouping of threads, which, however, do not cross, as they do in leno and gauze fabrics. Also called IMITATION GAUZE.

mock moons (*Meteor.*). Lunar images similar to *mock suns* (q.v.). Also called PARASELENAE.

mock suns (*Meteor.*). Images of the sun, not usually very well defined, seen towards sunset at the same altitude as the sun and 22° from it on each side. They are portions of the 22° ice *halo* (q.v.) formed by ice crystals which, for some reason, are arranged with their axes vertical. Also called PARHELIA.

mode (*Geol.*). The actual mineral composition of a rock expressed quantitatively in percentages by weight. Cf. *norm.*

modelling (*Plast.*). The operation of smoothing a plaster surface to a required shape.

moderately hydraulic lime (*Build.*). *Lime* (q.v.) made by burning a limestone containing 12-22% clay.

modern face (*Typog.*). A style of type with contrasting thick and thin strokes, serifs at right-angles, curves thickened in the centre, etc. See also **type.**

modification (*Bot.*). A change in a plant brought about by environmental conditions and lasting only as long as the operative conditions last.

modification (*Met.*). Originally the altering of structure and properties of aluminium-silicon alloys, e.g. Alpax, by adding about 0·1% of sodium. Now also the production of fine graphite in grey cast-iron by various treatments.

modifier or **modifying factor** (*Bot.*). A hereditary factor which influences the operation of another.

modil'lion (*Build.*). An ornamental bracket supporting a cornice.

modio'lus (*Zool.*). The central pillar of the cochlea.

modular ratio (*Civ. Eng.*). The ratio between Young's modulus for steel and that for the concrete in any given case of reinforced concrete.

modulated amplifier valve (*Radio*). The valve in an anode modulation system to the grid of which the high-frequency carrier voltage is applied, and whose mean anode potential (over a high-frequency cycle) is varied, in accordance with the impressed modulation, through the coupling to the modulator valve.

modulation (*Acous.*). The changing from one key to another in music. The continual change from one fundamental frequency to another in speech, as automatically regulated by the tension in the muscles of the larynx.

modulation (*Cathode Ray Tubes, Television*). Control of the intensity of illumination produced by a cathode ray beam in accordance with the picture signal, as by varying the beam current, voltage, or scanning velocity.

See also **intensity—** **velocity—**

modulation (*Elec. Comm.*). The process whereby a high frequency is rectified with a lower frequency, thereby producing sum-and-difference frequencies. These are called the side-frequencies of the upper frequency, which is termed the carrier.

modulation (*Radio*). Variation of the frequency, phase, or magnitude of a high-frequency current in accordance with an impressed telephonic, telegraphic, or picture signal current.

See **amplitude—** **frequency—** **phase—**

modulation condition (*Elec. Comm.*). The condition of voltages and currents in an amplifier for a modulated signal when the carrier is steadily modulated to a stated degree, e.g. 100%.

modulation depth (*Radio*). See **depth of modulation.**

modulation distortion (*Elec. Comm.*). When a carrier frequency is modulated, any departure from invariability of carrier amplitude and the addition of side-frequencies proportional in amplitude to the corresponding frequencies in the signal, with phases balanced with respect to the initial phase of the carrier, causes *modulation distortion.*

modulation frequency (*Radio*). The frequency with which change is effected in any of the quantities associated with a high-frequency current.

modulation meter (*Elec. Comm.*). A meter, placed in shunt with a communication channel, which gives an indication that interprets, in a stated way, the instant-to-instant power-level in the varying modulation currents.

modulation system (*Radio*). See **control system.**

modulator (*Radio*). Any device for effecting modulation.

modulator valve (*Radio*). The valve in an anode modulation system to the grid of which the modulating signal is applied, and which impresses the variations in its anode potential upon the anode circuit of the modulated amplifier valve.

module (*Arch.*). The radius of the lower end of the shaft of a column.

module (*Eng*). (In a gear-wheel) the pitch circle diameter per tooth, i.e. the reciprocal of the *diametral pitch.*

modulus (*Elec. Eng.*). See **amplitude.**

modulus of elasticity (*Eng., etc.*). See **elasticity, Young's modulus.**

modulus of rigidity (*Eng.*). Of a material suffering shear, the ratio of the intensity of the shear stress across the section to the shear strain, i.e. to the angle of distortion in radians; expressed in pounds or tons per square inch.

Moebius process (*Met.*). An electrolytic process for parting gold-silver bullion. The electrolyte is silver nitrate. Bullion forms the anode. Silver passes into solution and is deposited on the cathode. Gold remains on the anode.

mo'ellen (*Leather*). *Degras* (q.v.).

moellon (*Build.*). A rubble filling between the facing walls of a structure, sometimes laid in mortar.

Moel-y-Gest Beds (*Geol.*). Banded grey slates and mudstones belonging to the Tremadoc rocks of the Upper Cambrian of Carnarvonshire.

Moerner's test, mér'ner (*Chem.*). A test for the presence of tyrosine, based on the appearance of a green colour when the solution is heated with a mixture of formalin and sulphuric acid.

mofette, mo-fet' (*Geol.*). A volcanic opening through which emanations of carbon dioxide, nitrogen, and oxygen pass. It marks the last phase of volcanic activity.

mohair (*Textiles*). Formerly, the long fine fleece-like hair from the Angora goat, *Capra Mircus*, family *Ovinae*; now, hair obtained for commercial purposes from crossbred animals.

mohair lustre (*Textiles*). A plain or figured cloth made from fine cotton warp and mohair weft; used for dresses.

Mohawk'ian Series (*Geol.*). The middle of the main divisions of the Ordovician System in N. America, comprising the Utica, Lorraine, Richmond, and Gamache formations.

Mohr's litre (*Chem.*). The volume occupied by one kilogram of distilled water when weighed in air against brass weights; it is approximately equal to 1·002 true litres.

Mohr's salt (*Chem.*). Ferrous ammonium sulphate, $(NH_4)_2SO_4{\cdot}FeSO_4{\cdot}6H_2O$.

Mohs' scale of hardness (*Min.*). A scale introduced by Mohs to measure the hardness of minerals. See **hardness** (*Min.*).

moil (*Glass*). Glass left waste in the manufacture of glassware by hand methods. See also **cullet.**

Moine Schists (or **Series**) (*Geol.*). Flaggy granulites and pelitic schists of sedimentary origin, occurring typically in the Moine (northern Scotland); presumably of Pre-Cambrian age.

moiré effect, moi'rē (*Photog.*). A 'watered-silk' *pattern* (q.v.) arising from interference between two line-screens; a defect for which occasional uses are found.

moisture expansion (*Build.*, *Civ. Eng.*). Increase in the volume of a material from absorption of moisture. Also called BULKING.

moits or **motes** (*Textiles*). A term for vegetable matter, burrs, seeds, twigs, straw, etc., found in wool.

mol (*Chem.*). A unit of weight of an element or compound, equal to its molecular weight in grams, or also, if a gas, to a volume of approximately 22·4 litres at N.T.P.

molal specific heat (*Chem.*). The *specific heat* (q.v.) of one mol of an element or compound. Also called VOLUMETRIC HEAT (for gases).

molality (*Chem.*). The concentration of a solution expressed as the number of gram-molecules of dissolved substance per 1000 grams of solvent.

molar volume (*Chem.*). See **gram-molecular volume.**

molarity (*Chem.*). The concentration of a solution expressed as the number of gram-molecules of dissolved substance per litre of solution.

molars (*Zool.*). The posterior grinding or cheek teeth of Mammals which are not represented in the milk dentition.

Molasse, mō-las' (*Geol.*). A series of deposits in Switzerland consisting of soft sandstones and grey and red sandy marls; formerly considered to be of Miocene age, now, in part, found to be in the Oligocene System.

molas'ses (*Chem.*). Residual sugar syrups from which no crystalline sugar can be obtained by simple means. It forms an important raw material for the manufacture of ethyl and other alcohols.

mold, molding, etc. A variant spelling of *mould*, *moulding*, etc.

mol'davite (*Min.*). See **bottle-stone**; also **tektites.**

mole (*Civ. Eng.*). A *breakwater* (q.v.) or a masonry *pier* (q.v.).

mole (*Furs*). The dressed skin of the mole; the fur is bluish-grey, short, and velvety.

moleskin (*Textiles*). A heavy fustian type of fabric, with smooth face and twill back; used for clothing by blacksmiths, moulders, and labourers.

mole (*Med.*). (1) *Naevus* (q.v.).—(2) A haemorrhagic mass formed in the Fallopian tube as a result of bleeding into the sac enclosing the embryo.

molec'ular (*Chem.*). (1) Pertaining to a molecule or molecules.—(2) Pertaining to one gram-molecule

molecular (*Zool.*). Granular.

molecular association (*Chem.*). The relatively loose binding together of the molecules of a liquid or vapour in groups of two or more.

molecular compound (*Chem.*). A compound formed by the combination of two or more molecules capable of independent existence.

molecular conductivity (*Chem.*). The conductivity of a volume of electrolyte containing one gram-molecule of dissolved substance.

molecular depression of freezing-point (*Chem.*). The drop in the freezing-point of a liquid which would be produced by the dissolution of one gram-molecule of a substance in 100 gms. of the solvent, if the same laws held as in dilute solutions.

molecular elevation of boiling-point (*Chem.*). The rise in the boiling-point of a liquid which would be produced by the dissolution of one gram-molecule of a substance in 100 gms. of the solvent, if the same laws held as in dilute solutions.

molecular heat (*Chem.*). The product of the specific heat of a substance and its molecular weight.

molecular layer (*Zool.*). The outer layer of the cerebral cortex in higher Vertebrates: the outer layer of the cerebellar cortex.

molecular refraction (*Chem.*). See **Lorentz-Lorenz equation.**

molecular rotation (*Chem.*). One-hundredth of the product of the specific rotation and the molecular weight of an optically active compound.

molecular solution (*Chem.*). A true solution, in which molecules of the dissolved substance are separated from one another by molecules of solvent.

molecular structure (*Chem.*). The way in which atoms are linked together in a molecule.

molecular volume (*Chem.*). The volume occupied by one gram-molecule of a substance, particularly by a gram-molecule of a liquid at its boiling-point under normal pressure (760 mm.).

molecular weight (*Chem.*). The weight of a molecule of a substance referred to that of an atom of oxygen as 16·000.

molecule (*Chem.*). The smallest particle of a substance that is capable of independent existence while still retaining its chemical properties. This concept is largely meaningless in the case of crystalline salts.

moler (*Build.*). A diatomaceous earth used in the manufacture of Fosalsil.

Mo'lisch test (*Chem.*). A test for proteins, based on the appearance of a violet ring between two layers of a protein solution containing some α-naphthol and concentrated sulphuric acid. The reaction is due to the presence of a carbohydrate group in the protein molecule, and the same reaction is also given by carbohydrates in general.

mol'leton or **mol'litan** (*Textiles*). A heavy type of cotton fabric, plain or figured, raised on both sides; used for dressing-gowns.

mollit'ies os'sium (*Med.*). See **osteomalacia.**

Mollus'ca (*Zool.*). A phylum of non-metameric *Invertebrata*, having a calcareous shell secreted by a sheath of skin (the mantle) which hangs down around the body and covers the respiratory organs or ctenidia; there are no limbs, but the under surface of the body (the foot) is highly muscular and used for locomotion; the mouth contains a ribbon of chitinous teeth, the radula. Coat-of-Mail Shells, Tusk Shells, Limpets, Whelks, Snails, Slugs, Mussels, Scallops, Oysters, Squids, Cuttlefish, and Octopods.

Mollusco'idea (*Zool.*). An obsolete group; formerly used to include the *Polyzoa* and the *Brachiopoda*, which are now classed as separate phyla.

mollus'cum contagio'sum (*Med.*). A contagious condition in which small, white, waxy nodules appear on the skin; believed to be due to infection with a filter-passing virus.

molluscum fibro'sum (*Med.*). Von Recklinghausen's disease; multiple neurofibromata. A disease characterised by the appearance on the skin (and elsewhere in the body) of soft nodules composed of fibrous tissue and believed to develop from nerve fibres.

Molpadi'da (*Zool.*). An order of *Holothuroidea* having small simple buccal tube-feet with ampullae, and with or without retractor muscles; there are no tube-feet on the trunk; respiratory trees occur; the madreporite is internal. Burrowing forms.

molyb'dates (*Chem.*). Salts of molybdic acid.

molyb'denite (*Min.*). Disulphide of molybdenum, crystallising in the hexagonal system. It is the most common ore of molybdenum, but never occurs in large quantities.

molyb'denum (*Met.*). A metallic element in the sixth group of the periodic system. Chemical symbol, Mo; at. wt. 96, at. no. 42, sp. gr. at 20° C. 10·2, hardness 147 (Brinell), m.p. 2450° C., b.p. 3200° C., specific electrical resistivity 4·77 microhms per cm. cub. Its physical properties are similar to those of iron, its chemical properties to those of a non-metal. Used in the form of wire for filament supports, hooks, etc. in electric lamps and radio valves, for electrodes of mercury-vapour lamps, and for winding electric resistance furnaces. Is added to a number of types of alloy steels, certain types of Permalloy, and Stellite.

molybdenum trioxide (*Chem.*). MoO_3. Behaves as an acid anhydride, forming molybdic acid. The essential starting-point in the manufacture of molybdenum metal.

molyb'dic acid (*Chem.*). H_2MoO_4. See also **molybdenum trioxide.**

molyb'dite (*Min.*). A hydrous ferric molybdate which crystallises in the orthorhombic system. It is commonly impure and occurs in small amounts as an oxidation product of molybdenite. Also called MOLYBDIC OCHRE, FERRIMOLYBDITE.

moment of a force (*Phys., etc.*). The *moment* of a force about a given point is its turning effect, measured by the product of the force and the perpendicular distance of the point from the line of action of the force. Clockwise moments are usually considered as positive, and counterclockwise as negative.

moment of a magnet (*Elec. Eng.*). See **magnetic moment.**

moment of inertia (*Mech.*). A measure of the resistance offered by a body to angular acceleration. For a given body, the moment of inertia is not unique but depends on the particular axis of rotation chosen. It is defined as Σmr^2, where m is the mass of a particle in the body and r is its perpendicular distance from the axis.

moment of momentum (*Mech.*). Angular momentum. See **momentum.**

momentum (*Mech.*). The product of the mass of a body and its velocity. *Angular momentum* is the product of the moment of inertia and the angular velocity of a body. See also **conservation of momentum.**

mon-, mono- (Greek *monos*, alone). A prefix used in the construction of compound terms; e.g. *monogamous*, having only one mate.—(*Chem.*) Containing one atom, group, etc., e.g. *monobasic* (q.v.).

Mona Complex (*Geol.*). The name given to the rock groups of Pre-Cambrian age exposed in Anglesey and parts of peninsular Carnarvonshire.

monacid (*Chem.*). Containing one hydroxyl group, replaceable by an acid radical, with the formation of a salt.

mo'nad (*Zool.*). A *flagellispore* (q.v.); a primitive organism.—*adj.* **monad'iform.**

monadel'phous (*Bot.*). Having all the stamens in the flower joined together by their filaments.

monan'drous (*Bot.*). (1) Having one antheridium. —(2) Having one stamen.

monan'gial (*Bot.*). Said of a sorus consisting of a single sporangium.

monarch (*Bot.*). Having a single strand of protoxylem in the stele.

monau'ral (*Acous.*). Pertaining to the use of one ear instead of two (cf. *binaural*). Hence *monaural system of reproduction*, e.g. telephone, broadcasting, etc., which uses one channel only and eliminates any subjective effects arising from the possession of two ears.

monax'on (*Zool.*). Having only one axis; said of Sponge spicules.

Monaxo'nida (*Zool.*). An order of *Demospongiae* in which the skeleton is composed of monaxial spicules only, in some cases cemented together by spongin.

mon'azite (*Min.*). An accessory mineral, crystallising in the monoclinic system. One of the chief sources of thorium used in the manufacture of gas mantles. The mineral frequently contains the rare earth metals, principally cerium and lanthanum.

monchiquite, mon'chi-kit (*Geol.*). A dark-coloured lamprophyric igneous rock, microcrystalline or porphyritic, and containing abundant mafic minerals, with little or no feldspar, in an isotropic base consisting of analcite. Some varieties contain olivine, nepheline, or leucite.

Mönckeberg's sclerosis (or **degeneration**) (*Med.*). Degeneration of the middle coat of medium-sized arteries in old people, characterised by the deposit of lime salts in it.

Mond gas (*Chem.*). The gas produced by passing air and a large excess of steam over coal-slack at about 650° C. See also **semi-water gas.**

Mond process (*Met.*). A process used by Mond Nickel Co. in extracting nickel from a matte consisting of copper-nickel sulphides. The matte is roasted to obtain oxides, the copper is leached out with H_2SO_4, the nickel oxide is reduced to nickel with hydrogen, then the nickel is caused to combine with CO to form a carbonyl, which is decomposed by heating.

Monel' metal (*Met.*). A nickel-base alloy containing nickel 68%, copper 29%, and iron, manganese, silicon, and carbon 3%. Has high strength (about 33 tons per sq. in.), good elongation (about 45%), and high resistance to corrosion. Used for condenser tubes, propellers, pump fittings, turbine blades, and for chemical and food-handling plant.

mon'golism (*Med.*). Mongolian idiocy. A condition in which mental deficiency is associated with snub nose, Mongolian-like eyes, prominent cheek-bones, small mouth, large tongue, and short, broad, and thick hands and feet.

mongrel (*Bot., Zool.*). The offspring of a cross between varieties or races of a species.

mo'nial (*Join.*). A *mullion* (q.v.).

monili'asis (*Med.*). Infection with any of the various species of the fungus *Monilia.*

monil'icorn (*Zool.*). Having moniliform antennae.

monil'iform (*Zool.*). Resembling a necklace or chain of beads, as *moniliform antennae.*

mon'imosty'ly (*Zool.*). In Vertebrates, the condition of having the quadrate immovably united to the squamosal; cf. *streptostyly.*—*adj.* **monimosty'lic.**

monis'tic (*Chem.*). Un-ionised in solution.

monitor (*Elec. Comm.*). An arrangement for reproducing any kind of transmission so that such reproduction does not interfere with the regular transmission. Used for checking the quality of the transmission, and for quickly locating faults in the channel.

monitor-man (*Cinema.*). An alternative name for the *recordist* (q.v.), since he is at all times hearing the reproduction of the sound-transmission which he is controlling for recording.

monitor position (*Teleph.*). The special position at any exchange at which operators deal with queries and complaints.

monitor tube (*Television*). A cathode ray tube at a television transmitting station to check the quality of the transmitted picture.

monitoring (*Elec. Comm.*). A general term for the act of tapping on to a communication circuit with the view to ascertain that the transmission is that desired, without interfering with the transmission. Monitoring may be with head receivers or with an amplifier and loudspeaker. See also **blind monitoring.**

monitoring amplifier (*Elec. Comm.*). See **bridging amplifier.**

monitoring booth (*Cinema.*). A portable enclosure on wheels for the use of the recordist on the floor of a sound-film studio. It is arranged so that he sees the action and hears on a monitoring receiver what is being recorded.

monitoring receiver (*Radio*). A high-fidelity receiver employed at a transmitting station to check the quality of the outgoing transmissions. Also called CHECK RECEIVER.

monk (*Typog.*). An area of printing with too much ink.

monk bond (*Build.*). A modification of the *Flemish bond* (q.v.), each course consisting of two stretchers and one header alternately. Also called FLYING BOND.

monkey (*Civ. Eng.*). The falling weight of a pile-driver. Also called BEETLE-HEAD.

monkey chatter (*Elec. Comm.*). The interference between a wanted carrier and the nearer side-band (modulation) of an unwanted transmission in radio reception.

monkey pot (*Glass*). See **jockey pot.**

monkey tail (*Join.*). A vertical scroll at one end of a hand-rail.

monkey-tail bolt (*Join.*). A long-handled bolt for the top of a door, capable of operation from the floor.

mono-. Prefix. See **mon-.**

monoba'sic (*Chem.*). Containing one hydrogen atom replaceable by a metal with the formation of a salt.

mon'obloc (*I.C. Engs.*). The integral casting of all the cylinders of an engine, i.e. in the same cylinder block.

mon'ocable (*Civ. Eng.*). The type of *aerial ropeway* (q.v.) in which a single endless rope is used both to support and to move the loads.

monocar'dian (*Zool.*). Having a completely undivided heart.

monocarpel'lary (*Bot.*). Having, or consisting of, a single carpel.

monocarp'ic (*Bot.*). (1) Forming a single fruit and then dying.—(2) Dying after one flowering season.

monocer'cous (*Zool.*). Uniflagellate.

monoc'erous (*Zool.*). Having a single horn.

monocha'sium (*Bot.*). A cymose inflorescence in which each successive branch bears one branch in its turn.

Monochlamyd'eae (*Bot.*). See **Incompletae.**

monochlamyd'eous (*Bot.*). Having a perianth of one whorl of members.

monochlamydeous chimaera (*Bot.*). See **haplochlamydeous chimaera.**

monochromat'ic filter (*Photog.*). A filter which transmits light of a single wavelength, or, in practice, a very narrow band of wavelengths.

monochromatic light (*Phys.*). Light containing radiation of a single wavelength only. For many purposes the light from a sodium flame (i.e. a Bunsen flame coloured yellow by the introduction of common salt) is sufficiently nearly monochromatic. The wavelengths it gives are 5890 and 5896 A.U. See also **cadmium red line.**

mon'ochrome (*Photog.*). A photographic print in one colour of varying brightness.

monocle (*Photog.*). An uncorrected simple lens, similar to a spectacle lens, for soft focus work.

mon'ocline (*Geol.*). A fold with a single limb which produces a sudden steepening of the dip; the rocks, however, soon approximate to horizontality on either side of this flexure.

monoclin'ic system (*Crystal.*). The style of crystal architecture in which the three crystal axes are of unequal lengths, having one of their intersections oblique and the other two at right-angles. Also called OBLIQUE SYSTEM.

monocli'nous (*Bot.*). Having stamens and carpels in the same flower.

mon'ocoque,—kok' (*Aero.*). A type of construction of a fuselage or nacelle in which the loads in the structure are taken principally by the skin, reinforced sometimes by bulkheads and stringers. Colloquially STRESSED SKIN CONSTRUCTION. See **Geodetic.**

Monocotyle'dones (*Bot.*). One of the two main groups included in the Angiospermae, with many thousands of species. The plants are mostly herbs with parallel venation in the leaves, flowers with parts in threes, and stems without a clearly defined pith, and containing scattered vascular bundles without a cambium (with few exceptions). The embryo has one cotyledon.

monocotyle'donous (*Bot.*). (1) Belonging to the *Monocotyledones.*—(2) Said of an embryo having a single cotyledon.—(3) Said of a seedling having a single cotyledon.

monoc'ular vision (*Photog.*). The viewing, by one eye only, of a scene to be photographed, the axis of vision being parallel to the axis of the camera.

mo'nocule (*Zool.*). An animal possessing a single eye, as the Water Flea *Daphnia.*—*adj.* **monoc'ular.**

monocy'clic (*Bot.*). (1) Said of an annual plant.—(2) Having each kind of member forming one whorl.—(*Zool.*) Said of the calyx of *Crinoidea* when the row of infrabasals is lacking. Cf. *dicylic.*

mo'nocyte (*Zool.*). A type of large uninuclear macrocyte.

monodac'tylous (*Zool.*). Having only a single digit.

Monodel'phia (*Zool.*). See **Eutheria.**

monode'smic (*Bot.*). Said of a petiole which contains one vascular strand.

mo'nodont (*Zool.*). Having a single persistent tooth, as the male Narwhal.

monoe'cious (*Bot.*). Having separate staminate and pistillate flowers on the same individual plant.—(*Zool.*) See **hermaphrodite.**

monoe'strous (*Zool.*). Exhibiting only one oestrous cycle during the breeding season. Cf. *polyoestrous.*

monogas'tric (*Zool.*). (Of *Siphonophora*) having a single gastric cavity.

monogenet'ic (*Chem.*). Producing only one colour on fabrics.

monogenetic (*Zool.*). Multiplying by asexual reproduction; showing a direct life-history; of parasites, having a single host.

monogenetic gravel (*Geol.*). A loose detrital sediment in which the predominant size of the particles is 2-10 mm.; it consists of one type of constituent.

monogo'nopor'ous (*Zool.*). (In hermaphrodite forms) having a single genital opening through which both male and female genital products are discharged.

monog'ony (*Zool.*). Asexual reproduction.

monohy'brid (*Bot.*). The result of a cross between two plants in which the inheritance of a single pair of characters is being investigated.

monohy'dric alcohols (*Chem.*). Alcohols containing one hydroxyl group only.

monoi'cous (*Bot.*). Said of mosses which have the antheridia and archegonia borne on the same plant, but in separate groups.

monokar'yon (*Cyt.*). A nucleus with only one centriole.

monolayer (*Chem.*). See **monomolecular layer.**

mon'olith (*Build.*). A single detached column or block of stone.

monolith (*Civ. Eng.*). A hollow foundation piece of concrete, brickwork, or masonry with a number of open wells passing through it. It is sunk in a manner similar to the *cylinder caisson* (q.v), the wells being finally filled with concrete to form a solid foundation.

monolith'ic (*Build., Civ. Eng*). The term applied to a structure made of a continuous mass of material.

monomas'tigote (*Zool.*). See **monocercous.**

monomeroso'matous (*Zool.*). Having all the somites of the body fused to form a single tagma, as in Mites.

monomineral'ic rocks (*Geol.*). Rocks consisting essentially of one mineral, as, for example, dunite and anorthosite.

monomolec'ular layer, monolayer (*Chem.*). A film of a substance one molecule thick.

monomolecular reaction (Chem.). A reaction whose speed is proportional to the concentration of one reactant only.

monomor'phic (*Zool*). Showing little change of form during the life-history; showing only a single type of bodily structure. Cf. *polymorphic.*

monomor'phous (*Crystal.*) Existing in only one crystalline form.

Monongahe'la Series (*Geol.*). The Upper Productive coal measures of the Pennsylvanian, of which they constitute the highest member.

mononucleo'sis, infectious (*Med.*). Glandular fever. An acute infectious disease characterised by slight fever, enlargement of glands in the neck, and an increase in the white (mononuclear) cells of the blood.

monony'chous (*Zool.*). Possessing a single claw.

Monopet'alae (*Bot.*). See **Sympetalae.**

monopet'aly (*Bot.*). See **gamopetaly.**

monoph'agous *or* —fă'-gus (*Bot.*). Said of a fungal parasite having a thallus which attacks one host cell only.—(*Zool.*) Feeding on one kind of food only; as *Sporozoa*, living always in the same cell, or phytophagous Insects, with only one food-plant.

monopha'sic (*Zool.*). Having an abbreviated life-cycle, without a free active stage; said of certain Trypanosomes. Cf. *diphasic.*

monophylet'ic (*Gen.*). Descended from a single parent form.

monophy'odont (*Zool.*). Having only a single set of teeth, the permanent dentition.

mon'oplane (*Aero.*). A heavier-than-air craft, either aeroplane or glider, having one main supporting surface. The term is also used as an adjective associated with some part, as *monoplane tail*, etc.

monoplanet'ic (*Bot.*). Having one period of locomotion.

monople'gia (*Med.*). Paralysis of an arm or of a leg.

mon'oploid (*Cyt.*). Haploid.

monopo'dium (*Bot.*). A branch system in which each or any branch continues to increase in length by apical extension and bears similar lateral branches in acropetal succession.

monoprosthom'erous (*Zool.*). Having one somite in front of the mouth.

mon'orail (*Civ. Eng.*). A railway system in which carriages are suspended from, and run along, a single continuous elevated rail.

monorhi'nal (*Zool.*). Having only a single nostril.

monosac'charoses (*Chem.*). The simplest group of carbohydrates, which are represented by aldehyde-alcohols or by ketone-alcohols, containing from three to six carbon atoms.

monosep'alous (*Bot.*). See **gamosepalous.**

mono'ses (*Chem.*). *Monosaccharoses* (q.v.).

mon'osome (*Cyt.*). See **sex chromosome.**

mon'ospermy (*Zool.*). Fertilisation of an ovum by a single spermatozoon.

mon'ospor'ous (*Bot.*). (1) Containing one spore.—(2) Derived from one spore.

mon'osti'chous (*Bot.*). Forming, or arranged in, one row.

mono'sy (*Zool.*). Separation of parts normally fused.

monosymmet'ric system (*Crystal.*). See **monoclinic system.**

monosymmet'rical (*Bot.*). See **zygomorphic.**

monothal'amous (*Zool.*). (In *Protozoa*) said of a shell or test which always has a single chamber.

Mono'tocar'dia (*Zool.*). See **Pectinibranchia.**

monoto'cous (*Zool.*). Producing a single offspring at a birth.

monotower crane (*Civ. Eng.*). A crane whose jib is counterpoised about a single tower.

Monotre'mata (*Zool.*). The single order included in the Mammalian group *Prototheria* (q.v.) and having the characteristics of the subclass.

mon'otri'chous (*Bot.*). Bearing a single flagellum.

mon'otro'chous (*Zool.*). Having the trochanter undivided.

mon'otro'phic (*Zool.*). See **monophagous.**

mon'otro'pic (*Chem.*). Existing in only one stable crystalline form, the other forms being unstable under all conditions.

Mon'otype (*Typog.*). See **composing machines.**

monotyp'ic (*Bot., Zool.*). Said of a species or genus which is exemplified by only a single type.

monova'lent (*Chem.*). Capable of combining with one atom of hydrogen or its equivalent.

monoxenous, —zĕ'nus (*Bot.*). Said of a parasitic fungus which is restricted to one species of host plant.

Monozo'a (*Zool.*). An order of *Cestoda* in which the body is not differentiated into a scolex and proglottides, and the genitalia are not repeated; most of the adults are parasitic in the gut of various Fish, but one form occurs in an Annelid.

Monro's foramen (*Zool.*). A narrow canal connecting the first or second ventricle with the third ventricle in the brain of *Vertebrata.*

Monroan (or **Monroe**) **Stage** (*Geol.*). Marine and estuarine strata which succeed the Salinian in Michigan, Ohio, New York, and Ontario; they consist of limestones, dolomites, and a pure quartz sand, the Sylvania Sandstone.

monsoon (*Meteor.*). A wind which blows in opposite directions at different seasons of the year. Similar in origin to land and sea breezes, but on a much larger scale, both in space and time. Particularly well developed over southern and eastern Asia, where the wet summer monsoon from the S.W. is the outstanding feature of the climate.

montage (*Cinema.*). The composition of shots or strips of images so that the whole idea conveyed to the viewer is something more than the sum of the material in the shots.

montage photograph (*Photog.*). A composite photograph, for decoration or publicity, made from the juxtaposition of cut-up photographs arranged in a pattern.

montage record (*Acous.*). A gramophone record which consists of a composite sound-picture formed from re-recordings from other records.

montan wax (*Chem.*). A bituminous wax extracted under high temperature and pressure from lignite. It is dark brown in colour, and can be bleached. M.p. 80°-90° C.; soluble in benzene, chloroform, carbon tetrachloride. It forms the basis for the metallic soaps which are used for making the original recordings in gramophone-disc manufacture.

Montan'an (*Geol.*). The Middle Cretaceous (American usage), comprising the Pierre Group below and the Fox Hill Group above; succeeded by the Laramian and underlain by the Coloradoan. Represented in Canada by coal-bearing strata in Alberta.

montant (*Join.*). A vertical member in panelling or framing.

montebra'site (*Min.*). The name given to *amblygonite* (q.v.) when there is an increase of hydroxyl.

Monterey Shale, mon-te-rā' (*Geol.*). A hard flinty shale passing upwards into a chalky rock containing only foraminifera and diatoms; of Middle Miocene age; the possible source-rock of the Californian oil-fields. It is 7000 ft. thick.

month (*Astron.*).
See **anomalistic—** **synodic—**
calendar— **lunation.**
sidereal—

monticel'lite (*Min.*). A silicate of calcium and magnesium which crystallises in the orthorhombic system. It occurs very often in crystals embedded in limestones.

montic'olous (*Zool.*). Living in mountainous regions.

montmoril'lonite (*Min.*). A hydrated silicate of calcium and magnesium, one of the important clay-minerals and the chief constituent of bentonites and fuller's earth.

monture (*Silk*). An old name for the jacquard harness and its accessories.

mon'zonite (*Geol.*). A coarse-grained igneous rock of intermediate composition, characterised by approximately equal amounts of orthoclase and plagioclase (near andesine in composition) together with coloured silicates in variety. Named from Monzoni in the Tyrol. Often referred to as SYENODIORITE.

moon (*Astron.*). The satellite which moves round the earth in an elliptic orbit and appears differently illuminated by the sun according to the relative positions of the sun, moon, and earth; the mean distance from the earth is 238,900 miles, and the moon's diameter 2158 miles. By extension, any similar satellite. See **Jupiter, Saturn,** etc.

moon blindness. See **nyctalopia.**

moonstone (*Min.*). A variety of adularia or microperthite which often possesses a bluish pearly opalescence. It is used as a gemstone.

Moore lamp (*Elec. Eng.*). A type of electric discharge lamp, usually in the form of a long tube, employing a gas other than mercury or sodium vapour.

mooring anchor (*Ships*). See **bower anchor.**

mooring guy (*Aero.*). A rope used for securing an airship, either when housed in a shed in a buoyant condition or when picketed in the open.

mooring mast (*Aero.*). A relatively small mast for the mooring of airships. Sometimes made portable and carried by the ship itself. Sometimes mounted on a movable platform to facilitate handling the airship on the ground. Also called TRANSPORTER MAST.

mooring, three-wire (*Aero.*). A three-wire system of cables attached to points in the ground in such positions that the dynamic lift due to the prevailing wind is counterbalanced, and the airship rides at a constant safe height above the ground.

mooring tower (*Aero.*). A permanent tower for the mooring of airships. Provided with facilities for the transference of passengers and freight and arrangements for replenishing ballast, gas, and fuel.

mop-board (*Build.*). A *skirting board* (q.v.).

mop-stick hand-rail (*Join.*). A timber hand-rail having a circular section flattened on the under side.

moraine' (*Geol.*). A trail of rock waste left either at the margins or at the base of a mass of ice.

morbid (*Med.*). Diseased: pertaining to, or of the nature of, disease.

morbidity (*Med.*). The state of being diseased: the sick-rate in a community.

morbil'li (*Med.*). See **measles.**

mor'bus maculo'sus (*Med.*). See **purpura haemorrhagica.**

mor'danting (*Photog.*). Adding to a silver image, or replacing a silver image by, a substance having the requisite affinity for a specified dye, which silver in itself has not.

mordants (*Chem.*). Substances, chiefly the weakly basic hydroxides of aluminium, chromium, and iron, which combine with and fix a dyestuff on the fibre in cases where the fibre cannot be dyed direct. The product formed by the action of a dye on a mordant is called a *lake* (q.v.).—(*Paint*) Preparations applied to surfaces to assist paint or gold-leaf to adhere thereto.

moreen' (*Textiles*). A plain cotton cloth with fine cord running lengthwise and watered finish; used for linings.

Morgagni's ventricle, mor-gan'yē (*Zool.*). In the higher Mammals, a paired pocket of the larynx, anterior to the vocal cords, and acting in the *Anthropoidea* as a resonator.

mor'ganite (*Min.*). A rose-coloured variety of beryl (named after J. Pierpont Morgan), obtained chiefly from California and Madagascar; used as a gemstone. Also called VEROBYERITE.

mor'iform (*Bot.*). Mulberry-like.

Mormon Sandstone (*Geol.*). A member of the Jurassic succession in California, comparable with the British Inferior Oölite.

morning glory column (*Struct.*). A slim tapering hollow concrete shaft topped by a shallow flaring circular cap supporting the floor above.

morning star (*Astron.*). The name given in popular language to a planet, generally Venus or Mercury, seen in the eastern sky at or about sunrise.

morocco (*Leather*). Tanned goatskins, finished by glazing or polishing; used in upholstery and high-class bookbinding, etc.

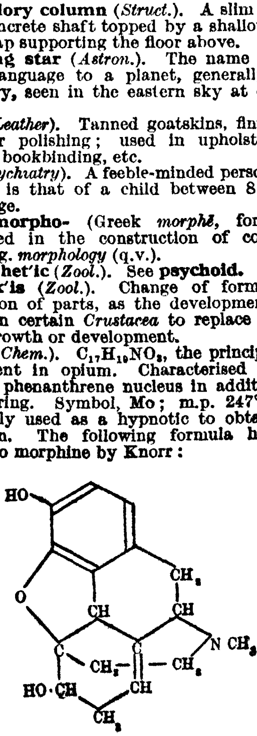
mo'ron (*Psychiatry*). A feeble-minded person whose mentality is that of a child between 8 and 12 years of age.

morph-, morpho- (Greek *morphē*, form). A prefix used in the construction of compound terms; e.g. *morphology* (q.v.).

mor'phaesthet'ic (*Zool.*). See **psychoid.**

morphallax'is (*Zool.*). Change of form during regeneration of parts, as the development of an antenna in certain *Crustacea* to replace an eye; gradual growth or development.

morphine (*Chem.*). $C_{17}H_{19}NO_3$, the principal alkaloid present in opium. Characterised by containing a phenanthrene nucleus in addition to a nitrogen ring. Symbol, Mo; m.p. 247°-254° C. Extensively used as a hypnotic to obtain relief from pain. The following formula has been ascribed to morphine by Knorr:



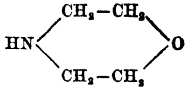
morpho-. See **morph-.**

morphoe'a, morphea (*Med.*). Localised sclerodermia. A disease in which thickened pinkish patches appear on the skin of the trunk.

morphogen'esis (*Zool.*). The origin and development of a part, organ, or organism.

morphog'raphy (*Zool.*). The description of the structure of the parts of animals; morphology.

mor'pholine (*Chem.*). A six-membered heterocyclic compound of the formula:



It is a liquid, b.p. 128° C., with strong basic properties.

morphol'ogy (*Bot.*, *Zool.*). The study of the structure and form of organisms, as opposed to the study of their functions.—(2) By extension, the nature of a member.—*adj.* **morphological.**

morphology (*Geol.*). The study of the shapes and contours of objects, especially of the surface of the earth.

morpho'sis (*Zool.*). The development of structural characteristics; tissue formation.—*adj.* **morphot'ic.**

morphot'ropy (*Chem.*). The change in crystalline form produced by replacing certain atoms or radicals in a crystal by others.

Morrison Series (*Geol.*). Part of the Comanchean, consisting of flood-plain, fluviatile deposits occurring in the Colorado region. Cf. the *Kootenai Series* of Canada.

Morse code (*Teleg.*). The dot-dash heterogeneous code devised by Morse for telegraphy.

mortar (*Artillery*). A low-velocity weapon for projecting bombs or heavy shell a short distance.

mortar (*Build.*, *Civ. Eng.*). A pasty substance which gradually hardens on exposure and is used as a jointing medium in masonry or brickwork construction.

mortar (*Chem.*). A bowl, made of porcelain, glass, or agate, in which solids are ground up with a pestle.

mortar board (*Build.*). A *hawk* (q.v.).

mortar box (*Build.*, *Plast.*). The box in which mortar or plaster is mixed.

mortar fruit (*Bot.*). A structure consisting of a persistent calyx from which the true fruits are thrown out by the wind or by shaking caused by animals.

mortar mill (*Build.*). An appliance in which the ingredients of a mortar mix are crushed mechanically by two rollers running on the ends of a horizontal bar rotating about a central vertical axis, the rollers running around a shallow pan containing the ingredients.

mortar structure (*Geol.*). A mechanical structure in which small grains produced by granulation occupy the interstices between larger grains.

Morte Slates (*Geol.*). Slate rocks found in Upper Devonian strata of North Devon and West Somerset; extensively quarried for roofing-slates.

mortise or **mortice** (*Carp.*). A rectangular hole cut in one member of a framework to receive a corresponding projection on the mating member.

mortise-and-tenon joint (*Carp.*). A framing joint between a *mortise* (q.v.) and a *tenon* (q.v.).

mortise bolt (*Join.*). A bolt which is housed in a mortise in a door so as to be flush with its edge.

mortise chisel (*Carp.*, *Join.*). A more robust type of chisel than the firmer, for use in cutting mortises and therefore designed to withstand blows from a mallet. Also called FRAMING CHISEL, HEADING CHISEL.

mortise gauge (*Carp.*). A tool similar to the *marking gauge* (q.v.) but having an additional marking pin, which is adjustable for position along the bar and allows parallel lines to be set out in marking tenons and mortises. Also called COUNTER GAUGE.

mortise joint (*Carp.*). A *mortise-and-tenon joint* (q.v.).

mortise lock (*Join.*). A lock sunk into a mortise in the edge of a door.

mortising-machine (*Join.*). A machine for cutting square or rectangular holes in wood.

mo'rula (*Zool.*). A solid spherical mass of cells resulting from the cleavage of an ovum.

Morvan's disease (*Med.*). A form of *syringomyelia* (q.v.) in which there are complete loss of sensibility in, and wasting of muscles of, hands and feet, accompanied by cyanosis of these parts and, in the early stages, severe pain.

mosa'ic (*Bot.*). (1) The arrangement of leaves in a pattern in such a way that each leaf is very little covered by its neighbours.—(2) A disease caused by a virus, and indicated chiefly by chlorosis or mottling of the leaves.

mosaic (*Dec.*). Inlaid work on plaster or stone, formed with small cubes (tesserae) or irregular-shaped fragments of marble, glazed pottery, or glass.

mosaic (*Television*). A photo-electric surface made up of a large number of infinitesimal granules of photo-emissive material deposited on an insulating support. Used as the emitting electrode in some forms of electron camera, such as the Iconoscope.

mosaic gold (*Chem.*). A complex product obtained by heating dry tin amalgam, ammonium chloride, and sulphur in a retort. A complex stannic sulphide. Sometimes used as a pigment.

mosaic gold (*Furn.*). An alloy of copper and zinc. Also called ORMOLU.

mosaic image (*Zool.*). The type of image formed in a compound eye by apposition of the separate images formed by the various facets. Also called APPOSITION IMAGE.

mosaic screen (*Photog.*). The parti-coloured screen of fine pattern used for separating the component colours in colour photography.

mosaic structure (*Met.*). An assumed division of metallic crystals into blocks so that the structure is not continuous throughout each individual crystal.

mosaic vision (*Zool.*). The mode of vision of a compound eye when the pigment is extended. A mosaic or apposition image is formed which is composed of as many points of light as there are visual elements.

Moscicki condenser, mos-tsits'ki (*Elec. Eng.*). A condenser on the principle of the Leyden jar; sometimes used on transmission lines to act as a protective device against effects of high-frequency surges.

Moseley's law (*Phys.*). The frequencies of the characteristic X-rays of the elements show a strict linear relationship with the square of the atomic number. This result of Moseley's researches stressed the importance of atomic number, and not atomic weight, in considering regularities in atomic structure. See **K-series.**

moss agate (*Min.*). A variegated cryptocrystalline silica containing visible impurities, as manganese dioxide, in moss-like or dendritic form. Also called MOCHA STONE.

moss pile (*Textiles*). A short nap or pile.

mossite (*Min.*). See **tapiolite.**

mossy cells (*Zool.*). See **neuroglia.**

motes (*Textiles*). See **moits.**

mo'tes peculia'res (*Astron.*). See **peculiar motion.**

mother (*Acous.*). The copper electroplate positive which is made from the master in gramophone-record manufacture. See **matrix.**

mother cell (*Bot.*, *Zool.*). A cell which divides to give daughter cells; the term is applied particularly to cells which divide to give spores, pollen grains, gametes, and blood corpuscles.

mother liquor (*Chem.*). The solution remaining after a salt has been crystallised out.

mother of emerald (*Min.*). A variety of *prase*, a leek-green quartz owing its colour to included fibres of actinolite; thought at one time to be the mother-rock of emerald.

mother rod (*Eng.*). See **master connecting-rod.**

mother set (*Typog.*). A set of printing plates (e.g. of a standard reference work) kept solely for the purpose of electro- or stereotyping, as required, further sets therefrom. Not used for printing.

mo'tile (*Bot.*). Able to move about as a whole by means of flagella or other organs of locomotion.

motion bars (*Eng.*). The bars which guide the motion of an engine crosshead; often called SLIDE BARS (q.v.) or GUIDE BARS.

motion block (*Eng.*). In some steam-engine valve-gears, a block attached to the valve rod, held by or constrained to move in a circular path by a curved slotted link. See **Joy's valve-gear, Walschaert's valve-gear.**

motion in line of sight (*Astron.*). See **line of sight velocity.**

motion study. A technical study of the essential movements of a workman in performing a given piece of work.

motion work (*Horol.*). The auxiliary train of wheels, normally under the dial, which gives the correct relative motion to the hour and minute hands.

motional impedance (*Elec. Comm.*). In an electro-mechanical transducer, such as a telephone receiver or relay, that part of the input electrical impedance which is due to the motion of the mechanism; it is, therefore, the difference between the input electrical impedance when the mechanical system is allowed to oscillate and the same impedance when the mechanical system is stopped from moving, or blocked.

motor (*Bot.*, *Zool.*). Pertaining to movement; as nerves which convey movement-initiating impulses to the muscles from the central nervous system.

motor areas (*Zool.*). Nerve-centres of the brain concerned with the initiation and correlation of movement.

motor cell (*Bot.*). One of a number of cells which together can expand or contract and so cause movement in a plant member.

motor end plates (*Zool.*). The special end-organ in which a motor nerve terminates in a striated muscle.

motor oculi (*Zool.*). See **oculomotor.**

motor system (*Bot.*). A general name for the tissues and structures concerned in the movements of plant members.

motor (*Eng.*). The petrol engine of an automobile or aeroplane. See also **electric motor.**

motor-boating (*Elec. Comm.*). Very low frequency oscillation, of a few cycles per second, arising from common impedances in the source of the power supplies to the anodes and grids in amplifiers.

motor-boating (*Radio*). Intermittent oscillation of a multi-stage amplifier due to coupling between the output and input circuits, causing it to become periodically inoperative.

motor-bogie (*Elec. Eng.*). A bogie or truck on an electric locomotive or motor-coach which carries one or more electric motors.

motor-car. A self-propelled vehicle or private carriage, now almost universally powered by a multi-cylinder petrol-engine which drives the rear (sometimes the front) wheels through a variable-speed gear-box. Also called AUTOMOBILE (q.v.).

motor-coach (*Elec. Eng.*). A passenger coach, equipped with its own motors, for use on electrified railways; it is commonly used in conjunction with trailer coaches to make up a multiple-unit train.

motor convertor (*Elec. Eng.*). A form of convertor in which an induction motor, to which the a.c. supply is connected, is combined with a synchronous convertor which is connected to the d.c. circuit, the armature winding of the induction motor being connected directly to that of the synchronous convertor.

motor generator (*Elec. Eng.*). A convertor consisting of a motor connected to a supply of one voltage, frequency, or number of phases, and a generator providing output power to a system of different voltage, frequency, or number of phases, the motor and generator being mechanically connected.

motor-generator locomotive (*Elec. Eng.*). A type of electric locomotive on which is mounted a motor generator for converting current of one type supplied by the trolley wire, e.g. 1-phase a.c., to current of another type, e.g. d.c., for supply to the traction motors.

motor meter (*Elec. Eng.*). An integrating meter embodying a motor whose speed is proportional to the power flowing in the circuit to which it is connected, so that the number of revolutions made by the spindle is proportional to the energy consumed by the circuit. See also **mercury motor meter, induction meter.**

motor-oils (*Eng.*). Mineral oils, or blends of mineral and vegetable oils, specially prepared for lubricating automobile engines, the viscosity being adjusted to the season in *summer* and *winter* grades.

motor-operated switch (or **circuit-breaker**) (*Elec. Eng.*). A large switch or circuit-breaker which is closed by means of an electric motor. Cf. *solenoid-operated switch.*

motor starter (*Elec. Eng.*). A device for operating the necessary circuits for starting and accelerating to full speed an electric motor, but not for controlling its speed when running. See **controller.**

motor'ium (*Zool.*). See **motor areas.**

mottle (*Textiles*). Two yarns of different colours folded together.

mottled. A term applied to a surface marked with spots of different colours or shades of colour.

mottled clay (*Geol.*). Variegated clay rock, found, for example, in the Keuper Marls. The mottling results from oxidation of iron compounds in localised patches.

mottled iron (*Met.*). Pig-iron in which the majority of the carbon is combined with iron in the form of cementite (Fe_3C) but in which there is also a small amount of graphite. The fractured pig has a white crystalline fracture with clusters of dark spots, indicating the presence of graphite.

mottled sandstone (*Geol.*). Variegated sandstones found in the Bunter Series of the Triassic System in the Midlands and North of England.

mot'tramite (*Min.*). A variety of descloizite in which the zinc element is almost entirely replaced by copper.

mould (*Civ. Eng.*). A temporary timber or metal construction used for the support of concrete in position while it is setting. Also called FORM.

mould (*Paper*). A wooden frame covered with woven or laid wire, on which hand-made paper is made.

mould (*Plast.*). A zinc sheet or thin board cut to a given profile and used in running cornices, etc.

mould (*Typog.*). A papier-mâché impression of type from which, when heat-dried, stereotypes for printing may be made. See **flong.**

mouldboard (*Agric. Mach.*). In the general purposes plough, a long, gently curving implement which turns over the furrow slice cut by the coulter and the share. In the digger plough the mouldboard is short, with an abrupt curve. Also called BREAST.

mouldboard plough (*Agric. Mach.*). An implement (drawn by horses or by mechanical power) which by means of a coulter and a share detaches a slice of soil vertically from the undersoil. This is turned over by the *mouldboard* (q.v.), leaving an unbroken furrow slice, or, in the case of the digger plough, a flat broken surface. See also **disc plough, tractor plough.**

mould oil (*Build., Civ. Eng.*). A substance applied to shuttering to prevent adherence of the concrete.

moulded breadth, moulded depth (*Ship Constr.*). See **breadth (moulded), depth (moulded).**

moulded-intake belt course (*Masonry*). An *intake belt course* (q.v.) shaped along the projecting corner to a more or less ornamental profile.

moulded-in-place concrete piles (*Civ. Eng.*). See **cast-in-situ concrete piles.**

moulding. See **foundry, machine moulding, moulding sands, pipe moulding, plate moulding.**

moulding (*Build*) A more or less ornamental band projecting from the surface of a wall or other surface.

moulding (*Plastics*). The moulding powder is weighed carefully into small containers or preformed in pill machines to pellets. The material is then placed in a steel die, heated to about 160° C., and subjected to a pressure of 3000-5000 lb. per sq. in. The volume of the powder is reduced to about ⅖.

mouldings (*Join*). Strips of wood cut to a given cross-sectional profile and applied to surfaces required to be decorated.

moulding box (*Foundry*). See **flask.**

moulding cutter (*Join.*). A specially shaped cutting tool which, when revolving about its own axis, is capable of cutting a desired moulding profile.

moulding machines (*Moulding*). See **machine moulding.**

moulding powder (*Plastics*). The finely ground mixture of binder, accelerator, colouring matter, filler, and lubricant which is converted under pressure into the final moulding.

moulding sands (*Moulding*). Siliceous sands (containing clay or aluminium silicate as a binding agent) possessing naturally or by blending the qualities of fineness, plasticity, adhesiveness, strength, permeability, and refractiveness. See **dry sand, green sand, loam.**

Mouldrite (*Plastics*). A thermosetting plastic, of the phenol-cresol-formaldehyde type. See **Bakelite.**

Moullin voltmeter (*Radio*). A thermionic voltmeter employing the anode bend principle, in which the anode is connected to one end of the filament, the potential drop across which provides the anode voltage supply.

moult (*Zool.*). See **ecdysis.**

mound (*Civ. Eng.*). An undisturbed hillock left on an excavated site as an indication of the depth of the excavation.

mound breakwater (*Civ. Eng.*). A breakwater formed by depositing rubble to form a mound which eventually rises above water.

mounding (*Med.*). See **myoidema.**

mount (or mounting), lens (*Photog.*). See **lens mount (or mounting).**

mountain cork (*Min.*). A variety of asbestos which consists of thick interlaced fibres. It is light and will float, and is of a white or grey colour.

mountain leather (*Min.*). A variety of asbestos which consists of thin flexible sheets made of interlaced fibres.

mountain railway (*Civ. Eng.*). A type of railway in which, on account of the steep ascents required, other means of traction than mere adhesion between train and rails become necessary.

mountain wood (*Min.*). A compact fibrous variety of asbestos looking like dry wood.

mountains, origin of (*Geol*). Most mountains, other than those of volcanic origin, have originated by the dissection of uplifted areas of the earth's crust.

mountants (*Photog.*). Special adhesives for fixing prints on mounts, free from chemicals which might attack the silver or other image during the course of time.

mounting (*Artillery*). A fixed support for an artillery weapon, for firing only. See **gun carriage.**

mounting, dry (*Photog.*). See **dry mounting.**

mouse roller (*Print*). A small extra roller used to obtain better distribution of the ink on a machine.

mousseline-de-laine, moos-lēn′ de len (*Textiles*). An all-wool muslin fabric made from yarn which has been spun on the worsted system.

mouth (*Acous*). See **flare.**

mouth (*Carp., etc.*). The slot in the body of a plane into which the cutting iron fits.

mouth grinding (*Glass*). After the cap of a hollow blown article has been cracked off, the mouth is ground flat and then sometimes bevelled slightly on the inside and outside edges before being fire-finished.

mouth-parts (*Zool.*). In *Arthropoda,* the appendages associated with the mouth.

mouth rot (*Vet.*). Pyorrhoea (of dogs).

mouth, sharp (*Vet.*). Overgrowth of a part of one or more teeth of a horse through loss of wear.

mouth, shear (*Vet.*). An increase in the obliquity of the wearing surfaces of the molar teeth of horses.

mouth, smooth (*Vet.*). Smooth and polished grinding surface of the molar teeth of horses.

mouth, wave-formed (*Vet.*). A variation in height of the molar teeth of horses.

movable bridge (*Civ. Eng.*). A bridge which is capable of being displaced bodily in order to permit the passage of vessels.

See **bascule—** **swing—**
floating— **traversing—**
lift—

movable types (*Typog.*). Single types, as distinguished from Linotype slugs or blocks.

movable weir (*Civ. Eng.*). A temporary weir capable of being removed from the river channel in times of flood.

movement (*Cinema.*). The essential part of the mechanism of a camera or projector.

movement (*Horol.*). The mechanism of a clock or watch, not including the case or dial.

movie (*Cinema.*). A cinematograph film.

Movieflood lamp (*Cinema.*). A tungsten-wire incandescent lamp run at excess voltage, with correspondingly reduced life, in order to raise its colour temperature.

movieo′la or **moviola** (*Cinema.*). Miniature sound-reproducing equipment for the use of editors in film studios. The picture is viewed through a lens and the reproduced sound heard through a small loudspeaker or head telephones, the film being reversed at will.

Movietone (*Cinema.*). The original method of recording sound on film, in which the variable light from an Aeolight lamp illuminates a constant slit sliding on the surface of the film, with a resulting variable-density track.

moving-coil galvanometer (*Elec. Eng.*). A galvanometer depending for its action on the movement of a current-carrying coil in a magnetic field. Cf. *moving-magnet galvanometer*.

moving-coil instrument (*Elec. Eng.*). An electrical measuring instrument depending for its action upon the force on a current-carrying coil in the field of a permanent magnet.

moving-coil loudspeaker (*Acous.*). A loudspeaker in which the driving force arises from the interaction of a current in an annular coil fixed near the apex of the radiating cone diaphragm and located in the circular gap of a pot-magnet.

moving-coil microphone (*Acous.*). A type of microphone in which the generated electromotive force arises in a coil attached to a diaphragm, the coil being in the radial field of a small pot-magnet. See also **Sykes microphone.**

moving-coil receiver (*Teleph*). The high-grade telephone receiver used as the reference receiver in the C.C.I.F. transmission reference system; used also for sound-film monitoring.

moving-coil regulator (*Elec. Eng*). A type of voltage regulator, for use on a.c. circuits, in which a short-circuited coil is made to move up and down the iron core of a specially arranged auto-transformer.

moving-coil transformer (*Elec. Eng.*). A type of transformer, occasionally used in constant-current systems, in which one coil is made to move relatively to the other for regulating purposes.

moving-conductor microphone (*Acous.*) A microphone in which a conductor (generally in the form of a foil) in a magnetic field is moved by the application of acoustic pressures. An electromotive force is thereby generated.

moving contact (*Teleph.*). An electrical contact carried on a moving spring which leaves a back contact and advances to make contact with a front contact on the operation of the relay.

moving form (*Civ. Eng.*). See **climbing form.**

moving-iron instrument (*Elec. Eng.*). An electrical measuring instrument depending for its action upon the magnetic force exerted by a current-carrying coil upon a piece of soft iron.

moving-iron (or, **-armature**) **loudspeaker** (*Acous.*). A loudspeaker in which the mechanism driving the diaphragm contains a moving element, which is acted on by magnetic forces across a gap.

moving-iron microphone (*Acous.*). A microphone in which the acoustic forces operate magnetic material in a magnetic field, and thereby induce an electromotive force in a coil on a magnetic circuit.

moving load (*Struct.*). A variable loading on a structure, consisting of the pedestrians or vehicles passing over it.

moving-magnet galvanometer (*Elec. Eng.*). A galvanometer depending for its action on the movement of a small permanent magnet in the magnetic field produced by the current to be measured. Cf. *moving-coil galvanometer*.

moving period (*Cinema.*). In describing an intermittent mechanism, the period (expressed in degrees or as a fraction of the whole cycle of operation) during which the film is actually in motion.

moving-staircase. See **escalator.**

mower (*Agric. Mach.*). See **horse mower, tractor mower.**

m.p. (*Chem.*). An abbrev. for melting-point.

M.Q. (*Photog.*). An abbrev. for metol-quinol or metol-hydroquinone developers. See **metol.**

M.S.C. (*Elec. Comm.*). An abbrev. for *mile of standard cable.*

MsTh (*Chem.*). The symbol for *mesothorium.*

Mu-metal (*Met.*). An alloy of Permalloy type (i.e. with high magnetic permeability and low hysteresis loss) but containing copper and manganese in addition to iron and nickel.

mu'cedin'eous, mu'cedin'ous (*Bot.*). Mould-like; white and cottony.

muci-, muco- (Latin *mucus*). A prefix used in the construction of compound terms, e.g. *muco-serous*, secreting both mucus and a watery fluid; *mucodermal*, pertaining to the skin and the mucous membrane.

mu'cic acid (*Chem.*). $HOOC{\cdot}(CHOH)_4{\cdot}COOH$, an acid obtained by the oxidation of galactose.

mu'cid. Musty or mouldy.

mu'cigen (*Zool*). A substance occurring as granules or globules in chalice cells and later extruded as mucin.

mu'cilages (*Chem.*). Complex organic compounds related to the polysaccharoses, of vegetable origin, and having glue-like properties.

mucila'ginous (*Bot., Zool.*). Pertaining to, containing, resembling, or composed of mucilage or mucin.

mu'cins (*Chem.*). A group of glucoproteins occurring in mucus and saliva and widely distributed in Nature. They are acid in character and dissolve readily in alkali carbonates and ammonia; they are not coagulable by heat.

mucking (*Mining*). See **lashing.**

mu'cocele (*Med.*). A localised accumulation of mucous secretion, in, for example, a hollow organ the outlet of which is blocked.

mu'coids (*Chem.*). A group of glucoproteins. They are not precipitated by acetic acid.

mucomem'branous colic (*Med.*). A condition in which constipation is associated with abdominal pain and the passing in the stools of membranes or casts of mucus.

mucon'ic acid (*Chem.*). $HOOC{\cdot}CH{:}CH{\cdot}CH{:}CH{\cdot}COOH$. Often obtained by cleavage of naturally occurring aromatic amino acids. A white crystalline solid; m.p. about 260° C., soluble in alcohol and in acetic acid, slightly in hot water.

mucopro'teins (*Chem.*). Conjugated proteins containing a carbohydrate group.

mucopu'rulent (*Med.*). Consisting of mucus and pus.

muco'sa (*Zool.*). See **mucous membrane.**

mucosanguin'eous (*Med.*). Consisting of mucus and blood.

mu'cose (*Bot.*). Slimy.

mu'cous glands (*Zool.*). Glands secreting or producing mucus.

mucous membrane (*Zool.*). A tissue layer found lining various tubular cavities of the body (as the gut, uterus, trachea, etc.). It is composed of a layer of epithelium containing numerous unicellular mucous glands and an underlying layer of areolar and lymphoid tissue, separated by a basement membrane. Also MUCOSA.

mu'cro (*Bot.*). A short sharp point formed by a continuation of the midrib.—(*Zool.*) Any sharp spiny structure, as the claw-like process of each dens of the furcula in *Collembola*.

mu'cronate (*Bot.*). Said of a leaf tipped by a short sharp point of much the same texture as the leaf.

mu'cus (*Zool.*). The viscous slimy fluid secreted by the mucous glands.—*adjs.* **mu'cous, mu'coid, mu'ciform, mucip'arous.**

mud (*Geol.*). A fine-grained unconsolidated rock, of the clay grade, often with a high percentage of water present. It may consist of several minerals.

mud drum (*Eng.*). A vessel placed at the lowest part of a steam-boiler: a similar plant to intercept and retain insoluble matter or sludge, as the lowest drum of a *water-tube boiler* (q.v.).

mud fever (*Vet.*). See **grease.**

mud hole (*Eng.*). A *hand hole* (q.v.) in a mud drum, or in the bottom of a boiler, for the removal of scale and sludge.

mudstone (*Geol.*). An argillaceous sedimentary rock characterised by the absence of obvious stratification. Cf. *shale.*

mud volcano (*Geol.*). A conical hill formed by the accumulation of fine mud which is emitted, together with various gases, from an orifice in the ground.

muff (or box) coupling (*Eng.*). A shaft coupling consisting of a sleeve, split longitudinally, which embraces and is keyed to the shafts, the halves being bolted together.

muffs (*Acous*). See **ear muffs.**

muffle furnace (*Met*). A furnace in which heat is applied to the outside of a refractory chamber containing the charge.

muffle kiln (*Pot.*). An arched fireclay-lined furnace in which seggars are placed.

mugearite, moo-gĕr′īt (*Geol.*). A dark, finely crystalline, basic igneous rock which contains oligoclase, orthoclase, and usually olivine in greater amount than augite. Occurs typically at Mugeary in Skye.

muir ill (*Vet.*). See **haemoglobinaemia (paralytic).**

mule (*Textiles*). A cotton-spinning machine invented by Samuel Crompton (*c.* 1779); it is intermittent in action, first spinning the yarn (outward run) and then winding it on a spindle (inward run); it spins yarn of any counts, but more particularly fine counts.

mull (*Textiles*). A light-weight plain grey cotton fabric, generally pure sized and bleached; for Eastern markets.—(*Bind.*) *Scrim* (q.v.).

Mull Leaf Beds (*Geol.*). Bands of sand and shale interstratified with the lava flows of Tertiary age in Scotland. They contain many plant remains.

Müller's fibres, mü′ler (*Zool.*). Long neuroglia cells occurring in the retina of the Vertebrate eye.

Müller's glass (*Min.*). See **hyalite.**

Müller's law (*Zool.*). Each nerve of special sense gives rise to its own peculiar sensation, however excited.

Müller's muscle (*Zool.*). The circular ciliary muscle of the Vertebrate eye.

Müller's organ (*Zool.*). In some Insects, a swelling formed by numerous scolophores applied to the inner surface of the tympanum.

Mülle′rian duct (*Zool.*). A duct which arises close beside the oviduct, or which, by the actual longitudinal division of the archinephric duct, in many female Vertebrates becomes the oviduct.

Müllerian mimicry (*Zool.*). Resemblance in colour between two animals, both of which benefit by the resemblance. Cf. *Batesian mimicry.*

mullion (*Join.*). A vertical member of a window frame separating adjacent panes. Also called MUNNION.

mullite (*Min.*). A silicate of aluminium, closely similar to sillimanite but with formula $3Al_2O_3$, $2SiO_2$. It occurs in contact-altered argillaceous rocks.

multi- (Latin *multus*, many). A prefix used in the construction of compound terms; e.g. *multiganglionate*, with many ganglia.

multiartic′ulate (*Zool.*). Many-jointed.

multi-break switch (or **circuit-breaker**) (*Elec. Eng.*). A switch or circuit-breaker in which the circuit is broken at two or more points in series on each pole or phase.

multicel′lular (*Bot., Zool.*). Consisting of a number of cells.

multicellular voltmeter (*Elec. Eng.*). A form of electrostatic voltmeter in which a number of moving vanes mounted upon the spindle are drawn into the spaces between a corresponding number of fixed vanes.

multi-channel system (*Television*). A system of transmission in which the picture signal is divided into a number of relatively narrow bands in the frequency spectrum by means of filters. Each band is transmitted over a separate channel, and all are recombined at the receiving end.

multi-channel telegraphy (*Teleg.*). The use of a large number of voice-frequency channels, e.g. 12 or 18, for the fullest utilisation of the transmission properties of normal audio-frequency telephone circuits.

multicip′ital (*Zool.*). Many-headed.

Multi-color (*Photog.*). A two-colour subtractive cinematograph film process in which two emulsions, blue-green on the front, panchromatic with an orange-red filter at the back, are exposed in a camera, separated, and normally printed on both sides of a positive film, the respective sides of which are dyed the same colours as registered.

multicus′pidate (*Zool.*). Said of teeth with many cusps.

multi-exchange system (*Teleph.*). A group of local exchanges in an exchange area.

mul′tifid (*Bot.*). Divided into a number of lobes.

multi-filament lamp (*Illum.*). An electric filament lamp having more than one filament in the same bulb, so that failure of one filament will not cause the lamp to be extinguished.

multifol′iolate (*Bot.*). Having many leaflets.

mul′tiform (*Bot.*). Diverse in shape.

multi-frequency generator (*Teleg.*). The multi-frequency inductor generator which is used for the multi-channel voice-frequency telegraph system operated by teleprinter and transmitting over normal telephone lines.

multigap arrester (*Elec. Eng.*). A form of lightning arrester in which a number of spark gaps are connected in series between the line and earth.

multigap discharger (*Elec. Eng.*). A discharger for use in a spark-type of radio transmitter, making use of a number of gaps in series.

multigrav′ida (*Med.*). A woman who has been pregnant more than once.

multilayer winding (*Elec. Eng.*). A type of cylindrical winding, used chiefly for transformers, in which several layers of wire are wound one over the other with layers of insulation between.

multilayered (*Bot.*). Consisting of several layers of cells.

multiloc′ular, multiloc′ulate (*Bot.*). Having a number of compartments.

mul′timu valve (*Thermionics*). See **variable mu valve.**

multinu′cleate (*Bot., Zool.*). With many nuclei.

multi-office exchange (*Teleph.*). A group of central offices in a telephone area.

multip′arous (*Zool.*). Bearing many offspring at a birth.

multiple (*Teleph.*). The face of the telephone switchboard in a telephone exchange, containing the outgoing jacks to subscribers' lines, each of which appears within the reach of every B-operator. The jacks are multipled round the positions by connecting the relevant jacks, which appear in order, in parallel.

See **check—** **ribbon—**

multiple-circuit winding (*Elec. Eng.*). See **lap winding.**

multiple-disc clutch (*Eng.*). A friction clutch similar in principle to the *single-plate clutch* (q.v.), but in which a smaller diameter is obtained by using a large number of discs, alternately splined to the driving and driven members, loaded by springs, and usually run in oil. See **friction clutch.**

multiple duct (*Elec. Eng.*). A cable duct having a number of tunnels for the reception of several cables.

multiple echo (*Acous.*). The perception of a number of distinct repetitions of a sound because of the multiple reflections and the differential delays in travel of the waves between the source and the observer.

multiple-expansion engine (*Eng.*). An engine in which the expansion of the steam or other working fluid is divided into two or more stages, which are performed successively in cylinders of increasing size. See **compound engine, triple-expansion engine, quadruple-expansion engine.**

multiple feeder (*Elec. Eng.*). A feeder consisting of a number of cables connected in parallel; used where a single cable to carry the load would be prohibitively large.

multiple fission (*Zool.*). A method of multiplication found in *Protozoa*, in which the nucleus divides repeatedly without corresponding division of the cytoplasm, which subsequently divides into an equal number of parts leaving usually a residuum of cytoplasm. Cf. *binary fission.*

multiple fruit (*Bot.*). A fruit formed from the flowers of an inflorescence, and not from one flower

multiple-hearth furnace (*Met.*). A type of roasting furnace consisting of a number of hearths (from 7 to 12). The charge enters on the top hearth and passes downwards from hearth to hearth, being rabbled by rotating arms from centre to circumference and circumference to centre of alternate hearths

multiple intrusions (*Geol.*). Minor intrusions formed by several successive injections of approximately the same magma.

multiple-operator welding-unit (*Elec. Eng.*). An electric-arc welding generator or transformer designed to supply current to two or more welding arcs operating in parallel.

multiple personality (*Psycho-an.*). A condition in which the normal organisation of mental life is disintegrated, or split up into distinct parts or sub-personalities, each with a fairly complicated organisation of its own, comparable with a normal individual personality. Each sub-personality may, from time-to-time, partially or completely usurp the main personality, but even in extreme cases the split is not absolutely complete, because there seems always to be some underlying personal unity, despite much disintegration. See also **dual personality.**

multiple proportions (*Chem.*). See **law of multiple proportions.**

multiple-retort underfeed stoker (*Eng.*). A number of underfed inclined retorts arranged side-by-side with tuyères between, resulting in a fuel bed the full width of the furnace walls. See **single-retort underfeed stoker.**

multiple scanning (*Television*). Repeated scanning of a television image by two or more scanning beams.

multiple-spark system (*Radio*). A form of quenched spark system in which the spark discharge takes place across a series of gaps formed between a number of closely spaced metallic plates.

multiple-spindle drilling machine (*Eng.*). A drilling machine having two or more vertical spindles for simultaneous operation on a number of holes in large work; e.g. an engine crankcase.

multiple star (*Astron.*). A system in which three or more stars are so united by gravitational forces as to revolve about a common centre of gravity.

multiple-switch starter (or **controller**) (*Elec. Eng.*). A starter (or controller) for an electric machine in which the steps of resistance are cut out, or other operations performed, by hand-operated switches.

multiple system (*Met.*). A method of connecting the anodes and cathodes in electrolytic refining. Each cell contains a number of electrodes, anodes and cathodes being connected in parallel. From the cathodes of one cell the current flows to the anodes of the next. The cells are therefore in series.

multiple-threaded screw (*Eng.*). A screw of coarse pitch in which two or more threads are used to reduce the size of thread and maintain adequate core strength. Also called MULTI-START THREAD, TWO-START THREAD, THREE-START THREAD. See also **divided pitch, multi-start worm.**

multiple-tool lathe (*Eng.*). A heavy lathe having two large tool posts, one on either side of the work, each carrying several tools operating simultaneously on different parts of the work.

multiple-tuned antenna (*Radio*). A transmitting antenna system comprising an extensive horizontal 'roof' with a number of spaced vertical leads, each connected to earth through appropriate tuning circuits, and all tuned to the same frequency, the connexion to the transmitter being made through one of them.

multiple-twin cable (*Elec. Comm.*). A lead-covered cable in which there are numbers of cores, each comprising two pairs twisted together.

multiple-unit control (*Elec. Eng.*). The method of control by which a number of motors operating in parallel can be controlled from any one of a number of points; used on multiple-unit trains.

multiple-unit train (*Elec. Eng.*). An electric train consisting of a number of motor-coaches, all controlled from one driving position at the front or rear of the train.

multiple valve (*Thermionics*). A valve comprising two or more separate electrode systems (sometimes with a common cathode) enclosed in one envelope.

mul'tiplet (*Bot.*). One of several individuals derived by the segmentation of an ovum.

mul'tiplex (*Teleg.*). A telegraph system which provides a number of channels by allocating the line to these in turn by means of distributors.

multiplex printing (*Teleg.*). A system which provides for printing the messages received over a multiplex system.

multiplex winding (*Elec. Eng.*). A two-layer armature winding sometimes used on d.c. machines. It has more than two parallel paths per pole-pair between the positive and negative terminals.

multiplication (*Bot.*). Increase by vegetative means.

multiplier (*Photo-electronics*). See **electron multiplier.**

multi-ply (*Timber*). Plywood formed of more than three layers of wood.

multiplying camera (*Photog.*). A camera for taking a number of small exposures on one negative, using a deflecting mirror or a number of lenses which can be traversed.

multiplying constant (*Surv.*). A factor in the computation of distance by tacheometric methods (see **tacheometer**). It is that constant value for the particular instrument by which the staff intercept must be multiplied in order to give the distance of the staff from the focus of the object glass. If the distance from the centre of the instrument is required, it is necessary to add (see **additive constant**) the distance between the focus of the object glass and the centre of the instrument.

multipo'lar (*Zool.*). Said of nerve cells having many axons.

multirota'tion (*Chem.*). See **mutarotation.**

multiser'iate (*Bot.*). (1) Said of ascospores arranged in several rows in the ascus.—(2) Said of a vascular ray which is several to many cells wide.

multi-start thread (*Eng.*). See **multiple-threaded screw.**

multi-start worm (*Eng.*). A worm in which two or more helical threads are used in order to obtain a larger pitch and hence a higher velocity ratio of the drive.

multitone (*Acous.*). A generator, either thermionic or mechanical, which produces a mass-spectrum of currents, i.e. a complex current with a large number of equal components, equally spaced in the frequency scale.

multituber'culate (*Zool.*). Said of tuberculate teeth with many cusps: having many small projections.

multi-turn current transformer (*Elec. Eng.*). A current transformer in which there are several turns on the primary winding. Cf. *bar-type current transformer*.

multiva'lent (*Chem.*). Polyvalent.

multivibra'tor (*Elec. Comm.*). An arrangement of thermionic valves, usually a back-coupled resistance-capacity coupled amplifier, which sustains relaxation oscillations which are readily pulled into step by a stable drive. Characterised by an irregular wave-form of oscillation, containing high-order harmonics.

multivin'cular (*Zool.*). (In Bivalves) said of the hinge of the shell when it is provided with several ligaments.

multivol'tine (*Zool.*). Having more than one brood in a year.

multiwire antenna (*Radio*). An antenna consisting of a number of horizontal wires in parallel.

multun'gulate (*Zool.*). Having the hoof divided into three or more parts.

Mummery's plexus (*Zool.*). A network of fine nerve-fibrils lying between the odontoblasts and the dentine in a tooth.

mumps (*Med.*). Epidemic or infectious parotitis. An acute infectious disease characterised by a painful swelling of the parotid gland; thought to be due to infection with a filter-passing virus.

mundic (*Min.*). See **iron pyrite.**

mungo (*Textiles*). A low grade of recovered waste from which certain types of woollen yarns are spun.

munnion (*Join.*). A mullion: a munting.

munting or **muntin** (*Join.*). The vertical framing piece separating the panels of a door. Also called MUNNION.

Muntz metal (*Met.*). Alpha-beta brass, 60% copper and 40% zinc. Stronger than alpha-brass and used for castings and hot-worked (rolled, stamped, or extruded) products. High-strength brasses are developed from this by adding other elements.

murex'ide test (*Chem.*). A test for uric acid in which the substance is heated with nitric acid. The residue of alloxantin thus produced turns purple-red on adding ammonia, owing to the formation of murexide, the ammonium salt of purpuric acid, $C_8H_5N_5O_6$.

muriat'ic acid (*Chem.*). Hydrochloric acid.

mu'ricate (*Bot.*). Having a surface roughened by short, sharp points.

mu'riform (*Bot.*). Said of a spore made up of a mass of cells formed by divisions in three intersecting planes.

murmur (*Med.*). An irregular rustling sound which follows, accompanies, or replaces the normal heart sounds and often indicates disease of the valves of the heart; similar sound heard over blood-vessels. The sound heard over the lungs during respiration.

mur'rain (*Vet.*). A malignant epizootic fever of contagious nature, affecting domestic animals: a lethal infection of animals.

Murray loop test (*Elec. Eng.*). A method of localising a fault in an electric cable. The cable up to and beyond the fault is made to form two arms of a Wheatstone bridge network.

mus'cae volitan'tes (*Med.*). The appearance of imaginary black specks in front of the eyes.

Muschelkalk, moosh'— (*Geol.*). A marine shelly limestone occurring between the rocks of Bunter and Keuper age in the Trias of France and Germany.

Mus'ci (*Bot.*). One of the two main groups of the *Bryophyta*, with some thousands of species. The plants are small, attached to the substratum by rhizoids and not by roots. The stem bears a number of small leaves, both members being of very simple internal structure, containing no woody material. The sexual organs are antheridia and archegonia, borne on the leafy moss plant, and the zygote gives rise to a small spore-bearing plant, a stalked capsule known as the sporogonium, which lives parasitically on the leafy moss plant.

muscle (*Zool.*). Tissue possessing the power of rapidly and forcibly changing shape; therefore the motile tissue of the animal body: a definitive mass of such tissue.—*adj.* **mus'cular.**

mus'covite (*Geol., Min.*). The common or white mica; for the most part an orthosilicate of aluminium and potassium, crystallising in the monoclinic system. It can be used as an insulator (not above 600° C., when its water of composition is driven off; see **phlogopite),** as a lubricant, or for non-inflammable windows.

muscovite-granite (*Geol.*). A granite which contains a fairly large proportion of the mineral muscovite.

Muscovy glass (*Min.*). Formerly a popular name for *muscovite*.

mus'culature (*Zool.*). The disposition and arrangement of the muscles in the body of an animal.

mus'culocuta'neous (*Zool.*) Pertaining to the muscles and the skin.

mush (*Radio*). The radiation emitted over a band of frequencies extending on either side of the carrier frequency of an arc transmitter; due to irregularities in the arc discharge.

mush winding (*Elec. Eng.*). A type of winding used for a.c. machines; the conductors are placed one-by-one into partially closed ready-lined slots, the end connexions being subsequently insulated separately.

mushroom bodies (*Zool.*). Paired nerve centres of the protocerebrum in Insects, regarded by some authorities as the principal motor and psychic centres of the brain.

mushroom construction (*Civ. Eng.*). Ferro-concrete construction composed only of columns and floor slabs.

mushroom follower (*Eng.*). A cam follower in the form of a mushroom, i.e., with a flat surface, as distinct from a roller-type follower.

mushroom gland (*Zool.*). In male *Orthoptera*, the large compact mushroom-shaped mass of the accessory genital glands.

mushroom loudspeaker (*Acous.*). A loudspeaker in which a vertical horn is fitted with directing baffles, so that the radiated sound-power is directed uniformly over an area in its neighbourhood.

mushroom valve (*Eng.*). See **poppet valve.**

mushy (*Textiles*). Said of wool that is lacking in grease and uneven in staple, the result of dry climate and light soil where the sheep are kept.

musical clock (*Horol.*). A clock which plays a tune instead of chiming.

musical echo (*Acous.*). A multiple echo in which the interval between the reception of successive echoes is so small that the impulses received appear to have the quality of music.

musical spark system (*Radio*). A form of spark transmitting system in which the sparks follow one another at regular intervals, so that the received signal, after rectification, produces a musical note in the telephones. Also called SINGING SPARK SYSTEM.

musical watch (*Horol.*). A repeater watch which plays a tune on a comb instead of striking on a gong.

musk glands (*Zool.*). In some Vertebrates, glands, associated with the genitalia, the secretion of which has an odour of musk.

muslin (*Textiles*). A light-weight, plain cotton cloth of open texture and soft finish, bleached, dyed, or printed; chiefly for Eastern markets.

musquash' (*Furs*). The dressed skin of the American musk-rat, an aquatic rodent. The fur is dark-brown, with lighter underfur. There is also a black variety.

mustard gas (*Chem.*). $(CH_2Cl{\cdot}CH_2)_2S$, dichlorodiethyl sulphide; a poison gas manufactured from ethylene and S_2Cl_2.*

mustard oils (*Chem.*). *Iso*-thiocyanates.

mutam'erism (*Chem.*). The formation of an equilibrium mixture of two isomers from a freshly prepared solution of one of them.

mu'tant (*Gen.*). See **mutation.**

mutarota'tion (*Chem.*). The change with time of the optical activity of a freshly prepared solution of an active substance. The sugars are the best-known class to exhibit the phenomenon.

mutation (*Gen.*). The inception of a heritable variation.

mutations (*Acous.*). Stops on an organ manual or pedal which sound notes with intervals other than multiples of an octave with respect to the nominal pitches of the keys.

mutation rate (*Gen.*). The frequency of gene mutations in a given species.

mute. See **deaf-mute.**

mute (*Cinema.*). A rush print of the exposed film in a motion-picture camera, i.e. one printed without the sound-track; it is independently printed on another positive and reproduced synchronously in another projection machine when the rushes are viewed.

mute shot (*Cinema.*). A shot taken in a motion-picture studio without sound being recorded.

Muthmann's sulphur, moot'man (*Chem.*). The various crystalline forms of sulphur.

mu'ticate (*Bot.*). Without a point.

mu'ticous (*Bot.*). **Muticate.**—(*Zool.*) Lacking defensive structures.

mu'toscope (*Cinema.*). A form of *flickers* (q.v.). The illusion of photographed motion is obtained by exposing rapidly a sequence of photographs.

mutton (*Typog.*). See **em quad.**

mutton rule (*Typog.*). See **em rule.**

mutual conductance (*Radio*). Transconductance specifically applied to a thermionic valve. The differential change in a space or anode current divided by the differential change of grid potential which causes it. Colloquially termed *slope, slope conductance,* or *goodness* of a valve, measuring the effectiveness of the valve as an amplifier in normal circuits. Expressed in milli-amperes per volt, and denoted by G_m.

mutual coupling (*Elec. Comm.*). See **transformer coupling.**

mutual impedance (*Elec. Comm.*). See **transfer impedance.**

mutual inductance (*Elec. Eng.*). The property of two circuits by virtue of which mutual induction occurs between them. It is measured by the rate of change of linkages in one coil when there is a unit rate of change of current in the other coil. Also called COEFFICIENT OF MUTUAL INDUCTION.

mutual induction (*Elec. Eng.*). A phenomenon whereby a change of current in one of two coils causes a change of the flux linked with another coil, thereby setting up an e.m.f. in the latter.

mutualism (*Bot., Zool.*). Any association between two animals which is beneficial to both and injurious to neither; symbiosis.

mu'tule (*Build.*). A rectangular section modillion.

my-. See **myo-.**

myal'gia (*Med.*). The sensation of pain in muscle.

mya'rian (*Zool.*). Based on musculature, as a system of classification: pertaining to the musculature.

myasthe'nia (*Med.*). Muscular weakness.

myasthenia gravis (*Med.*). A malady of adult life in which there are a variable paralysis of muscles on exertion, with slow recovery during rest, and a permanent paralysis of muscles, which succeeds the variable paralysis.

myc-. See **myco-.**

My'calex (*Diel.*). Mica bonded with glass. It is hard, and can be drilled, sawn, and polished; has a low power factor at high frequencies, and is a very good insulating material at all frequencies.

myce'lium (*Bot.*). The thallus of a fungus when it consists of hyphae.

myceto-. See **myco-.**

myce'tocytes (*Zool.*). Cells containing symbiotic micro-organisms occurring in the *pseudovitellus* (q.v.).

myceto'ma (*Med.*). See **Madura foot.**

my'cetome (*Bot.*). A cellular organ inside an aphid, containing symbiotic yeasts.—(*Zool.*) See **pseudovitellus.**

mycetoph'agous (*Zool.*). Fungus-eating.

Mycet'ozo'a (*Bot.*). See **Myxomycetes.**

Mycetozoa (*Zool.*). An order of semi-terrestrial *Sarcodina* the members of which possess numerous blunt pseudopodia but have no shell, skeleton, or central capsule; they form cellulose-coated cysts and spores.

my'co-, myc-, myce'to- (Greek *mykēs*, gen. *mykētos*, fungus). A prefix used in the construction of compound terms; e.g. *mycology, mycelium* (qq.v.).

mycocecid'ium (*Bot.*). A gall caused by a fungus.

my'cocri'ny (*Bot.*). The decomposition of plant material by fungi.

mycoder'ma (*Bot.*). A name sometimes applied to the saccharomyces or *yeasts* (q.v.).

mycol'ogy (*Bot.*). The study of fungi.

mycophthorous, mĭ'kof-thŏr'us (*Bot.*). Said of a fungus which is parasitic on another fungus.

my'corrhi'za (*Bot.*). A symbiotic association between a fungus and a higher plant, most often consisting of an intimate relation between the roots of the higher plant and the mycelium of the fungus.

myco'sis. A disease of animals caused by a fungus.

mycosis fungoi'des (*Med.*). A chronic, and usually fatal, disease in which fungus-like tumours appear in the skin.

mycotroph'ic plant (*Bot.*). A plant which lives in symbiosis with a fungus.

mydri'asis (*Med.*). Extreme dilatation of the pupil of the eye.

mydriat'ic (*Med.*). Producing dilatation of the pupil of the eye: any drug which does this.

mydriatic alkaloids (*Med.*). Alkaloids which cause dilatation of the pupil of the eye; e.g. atropine.

Mydrim Limestone (*Geol.*). A calcareous band which occurs at the base of the Caradoc Series in South Wales.

Mydrim Shales (*Geol.*). A series of shales which belong to the Caradocian Series of the Ordovician System in South Wales.

my'el-, my'elo- (Greek *myelos*, marrow). A prefix used in the construction of compound terms; e.g. *myelitis* (q.v.).

myelenceph'alon (*Zool.*). The hind brain in Vertebrates, excluding the cerebellum.

my'elin (*Zool.*). A white fatty substance which forms the medullary sheath of nerve fibres.

myelin sheath (*Zool.*). See **medullary sheath.**

myelina'tion (*Zool.*). Formation of a myelin sheath.

myeli'tis (*Med*). (1) Inflammation of the spinal cord.—(2) Inflammation of the bone-marrow, but the term *osteomyelitis* is generally used for this.

myelo-. See **myel-.**

my'elocele (*Med.*). A condition in which the spinal cord protrudes on to the surface of the body; due to a defect of the spinal vertebrae.

my'elocoel, —sēl (*Zool.*). The central canal of the spinal cord.

my'elocyte (*Zool.*). A marrow-cell; a large amoeboid cell found in the marrow of the long bones of some higher Vertebrates, and believed to give rise, by division, to blood-leucocytes.

myelo'ma (*Med.*). A tumour composed of bone-marrow cells, appearing usually in the marrow of several bones. See also **Kahler's disease.**

myelomala'cia (*Med.*). Pathological softening of the spinal cord.

myelomato'sis (*Med.*). The occurrence of myelomata in several bones. See **myeloma.**

myelomenin'gocele (*Med.*). Protrusion of the spinal cord and spinal membranes; due to a defect in the spinal column.

myel'oplast (*Zool.*). A leucocyte of bone-marrow.

my'eloplax (*Zool.*). A giant cell of bone-marrow and other blood-forming organs, sometimes multinucleate, and usually having a central group of centrioles; believed to give rise to the blood-platelets.

myenter'ic (*Zool.*). Pertaining to the muscles of the gut; as a sympathetic nerve plexus controlling their movements.

myiasis, mī-ī'— (*Vet.*). Infection of animals and birds by adult or larval forms of flies of the sub-order *Cyclorrhapha.*

myiophi'lous plants (*Bot.*). Plants with inconspicuous and often ill-smelling flowers, which are pollinated by flies.

Mylius' test (*Chem.*). A colour test for bile acids, based on the appearance of a red colour between the layers of bile acids mixed with a trace of furfural and concentrated sulphuric acid.

mylohy'oid (*Zool.*). Pertaining to, or situated near, the mandible and the hyoid: a muscle of this region.

my'lonite (*Geol.*). A hard compact rock with a streaky or banded structure which is produced beneath thrust-planes in mountain-building movements.

mylonitisation (*Geol*). The process by which rocks are granulated and pulverised and formed into mylonite.

Mylor Series (*Geol.*). A group of slaty rocks of Middle to (?) Upper Devonian age found in Cornwall, England.

myo-, my- (Greek *mys*, gen. *myos*, muscle). A prefix used in the construction of compound terms; e.g. *myodynamic,* pertaining to the force of muscular contraction.

my'oblast (*Zool.*). An embryonic muscle cell which will develop into a muscle fibre.

myocar'dial (*Med.*). Pertaining to, or affecting, the myocardium.

myocardi'tis (*Med.*). Inflammation of the muscle of the heart.

myocar'dium (*Zool.*). In Vertebrates, the muscular wall of the heart.

myochon'dria (*Zool.*). Granules occurring in irregular masses in sarcoplasm.

myoclo'nus (*Med.*). (1) Paramyoclonus multiplex. A condition in which there occur sudden shock-like contractions of muscles, often associated with epilepsy and progressive mental deterioration.—(2) A sudden shock-like contraction of a muscle (see **clonus**).

my'ocoel, —sēl (*Zool.*). The coelomic space within a myotome.

myocom'ma (*Zool.*). A partition of connective tissue between two adjacent myomeres.

my'ocyte (*Zool.*). A muscle cell: a deep contractile layer of the ectoplasm of certain *Protozoa.*

Myo'doco'pa (*Zool.*). An order of *Ostracoda* in which the shell generally has an antennal notch, there are five pairs of postoral limbs, and the caudal furca have lamellar rami armed with spines.

my'odome (*Zool.*). In some *Neopterygii*, a chamber in which the muscles of the eye are situated.

myoepithe'lial, mī-ō-ep— (*Zool.*). A term used to describe the epithelial cells of *Coelenterata* which are provided with tail-like contractile outgrowths at the base.

myofibril'lae (*Zool.*). The contractile fibrils of a muscle.

myogen'ic (*Zool.*). Contraction arising spontaneously in a muscle, independent of nervous stimuli.

myohyper'trophy (*Med.*). Increase in the size of muscle fibres.

myoide'ma or **myo-ede'ma** (*Med.*). Mounding. A localised swelling of wasting muscle obtained when the muscle is lightly struck.

myolem'ma (*Zool.*). See **sarcolemma.**

myol'ogy (*Zool.*). The study of muscles.

myo'ma (*Med.*). A tumour composed of unstriped (leiomyoma) or striped (rhabdomyoma) muscle fibres.

myomala'cia cordis (*Med.*). Pathological softening of the muscle of the heart.

myomec'tomy (*Surg.*). Surgical removal of a myoma, especially of a fibromyoma of the uterus.

my'omere (*Zool.*). In metameric animals, the voluntary muscles of a single somite.

my'oneme (*Zool.*). In *Protozoa,* a contractile fibril of the ectoplasm.

myoneu'ral (*Zool.*). Pertaining to muscle and nerve, as the junction of a muscle and a nerve.

myop'athy (*Med*). Any one of a number of conditions in which there is progressive wasting of skeletal muscles from no known cause.

my'ophore (*Zool.*). A structure to which muscle attachments are led; as an apodeme.

my'ophrisk (*Zool.*). See **myoneme.**

myo'pia (*Med.*). Short-sightedness. A condition of the eye in which, with the eye at rest, parallel rays of light come to a focus in front of the retina. —*adj.* **myop'ic.**

myosarco'ma (*Med*). A malignant tumour composed of muscle cells and sarcoma cells.

myosep'tum (*Zool.*). See **myocomma.**

my'osin (*Chem.*). An insoluble protein obtained from paramyosinogen and myosinogen; its formation is the cause of rigor mortis.

myosin'ogen (*Chem.*). One of the chief proteins contained in the living muscle.

myo'sis (*Med.*). See **miosis.**

myosi'tis (*Med.*). Inflammation of striped muscle.

myositis ossif'icans progres'siva (*Med.*). A condition in which there is progressive ossification of the muscles of the body.

myota'sis (*Physiol.*). Muscular tension.

my'otome (*Zool.*). A muscle merome; one of the metameric series of muscle masses in a developing segmented animal.

myoto'nia atroph'ica (*Med.*). Dystrophia myotonica. A disease characterised by wasting of certain groups of muscles, difficulty in relaxing muscles after muscular effort, and general debility.

myotonia congen'ita (*Med.*). Thomsen's disease. A rare and congenital malady characterised by extreme slowness in relaxation of muscles after voluntary effort.

Myriapo'da (*Zool.*). A class of terrestrial *Arthropoda* which breathe by tracheae; they possess uniramous appendages; the head is distinct from the thorax and bears one pair of antennae; the legs are numerous, all alike, and extend the whole length of the body. Centipedes and Millipedes.

myr'icyl alcohol (*Chem.*). $C_{30}H_{61}OH$, a saturated monohydric alcohol, present as the palmitic ester in beeswax and in carnauba wax.

myringi'tis (*Med.*). Inflammation of the drum of the ear.

myrin'goscope (*Med.*). An instrument for viewing the drum of the ear.

myringot'omy (*Surg.*). Incision of the drum of the ear.

myr'iospored or **myriospor'ous** (*Bot.*). Having many spores.

myr'mecoch'ory (*Bot.*). The distribution of seeds by ants (Greek *myrmex*, ant).—*adj.* **myrmecochorous.**

myrmecoph'agous (*Zool.*). Feeding on ants.

myrmecoph'ilous (*Bot.*) Pollinated by ants.

myrmecoph'ily (*Bot.*). A symbiotic association between plants and ants.

myr'mekite (*Geol*). An intimate intergrowth on a microscopic scale of the minerals quartz and feldspar, formed apparently by interaction between magmatic residua and earlier-formed crystals.

Mysida'cea (*Zool.*). An order of *Peracarida* retaining more or less completely the primitive *caridoid facies* (q v); the carapace extends over most of the thorax but coalesces with not more than three somites; the eyes are borne on stalks; the uropods are lamellar; most are actively swimming marine forms. Opossum Shrimps.

mysopho'bia (*Med.*). Morbid fear of being contaminated.

mytil'iform (*Bot.*). Resembling a sea-shell in form.

Myt'ton Flags (*Geol.*). A local but thick group of flagstones found in Shropshire and the borderland of Wales, and belonging to the Arenig Series of the Ordovician System.

myx'a (*Zool.*). In Birds, the fused extremities of the rami of the lower beak.

myxamoe'ba (*Bot*). The product of germination of a spore of a Myxomycete. It is a uninucleate, naked protoplast, which creeps like an amoeba, and may develop a flagellum and swim as a zoospore.

myxoede'ma (*Med.*). A condition due to deficiency of thyroid secretion; characterised by loss of hair, increased thickness and dryness of the skin, increase in weight, slowing of mental processes, and diminution of metabolism.

myxo'ma (*Med.*). A term applied to a tumour composed of a clear jelly-like substance and star-shaped cells.

myxomato'sis (*Vet.*). A contagious filterable-virus infection of rabbits; characterised by proliferative changes in the connective tissues.

Myxomyce'tes (*Bot.*). A group of very simple organisms mostly living on or in rotten wood or in soil and having some plant and some animal characters. The thallus is a naked creeping mass of protoplasm, containing many nuclei and known as a *plasmodium*. Sporangia are developed and liberate spores which germinate to yield myxamoebae.

Myxophyc'eae (*Bot.*). Blue-green algae. A group of algae, unicellular or filamentous, without a well-defined nucleus or chromatophore, and usually bluish green in colour. They appear to have no sexuality, have no zoospores, and propagate chiefly by vegetative means. There are many fresh-water and marine species. Also called CYANOPHYCEAE.

Myxospon'gida (*Zool.*). An order of *Demospongiae* in which there is typically no skeleton.

Myzosto'mida, mī'zō— (*Zool.*). A class of *Annelida* the members of which are parasitic in or on *Crinoidea*; they have an oval depressed body provided with five pairs of ventral parapodia, each with a hooked seta, and ten pairs of marginal cirri; the epidermis is ciliated, and there are ventral suckers for attachment.

n (*Chem.*). A symbol for number of mols.

n- (*Chem.*). An abbrev. for *normal*, i.e. containing an unbranched carbon chain in the molecule.

n (*Light*). Symbol for *index of refraction.*

N (*Chem.*). The symbol for *nitrogen.*

N. or **N-** (*Chem.*). An abbrev. for *normal* (*concentration*).

N (*Chem.*). A symbol for the Avogadro number.

N (*Chem.*). A symbol for mol fraction.

N- (*Chem.*). A symbol indicating substitution on the nitrogen atom.

N (*Eng.*). A symbol often used for *modulus of rigidity.*

N-part commutator (*Elec. Eng.*). A commutator having N-bars.

N-truss (*Eng.*). See **Whipple-Murphy truss.**

Na (*Chem.*). The symbol for *sodium.*

N.A. (*Civ. Eng*). An abbrev. for *neutral axis.*

nab (*Join.*). The keeper part of a door-lock.

nacelle (*Aero.*). A small body, carrying the engines, and sometimes fuel, oil, and engineers, situated on the planes of a multi-engined aircraft.

na'cre or **na'creous layer** (*Zool.*). The iridescent calcareous substance composing the innermost layer of a molluscan shell. Mother-of-pearl (French *nacre*).

nacreous (*Min.*). A term applied to the lustre of certain minerals, usually on crystal faces parallel to a good cleavage, the lustre resembling that of pearls.

na'crite (*Min.*). A species of clay mineral, identical in composition with kaolin, from which it differs in certain optical characters and in atomic structure.

na'dir (*Astron.*). That pole of the observer's horizon which is vertically below his feet: hence, the point on the celestial sphere diametrically opposite the zenith.

nae'vus (*Med.*). Birth-mark. Mole. (1) A pigmented tumour in the skin.—(2) A patch or swelling in the skin composed of small dilated blood-vessels.

nagan'a (*Vet.*). A disease of animals in Africa due to infection by *Trypanosoma brucei*; transmitted by tsetse flies.

Nag'elfluh, —floo (*Geol.*). A group of massive conglomerates of Miocene age which form the Rigi and Rossberg in Switzerland.

nai'ad (*Zool.*). A nymph of a hemimetabolic insect.

nail (*Zool.*). In higher Mammals, a horny plate taking the place of a claw at the end of a digit.

nail punch (*Join.*). A small steel rod tapering at one end almost to a point; used to transmit the blow from a hammer when it is desired to drive a nail in so that its head is sunk beneath the surface. Also called NAIL SET.

nailing (*Build.*). See **centre— head—**

nailing (*Furs*). The operation involved in stretching and nailing damped skins according to pattern.

Nairn Sandstone (*Geol.*). A bed of sandstone, of Upper Old Red Sandstone age, found in Caithness.

Nairobi disease of sheep (*Vet.*). A filterable-virus infection of African sheep; transmitted by the 'brown tick' *Rhipecephalus appendiculatus*; characterised by an acute haemorrhage gastro-enteritis.

naked (*Bot.*). (1) Lacking a perianth.—(2) Without any appendages.—(3) Not enclosed in a pericarp.—(4) Bractless.

naked flooring (*Carp.*). A term for the timbers of a floor without the boards.

naked light (*Mining, etc.*). An open unscreened flame.

na'nism (*Med., etc.*). The condition of being a dwarf (Latin *nanus*); dwarfism.

nankeen' (*Textiles*). A twill cotton cloth, drab in colour; used for pocket linings, corsets, etc.

nankeen twill (*Textiles*). The name applied to the 2-and-1 twill weave.

nanophan'erophyte (*Bot.*). A plant from 25 centimetres to 2 metres in height, with its resting buds above the surface of the soil.

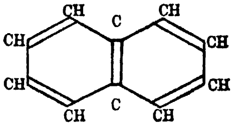
na'noplank'ton (*Zool.*). Plankton of microscopic size.

nanoso'ma (or **nanosomia**) **pituita'ria** (*Med.*). Dwarfism due to hypofunction of the pituitary gland.

Nansen-Pettersson water-bottle (*Ocean.*). See **insulating water-bottle.**

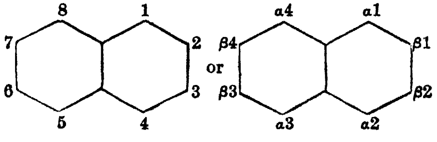
nap (*Textiles*). A woolly surface on fabrics, produced by the finishing process of raising.

naph'thalene (*Chem.*). $C_{10}H_8$; consists of two condensed benzene rings:

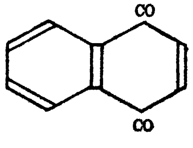


glistening plates, insoluble in water, slightly soluble in cold alcohol and ligroin, readily soluble in hot alcohol and ether; m p. 80° C., b.p. 218° C.; sublimes easily and is volatile in steam. It occurs in the coal-tar fraction boiling between 180° and 200° C. It forms an additive compound with picric acid. Naphthalene is more reactive than benzene, and substitution takes place in the first instance in the *alpha* position. It is an important raw material for numerous derivatives, many of which play a rôle in the manufacture of dyestuffs.

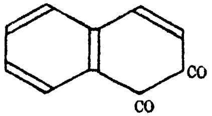
naphthalene derivatives (*Chem.*). Substitution products of naphthalene. The monosubstituted products form two series of isomers according to the position of the substituents in the benzene rings. The disubstituted derivatives can form ten isomers with identical substituents or even more with different substituents. The positions taken by substituents in the naphthalene molecule are marked as follows:



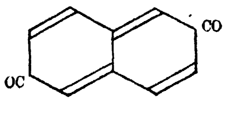
naphthaquinones, —kwi-nōnz' (*Chem.*). $C_{10}H_6O_2$. Three isomers are known, viz.: *α-naphthaquinone,*



yellow rhombic plates, m.p. 125° C., the analogue of ordinary quinone; *β-naphthaquinone*,



red needles, odourless, non-volatile, decomposes at 120° C.; *amphi-*, or 2, 6-*naphthaquinone*,



crystallises in small red prisms, and is not stable in the presence of water, acids, alkalis, and alcohols.

naph'thenes (*Chem.*). Polymethylene hydrocarbons. A great number of these occur in petroleum.

naphthion'ic acid (*Chem.*). 1,4-Naphthylamine-monosulphonic acid, $H_2N{\cdot}C_{10}H_6{\cdot}SO_3H$, obtained by the sulphonation of α-naphthylamine. Intermediate for azo-dyes.

naphtho'ic acids (*Chem.*). $C_{10}H_7{\cdot}COOH$, naphthalene carboxylic acids. There are two isomers, of which the α-naphthoic acid crystallises in fine needles, m p. 160° C. On distillation with lime they are decomposed into naphthalene and CO_2.

naph'thols (*Chem.*). $C_{10}H_7OH$. There is an α-naphthol, m.p. 95° C., b.p. 282° C., and a β-naphthol, m p. 122° C., b.p. 288° C. Both are present in coal-tar and can be prepared from the respective naphthalene-sulphonic acids or by diazotising the naphthylamines. They have a phenolic character, but also resemble alcohols; the hydroxyl groups, for example, can be readily replaced by the amino group. β-Naphthol is an antiseptic.

naph'thylamines' (*Chem.*). $C_{10}H_7{\cdot}NH_2$. α-Naphthylamine forms colourless prisms or needles, m.p. 50° C., b.p. 300° C., soluble in alcohol. It is of unpleasant odour, sublimes readily, and turns brown on exposure to the air. β-Naphthylamine, odourless, m.p. 112° C., b.p. 294° C., forms colourless plates.

Napier's compasses. A form of compasses having a needle-point and a pencil-holder pivoted at the end of one limb, and a needle-point and a pen pivoted at the end of the other limb, both limbs being jointed so that the ends may be folded in between the limbs for safety when being carried in the pocket.

Napierian logarithms. See **natural logarithms.**

nap'iform (*Bot.*). Shaped like a turnip.

Naples yellow (*Dec.*). A yellow pigment made from oxide of lead and antimony.

napo'leonite (*Min.*). A gabbro containing spheroidal structures, about one inch in diameter, which consist of alternating shells essentially of hornblende and feldspars. See **corsite.**

nappe (*Geol.*). A major structure of mountain chains such as the Alps, consisting essentially of a great recumbent fold with both limbs lying approximately horizontally and produced by compressional earth movements which have involved translation of the folded strata over distances of many miles in a horizontal sense.

napping (*Textiles*). Raising a downy surface on a fabric by means of a revolving cylinder covered with stiff wire, or by other process.

napping and friezing machine (*Textiles*). A machine used in the woollen trade to produce small beads (frieze effect) or ripples (wave effect) on the surface of a fabric.

nar'cissism (*Psycho-path.*). A state of self-love; so called after Narcissus, who fell in love with himself. Present in all people at an early stage of development, when sensual gratification is found in the person's own body and not in an outside love-object. According to Freud, some of the libido becomes attached to the ego in this state.

nar'colepsy (*Med.*). A condition characterised by sudden attacks of an uncontrollable desire to sleep and/or by cataplectic attacks (see **cataplexy**).

narco'sis (*Med.*). A state of unconsciousness produced by a drug; the production of a narcotic state.

narcot'ic (*Med.*). Tending to induce sleep or unconsciousness: a drug which does this.

nar'cotine (*Chem.*). $C_{22}H_{23}O_7N$, an alkaloid of the *iso*quinoline series; occurs in opium; forms colourless needles; m.p. 176° C.

narcotise (*Med.*). To subject to the influence of a narcotic.

nar'es (*Zool.*). Nostrils; nasal openings; as the internal or posterior *nares* to the pharynx, the external or anterior *nares* to the exterior.—*adjs.* **nar'ial, nar'iform.**

nar'icorn (*Zool.*). A scale of the nasal region: the terminal part of the nostril when that is horny.

narration (*Cinema*). A connected story rather than a simple commentary, as reproduced from a sound-film.—*n.* **narrator.**

narrow (*Typog.*). The old name for furniture 3 ems, or 36 points, wide.

narrow-base tower (*Elec. Eng.*). A tower for overhead transmission lines having a base sufficiently small to be supported on a single foundation. Cf. *broad-base tower.*

narrow gauge (*Rail*). A railway gauge less than the standard 4 ft. 8½ in.

narrowed (*Bot.*). Tapering, especially downwards.

na'sal (*Zool.*). Pertaining to the nose: a paired dorsal membrane bone covering the olfactory region of the Vertebrate skull.

nasal sinusitis (*Med.*). See **sinusitis.**

nas'cent (*Chem.*). Just formed by a chemical reaction, and therefore very reactive. Nascent gases are probably in an atomic state.

Na'smyth pile-driver (*Civ. Eng.*). A form of pile-driver in which the monkey is raised by steam pressure acting on an attached piston, facilitating rapid operation.

Nasmyth's membrane (*Zool.*). A thin horny membrane covering the enamel of unworn teeth.

na'so- (Latin *nasus*, nose). A prefix used in the construction of compound terms; e.g. *nasolabial*, pertaining to the nose and the lip.

nasopharyngi'tis (*Med.*). Inflammation of the nasopharynx.

nasophar'ynx (*Zool.*). In Vertebrates, that part of the pharynx continuous with the internal nares.

nasosinusi'tis (*Med.*). Inflammation of the air-containing bony cavities in communication with the nose.

nasotur'binal (*Zool.*). In Vertebrates, a paired bone or cartilage of the nose which supports the folds of the olfactory mucous membrane.

nastic movement (*Bot.*). A curvature of a plant member, brought about by growth in response to a diffuse stimulus.

na'sus (*Zool.*). See **clypeus.**

na'sute (*Zool.*). Having a rostrum; especially of soldier termites.

na'tal (*Med., Zool.*). (1) Pertaining to birth.—(2) Pertaining to the buttocks.

nata'tory or **natato'rial** (*Zool.*). Adapted for swimming.

na'tes (*Med.*). The buttocks.

National Electric Code (*Elec. Eng.*). A set of regulations governing electrical installation systems in America; it is established by the American National Board of Fire Underwriters.

native (*Min.*, *Mining*). Said of naturally occurring metal; e.g. *native* gold, ***native*** copper.

natrojar'osite (*Min.*). Hydrous sulphate of potassium and iron, crystallising in the trigonal system.

nat'rolite (*Min.*). Hydrated silicate of sodium and aluminium crystallising in the orthorhombic system. A soda-zeolite. It usually occurs in prismatic crystals which are slender or acicular and closely resemble tetragonal crystals. See also **mesotype, Permutite.**

natural cement (*Build.*, *Civ. Eng.*). A cement similar to a hydraulic lime, made from a natural earth, with but little preparation.

natural classification (*Bot.*). A classification based on the presumed relationships of plants in descent.

natural draught (*Eng.*). The draught or air-flow through a furnace induced by a chimney and dependent on its height and the temperature difference between the ascending gases and the atmosphere.

natural foundation (*Build.*, *Civ. Eng*). A foundation in which the earth requires no preparation, such as the sinking of piles, to make it effective as a support for the structure which it is to carry.

natural frequency (*Phys.*). The frequency of free vibrations of a body.

natural frequency of antenna (*Radio*) The lowest frequency at which an antenna system is resonant when directly earthed, without the addition of loading inductance.

natural gas (*Geol.*). The term includes gases generated during volcanic activity (see **pneumatolysis, solfatara**) and gaseous hydrocarbons distilled under natural conditions from the mineral oils stored in porous strata. The latter types of gas naturally occur in oil-producing localities the world over, notably in parts of the U.S.A., such as W. Virginia, Oklahoma, and Pennsylvania, where the gas derived from the Mississippi formation is the basis of a great industry. In England natural gas issues in small quantities from rocks of different ages, including the Hastings Beds at Heathfield in the Weald of Sussex, the Carboniferous Limestone of the Peak District, the Coal Measures of Hardstoft in Derbyshire, etc. At Heathfield the gas is chiefly methane.

natural glass (*Geol.*). Magma of any composition is liable to occur in the glassy condition if cooled sufficiently rapidly. Acid (i.e. granitic) glass is commoner than basic (i.e. basaltic) glass; the former is represented among igneous rocks by pumice, obsidian, and pitchstone; the latter by tachylyte. Natural quartz glass occurs in masses lying on the surface of certain sandy deserts (e.g. the Libyan Desert); while both clay rocks and sandstones are locally fused by basic intrusions. See also **australite, buchite.**

natural harbour (*Civ. Eng.*). A harbour provided by the natural configuration of the coast-line at a given place.

natural (or **Napierian**) **logarithms.** Logarithms to the base e (or ϵ), which is defined as the limiting value of $\left(1+\frac{1}{m}\right)^m$ when m approaches infinity. Its numerical value is 2·71828. . . . The following conversions are useful:

$$\log_e x = \log_{10} x \times 2{\cdot}30259$$
$$\log_{10} x = \log_e x \times 0{\cdot}43429.$$

See also **logarithm.**

natural magnet. See **lodestone.**

natural mode (*Radio*). The mode of oscillation of an antenna when it is oscillating at its natural frequency. It is characterised by a distribution of voltage rising from zero at the base to a maximum at the top, with no intermediate maxima or minima.

natural period (*Phys.*). The period of free vibrations of a body.

natural roadstead. A natural area of water providing good anchorage for ships, but not offering much shelter as a harbour.

natural scale (*Acous.*). The musical scale in which the frequencies of the notes within the octave are proportional to 24, 27, 30, 32, 36, 40, 45, and 48, and which can be realised in continuously variable pitch instruments, such as the human voice and string instruments, but not in keyboard instruments, which use the tempered scale. Also termed JUST SCALE, JUST TEMPERAMENT.

natural scale (*Surv.*). A term applied to a section drawn with equal vertical and horizontal scales.

natural seasoning (*Timber*) The process of seasoning by exposing cut timbers laid in a stack so as to permit free circulation of air around every timber.

natural selection (*Biol.*). A theory of the mechanism of evolution which postulates the survival of the best-adapted forms, with the inheritance of those distinctive characteristics wherein their fitness lies, and which arise as small uncontrolled variations; it was first propounded by Charles Darwin, and is, consequently, often referred to as *Darwinism* or the *Darwinian Theory.*

natural slope (*Civ. Eng.*). The maximum angle at which soil in cutting or bank will stand without slipping.

natural stone (*Build.*). Building-stone obtained from a quarry, as distinct from pre-cast stone.

natural wavelength of antenna (*Radio*). The free-space wavelength corresponding to the natural frequency of an antenna.

naturalised (*Bot.*). Introduced from another region, reproducing freely by seed and maintaining its position in competition with wild plants.—(*Zool.*) Said of introduced species which compete successfully with the native fauna.

nau'pliiform larva (*Zool.*). See **cyclopoid larva.**

nau'plius (*Zool*). A larval form of many *Crustacea*, characterised by the possession of three pairs of appendages and an unpaired median eye.

nauplius eye (*Zool.*). A median unpaired eye similar to that found in a nauplius larva.

nautical almanac (*Astron.*, *etc.*). An astronomical ephemeris published annually, some years in advance, by the Lords Commissioners of the Admiralty for navigators and astronomers.

nautical log (*Ships*). See **log (nautical).**

nautical mile. One sixtieth of a degree of latitude, a distance varying with latitude. Actually (U.K.) it is taken as =6000 ft. The *Admiralty measured mile* is 6080 feet; that of the *United States Coast Survey* 6080·27 feet.

Nautiloi'dea (*Zool.*). The only living order of *Tetrabranchia* (q.v.), having a wide siphuncle, a shell with simple sutures, and interlocular septa which are concave on the side nearest the aperture. Nautiloid cephalopods were abundant in the Palaeozoic seas, but since Triassic times have been represented by only one genus, *Nautilus* (Pearly Nautilus), which still lives in southern seas.

naval brass (*Met.*). Brass containing a small percentage of tin. Typical composition: Cu 60%, Zn 39%, Sn 1%. Resistant to corrosion by sea water.

nave (*Eng.*) The hub of a wheel. (Obsolete.)

na'vel (*Zool.*). In *Mammalia*, the point of attachment of the umbilical cord to the body of the foetus.

navel-ill (*Vet.*). See **pyosepticaemia of sucklings.**

navic'ular (*Bot.*). Shaped like a boat.

navigation. The science of ascertaining the position of ships and directing their course by astronomical observation and other calculations: the general processes involved in operating ships and aircraft.

navigation (*Hyd. Eng.*). A name frequently given to a canalised river the flow of which is more or less under artificial control.

navigation flame float (*Aero.*). A pyrotechnic device, dropped from an aircraft, which burns with a flame while floating on the water. Used for determining the drift of the aircraft at night.

navigation smoke float (*Aero.*). A pyrotechnic device, dropped from an aircraft, which emits smoke while floating on the water. Used for ascertaining the direction of the wind or the drift of the aircraft.

na'yagite (*Min.*). A sulpho-telluride of lead and gold (sometimes containing antimony) crystallising in the orthorhombic system.

Nay'lorite (*Build.*). Trade-name for a liquid preparation used for hardening and water-proofing cement surfaces.

Nb (*Chem.*). The symbol for *niobium.*

Nd (*Chem.*). The symbol for *neodymium.*

Ne (*Chem.*). The symbol for *neon.*

nean'ic (*Zool.*). Said of the adolescent period in the life-history of an individual.

neap tides (*Astron.*). High tides occurring at the moon's first or third quarter, when the sun's tidal influence is working against the moon's, so that the height of the tide is below the maximum in the approximate ratio 3 : 8.

near-end cross-talk (*Teleph.*). Cross-talk between two parallel circuits when both the listener and the speaker originating the inducing currents are at the same end of the parallelism. See **far-end cross-talk.**

Nearc'tic region (*Zool.*). One of the subrealms into which the Holarctic region is divided; it includes North America and Greenland.

neat (*Textiles*). The name applied by wool-sorters to wool taken from the sides of a lustre fleece of average quality.

neat cement (*Build., Civ. Eng.*). A cement mortar mixture made up without addition of sand.

neat size (*Build.*). The net or exact size after preparation.

neat work (*Build.*). The brickwork above the footings.

neat's-foot oil (*Chem.*). A pale-yellow oily liquid, obtained from the feet of cattle; m.p. about 30° C, sp. gr. 0·916, saponification no. 195-200, iodine no. 65-75. A good lubricating oil.

Nebalia'cea (*Zool.*). The only order comprised in the division *Phyllocarida*, possessing the characteristics of the division. Pelagic marine forms.

nebenkern, nā'ben-kern (*Zool.*). See **paranucleus.**

Nebraska Beds (*Geol.*). Strata of Upper Miocene age occurring in western N. America; famous as containing *Hipparion*, the immediate forerunner of the horse.

neb'ula (*Med.*). (1) A slight opacity in the cornea of the eye.—(2) An oily preparation for use in an atomiser or nebuliser (e.g. for spraying the nasal cavity).

neb'ulae (*Astron.*). A generic name given to a large class of heavenly bodies showing evidence of gaseous material surrounding starry nuclei; the main subclasses are *spiral*, *irregular*, *planetary*.

nebular hypothesis (*Astron.*). One of the earliest scientific theories of the origin of the solar system, stated by Laplace. It supposed a flattened mass of gas extending beyond Neptune's orbit to have cooled and shrunk, throwing off in the process successive rings which in time coalesced to form the several planets.

nebule (*Arch.*). An ornamental moulding characterised by a wavy lower edge.

nebuliser (*Med.*). An apparatus for converting a liquid into a fine spray. See **nebula.**

nebu'lium (*Astron.*). A hypothetical element to which are attributed certain spectral emission lines not found in known terrestrial elements; these appear in the spectra of the irregular nebulae, e.g. in the Great Nebula in Orion.

neb'ulous (*Bot.*). Clouded, dark.

neck (*Bot.*). (1) The upper tubular part of an archegonium, and of a perithecium.—(2) The lower part of the capsule of a moss, just above the junction with the seta.

neck (*Build.*). The narrow moulding separating the capital of a column from the shaft.

neck canal cell or **neck cell** (*Bot.*). One of the cells in the central canal in the neck of an archegonium.

neck-mould (*Build.*). The neck round the top of the shaft of a column.

neck, volcanic (*Geol.*). A vertical plug-like body of igneous rock or volcanic ejectamenta, representing the feeding channel of a volcano.

necking (*Build.*). The neck between the capital and the shaft of a column.

necro- (Greek *nekros*, a dead body). A prefix used in the construction of compound terms; e.g. *necrophagous* (q.v.).

necrobacillo'sis (*Vet.*). Lip-and-leg ulceration. Infection of animals by *Fusiformis necrophorus.*

necrobio'sis (*Med.*). The gradual death, through stages of degeneration and disintegration, of a cell in the living body.

necrogen'ic abortion (*Bot.*). The speedy death of the tissues of a plant close under the point of attack of a parasite, checking the spread of the latter.

necrog'enous (*Biol.*). Living or developing in the bodies of dead animals.

ne'cron (*Bot.*). Dead plant material not rotted into humus.

necroph'agous (*Zool.*). Feeding on the bodies of dead animals.

necroph'orous (*Zool.*). Carrying away the bodies of dead animals; as certain Beetles, which usually afterwards bury the bodies.

nec'ropsy (*Med.*). Autopsy. A post-mortem examination of the body.

necro'sis (*Biol.*). Death of a cell (or of groups of cells) while still part of the living body.—*adj.* **necrot'ic.**—*v.* **necrose.**

nectar (*Bot.*). A sugary fluid exuded by plants, usually from some part of the flower, occasionally from somewhere else on the plant; it attracts insects, which assist in pollination.

nectariv'orous (*Zool.*). Nectar-eating.

nectary (*Bot.*). A glandular organ or surface from which nectar is secreted.

necto- (Greek *nēktos*, swimming). A prefix used in the construction of compound terms; e.g. *nectocalyx* (q.v.).

nectoca'lyx (*Zool.*). In *Siphonophora*, a medusoid modified as a swimming organ and lacking a manubrium.

nec'tocyst (*Zool.*). The cavity of a nectocalyx.

necton (*Bot., Zool.*). See **nekton.**

necton'ic benthos (*Bot.*). Small organisms floating at the bottom of the water.

nec'tophore (*Zool.*). A *nectocalyx* (q.v.): that portion of the common stem of a siphonophoran colony bearing the nectocalyces.

nec'topod (*Zool.*). An appendage adapted for swimming.

nec'tosome (*Zool.*). The upper part of a siphonophoran colony to which the nectocalyces and pneumatophores are attached.

nectozo'oid (*Zool.*). See **nectophore.**

Needham's sac (*Zool.*). In certain Cephalopods, a spacious sac, being an expansion of the lower part of the vas deferens, in which spermatophores are stored.

needle (*Bot.*). A long, narrow, stiffly constructed leaf from which water does not readily escape; characteristic of pine trees and related plants.

needle (*Build.*). A timber or steel beam used in the process of underpinning. It is laid horizontally at right-angles to the wall (through which it passes) and is supported on both sides by dead shores, so as to take the load of the upper part of the walls.

needle (*Civ. Eng.*). The timbers used in a *needle weir* (q.v.).

needle (*Elec. Eng.*). The moving magnet of a compass or galvanometer of the moving-magnet type. Sometimes also the moving element of an electrostatic voltmeter.

needle beam (*Civ. Eng.*). A transverse floor-beam supported across the chords of a bridge.

needle instrument (*Surv.*). A surveying instrument in which the essential part is a magnetic needle.

needle lubricator (*Eng.*). A crude form of lubricator consisting of an inverted stoppered flask attached to a bearing and containing a wire loosely fitting a hole in the stopper and touching the shaft.

needle machines (*Textiles*). The name generally given to embroidery machines of single-needle type.

needle pick-up (*Acous.*). A pick-up in which the sole moving part is the magnetic needle, which by its motion diverts magnetic flux and induces electromotive forces in coils on the magnetic circuit.

needle-point gap (*Elec. Eng.*). A spark gap in which the electrodes are needle points.

needle roller-bearing (*Eng.*) A *roller-bearing* (q.v.) in which long rollers of very small diameter are used, located endwise by a lip on the inner or outer race.

needle scaffold (*Build.*). A scaffold which is supported on cantilever or needle beams jutting out from an intermediate height in the building, thereby avoiding the necessity for erection from ground-level.

needle stone (*Min.*). A popular term for clear quartz containing acicular inclusions, usually of rutile, but in some specimens, of actinolite. Also called RUTILATED QUARTZ.

needle system (*Teleg.*). A telegraph system in which signals are received by observing the deflections of one or more needles. Now generally replaced by audible signal indication.

needle traverse (*Surv.*). A traverse in which the angles between successive lines, or the directions of the lines, are found by means of a magnetic compass.

needle valve (*Eng.*). A slender pointed rod working in a hole or circular seating; operated by automatic means, as in a carburettor float chamber, or by a screw, for the control of fluid.

needle wear (*Acous.*). Wear of the rounded point of a gramophone reproducing needle caused by sliding along the track on the record. In principle, the needle has to fit itself into the track during the first few (blank) revolutions of the disc and not wear shoulders during the remainder of the playing.

needle weir (*Civ. Eng.*). A form of frame weir in which the wooden barrier consists of upright square-section timbers placed side-by-side against the iron frames.

needling (*Build.*). The process of underpinning in which needles are used in the support of the upper part of the building.

needling (*Surg.*). *Discission* (q.v.). Cutting with a needle the lens of the eye in the treatment of cataract.

negative (*Elec.*). A particular point or electrode is said to be *negative* with respect to another point when it is at a lower electric potential.

negative (*Photog.*). The black-and-white reversed image obtained by developing a sensitised and exposed photographic emulsion; so called because the greater the brilliance of the light arriving from the object, the blacker is the image, i.e. the greater is the reduction and retention of silver after fixing.

See **cloud—** **rainbow—**

negative (*Weaving*). See under **positive.**

negative after-image (*Optics*). The image of complementary colour arising after visual fatigue from viewing a coloured object and then a white surface.

negative booster (*Elec. Eng.*). A series-wound booster used in connexion with an earthed-return power supply system, e.g. for a tramway. It is connected between two points on the earth return path, in order to reduce the potential between them and minimise the possibility of electrolysis due to leakage currents.

negative carbon (*Illum.*). The carbon of a d.c. arc lamp which is connected to the negative terminal of the supply. It is usually of smaller diameter than the positive carbon as it burns away more slowly.

negative catalysis (*Chem.*). The retardation of a chemical reaction by a substance which itself undergoes no permanent chemical change.

negative conductance (*Radio, etc.*). A property which is similar to negative resistance, but in which an increase in voltage produces a decrease in current. A device possessing such a property can maintain oscillations in a resonant circuit with which it is connected in parallel. A typical example is the dynatron.

negative cyanotype (*Photog.*). A process which produces blue negative prints, i.e. white lines on a blue background Much used in engineering work.

negative electricity (*Elec.*). A body is said to possess *negative electricity* when it gives rise to certain well-recognised phenomena, this state arising from an excess of electrons above normal. Cf. *positive electricity*.

negative feedback (*Radio*). Interconnexion of the input and output terminals of an amplifier in such a manner that the output opposes the input, resulting in a reduction in amplification, but also in a corresponding increase in output power obtainable with a given degree of harmonic distortion. Also called COUNTER-COUPLING, DEGENERATION, REVERSE FEEDBACK.

negative feeder (*Elec. Eng.*). In the power supply to an electric traction system, the feeder connecting the track rails or negative conductor-rail to the negative bus-bars at the substation. Also called RETURN FEEDER.

negative film stock (*Cinema.*). The unexposed film used in cinematograph cameras in motion-picture production.

negative group (*Chem.*). (1) An acid radical.—(2) A group of atoms whose introduction into an organic molecule tends to give it an acidic character.

negative image (*Television*). A reproduced television image in which the light parts of the original scene appear dark, and vice-versa.

negative mineral (*Light*). A doubly refracting mineral in which the ordinary refractive index is greater than the extraordinary. Calcite is a negative mineral, for which the values of μ_o and μ_e are 1·66 and 1·48 respectively. See **optical sign.**

negative phase-sequence (*Elec. Eng.*). A three-phase system in which the voltages or currents in the three phases reach their maximum values in the non-standard order, i.e. in the order red, blue, yellow. See **phase-sequence.**

negative-phase-sequence component (*Elec. Eng.*). The symmetrical component of an unbalanced three-phase system of voltages or currents in which the phase sequence is in the opposite order to standard, i.e. it is in the order red, blue, yellow.

negative-phase-sequence relay (*Elec. Eng.*). A relay which operates when any negative-phase-sequence components of current or voltage appear in the circuit to which it is connected.

negative plate (*Elec. Eng.*). The plate of an accumulator or primary cell which is normally at the lower potential and to which the current from the circuit during discharge is said to return.

negative reaction (*Biol.*). A tactism or tropism in which the organism moves, or the member grows, from a region where the stimulus is stronger to one where it is weaker.

negative resistance (*Radio, Thermionics*). The property possessed by certain forms of gas-discharge and thermionic tubes, and combinations thereof, in which an increase in current flow is accompanied by a decrease in the voltage necessary to maintain it. Such a device is capable of maintaining continuous oscillations in a resonant circuit with which it is connected in series. A typical example is a carbon arc.

negative stagger (*Aero.*). See **stagger.**

negative transconductance (*Thermionics*). The property of certain forms of thermionic tube by virtue of which an increase in positive potential of a control electrode causes a decrease in the current flowing to another electrode.

negative video signal (*Television*). A video signal in which increasing amplitude corresponds to decreasing light-value in the transmitted picture. Black is taken as 100%, white about 30%, of the maximum amplitude in the signal.

negative well (*Civ. Eng*). A shaft sunk through an impermeable stratum to allow water to drain through to a permeable one.

negative wire (*Auto. Teleph*). Any wire in a circuit which is connected to the negative, or live, end of the main exchange battery.

negatron (*Thermionics*). A four-electrode thermionic tube for obtaining negative resistance, comprising an anode and grid on one side of a cathode, and an anode on the other. Increase of the grid potential causes a reduction in the current to the opposite anode.

nekton (*Zool.*). Actively swimming aquatic organisms, as opposed to the passively drifting organisms or *plankton* (q.v.).

nemathe'cium (*Bot*). A cushion-like projection formed on the thallus of a seaweed and bearing reproductive organs.

Nemathelmin'thes (*Zool.*). A phylum which formerly comprised the groups *Nematoda*, *Acanthocephala*, and *Nematomorpha*; now obsolete.

nemat'o- (Greek *nēma*, gen. *nēmatos*, a thread). A prefix used in the construction of compound terms; e.g. *nematocyst* (q.v.).

nemat'oblast (*Zool.*). A cell which will develop a *nematocyst* (q.v.).

nematoca'lyx (*Zool.*). See **nematophore.**

nemat'ocyst (*Zool.*). A chitinous sac filled with poisonous fluid and produced at one end into a long narrow pointed hollow thread, which normally lies inverted and coiled up within the sac but can be everted by pressure.

Nemato'da (*Zool.*). A phylum of non-metameric worms with an elongate rounded body pointed at both ends and marked by lateral lines; possessing a mouth and alimentary canal, a heavy cuticle, and longitudinal muscles only; cilia are absent; the sexes are separate; many members of the group are of economic importance. Round Worms, Thread Worms.

Nematomor'pha (*Zool.*). A small phylum of non-metameric worms with an elongate rounded body pointed at both ends, without lateral lines; in the adult the mouth and alimentary canal are occluded and functionless; there is a triple ventral nerve-cord; the young forms are parasitic in various Insects, Molluscs, and Oligochaetes, the adults are free-living in fresh water. Horse-hair Worms.

nematoparenchy'matous thallus (*Bot.*). An algal thallus composed of united threads, which are, however, still recognisable as individuals.

nemat'ophore (*Zool.*). A small, secondary type of polyp of certain *Hydrozoa* which lacks a mouth but is capable of engulfing organisms by means of pseudopodia.

nematozo'oid (*Zool.*). See **dactylozooid.**

Nemertin'ea (*Zool.*). A phylum of apparently non-metameric worms with an elongate depressed body, a ciliated ectoderm, and a dorsal eversible proboscis; there is a vascular system; the sexes are separate; the majority are of marine habit, but some forms occur in fresh water and on land. Ribbon Worms.

neo- (Greek *neos*, young). A prefix used in the construction of compound terms; e.g. *neoplasm*, young or newly formed tissue (usually pathological).

ne'oblasts (*Zool.*). In many of the lower animals (*Annelida*, *Ascidians*, etc.), large amoeboid cells widely distributed through the body which play an important part in the phenomena of regeneration.

Neoco'mian (*Geol.*). The name given to the lowest stage of the Cretaceous System which precedes the Aptian stage See also **Wealden Series.**

Neo-Darwinian (*Zool.*). Pertaining to the modern version of the natural selection theory of Darwin.

neodym'ium (*Chem.*). Symbol, Nd. A metallic element, a member of the rare earth group. At. no. 60, at wt. 144 3, sp. gr. 6 956, m.p. 840° C. The metal, which has a faint yellow colour, is found in cerite, monazite, and orthite.

neo-enceph'alon (*Zool.*). See **telencephalon.**

neog'amous (*Zool.*). (In *Protozoa*) showing precocious association of gametocytes.

Neog'nathae (*Zool.*). A division of *Neornithes* characterised by the possession of a palate in which the vomer is reduced in size, i e. a schizognathous, desmognathous, or aegithognathous palate.

Neo-Lamarck'ism (*Zool.*). A revival of the evolution theories of Lamarck, which postulated that differences between species arose by the inheritance of the effects of use and disuse.

Neolithic Period (*Geol*) The later portion of the Stone Age, characterised by well-finished, polished stone implements, made by men of the same species as ourselves. Cf. *Palaeolithic Period.*

neoman'oscope (*Photog*). An apparatus for viewing transparencies at the correct distance.

neomorpho'sis (*Zool.*). A type of regeneration in which the part reformed does not resemble any existing part of the body.—*adj.* **ne'omorph.**

ne'on (*Chem.*). Symbol, Ne. A zero-valent element, one of the rare gases. At. no. 10, at. wt. 20·183. It is a colourless and odourless monatomic gas; m p. −248·67° C., b.p. −245·9° C., density 0 90035 gms. per litre at N.T.P. It constitutes about 18 parts per million by volume of the atmosphere, from which it is obtained by the fractionation of liquid air. Neon is used in glow-discharge lamps.

neon induction lamp (*Illum.*). A lamp consisting of a small tube containing neon at low pressure; luminescence is produced by the action of high-frequency currents in a few turns surrounding the tube.

neon lamp (*Illum.*). An electric discharge lamp containing neon and giving a red glow. Widely used for advertising signs; also, on a small scale, for indicating lamps.

neonych'ium (*Zool.*). A pad of soft tissue enclosing a claw of the foetus during the development of many Mammals, to eliminate the risk of ripping the foetal membranes.

neopal'lium (*Zool.*). In Mammals, that part of the cerebrum occupied with impressions from senses other than the sense of smell.

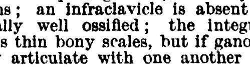
ne'oplasm (*Med.*). A new formation of tissue in the body: a *tumour* (q.v.).—*adj.* **neoplas'tic.**

Neopteryg'ii, nē-op-ter-ij'i-ī (*Zool.*). A subclass of *Pisces* comprising the great majority of living forms; an infraclavicle is absent; the skull is usually well ossified; the integument usually bears thin bony scales, but if ganoid scales occur they articulate with one another by a peg-and-socket arrangement, and are pierced by unbranched vascular canals; the caudal fin is usually homocercal.

Neor'nithes (*Zool.*). A subclass of *Aves* which includes all living Birds and is characterised by the absence of teeth in the jaw and of claws at the tips of the fingers. Cf. *Archaeornithes.*

neor'ophags (*Zool.*). Phagocytic cells which engulf and destroy senile nerve cells.

Neosal'varsan (*Chem.*). No. 914. The Na salt of 3,3'-diamino-4,4'-dihydroxyarsenobenzene-*N*-methylene-sulphinic acid, having the formula:



It has a therapeutical action against syphilis.

Neosporid'ia (*Zool.*). A subclass of *Sporozoa* in which the trophozoite is multinucleate and forms spores continuously; the spore cases are complex and usually contain only a single sporozoite.

neossoptiles —op'tī-lēz (*Zool.*). The down-feathers found on a newly hatched Bird.

neoteinic, —tē'nik (*Zool.*). In a state of arrested development, as certain castes of *Isoptera.*

neot'eny (*Zool.*). The retention of larval characters beyond the usual period, as in some *Amphibia* which may still have the appearance of Tadpoles when they have reached sexual maturity.

Neotre'mata (*Zool.*). An order of *Ecardines* having a horny or calcareous shell, of which the ventral valve is usually smaller and flat; there may or may not be a peduncle; of wide distribution.

Neotrop'ical region (*Zool.*). One of the primary faunal regions into which the surface of the globe is divided. It comprises South America, the West Indian islands, and Central America south of the Mexican plateau.

neovi'talism (*Zool.*). The theory which postulates that a complete causal explanation of vital phenomena cannot be reached without invoking some extra-material concept.

Neozo'ic (*Geol.*). The name (='new life') sometimes given to the Tertiary and Post-Tertiary rocks.

néper, nā-per (*Elec. Comm.*). The unit of attenuation adopted by the C.C.I.F. to be used with the same status as the decibel. If I_1 is attentuated to I_2 so that $I_2 = I_1 \epsilon^{-N}$, then the current attenuation is N népers. (Named after John Napier, the Scottish scientist, inventor of natural logarithms.)

neph'eline, neph'elite (*Min.*). Silicate of sodium and aluminium, $NaAlSiO_4$, which crystallises in the hexagonal system. It is frequently present in igneous rocks with a high soda content and a low percentage of silica.

nepheline-basalt (*Geol.*). A general name for any basic lava carrying nepheline as an essential constituent.—See **nephelinite,** also **basanite, tephrite.** By some petrologists the term is restricted to those nepheline-basalts which carry olivine but no feldspar. A more accurate name for the latter is *olivine-nephelinite.*

nepheline-syenite (*Geol.*). Also called ELAEOLITE-SYENITE. A coarse-grained igneous rock of intermediate composition, undersaturated with regard to silica, and consisting essentially of elaeolite, a varying content of alkali-feldspar, with soda amphiboles and/or soda-pyroxenes. Common hornblende, augite, or mica are present in some varieties. See, for example, **foyaite, laurdalite.**

neph'elinite (*Geol.*). A fine-grained igneous rock normally occurring as lava flows, and resembling basalt in general appearance; it consists essentially of nepheline and pyroxene, but not of olivine or feldspar. The addition of the former gives *olivine-nephelinite,* and of the latter, *nepheline-tephrite.*

nephelomet'ric analysis (*Chem.*). A method of quantitative analysis in which the concentration of suspended matter in a liquid is determined by optical means. Also called TURBIDIMETRIC ANALYSIS.

neph'ograph (*Photog.*) An instrument comprising electrically controlled cameras for photographing clouds, etc., in order that their position in the sky may subsequently be determined.

neph'oscope (*Meteor.*). An apparatus which determines the direction of motion and the rate of rotation of a cloud which is vertically above it.

nephr-, nephro- (Greek *nephros,* kidney). A prefix used in the construction of compound terms; e.g. *nephrectomy* (q.v.).

nephrec'tomy (*Surg.*). Removal of a kidney by operation.

neph'ric (*Anat., Zool.*). Pertaining to the kidney.

nephrid'iopore (*Zool.*). The external opening of a nephridium or nephromixium.

nephrid'ium (*Zool.*). In *Invertebrata* and lower *Chordata,* a segmental excretory organ consisting of an intercellular duct of ectodermal origin, typically terminating at the inner end in a solenocyte or flame-cell. more generally, an excretory tubule; cf. *coelomoduct, nephromixium.*—*adj.* **nephrid'ial.**

nephrite (*Min.*). One of the minerals grouped under the name of *jade*; consists of compact and fine-grained tremolite or actinolite. It has been widely used for ornaments in the Americas and the East.

nephri'tis (*Med.*). Inflammation of the substance of the kidney.—*adj.* **nephrit'ic.**

neph'rocoel, —sēl (*Zool.*). The coelomic cavity of a nephrotome.

neph'rocysti'tis (*Med.*). Inflammation both of the kidney and of the bladder.

neph'rocyte (*Zool.*). A cell which has the property of storing up substances of an excretory nature, as in *Porifera* and *Insecta.*

nephrodin'ic (*Zool.*). Employing the same duct for the discharge of excretory and genital products.

neph'rogon'oduct (*Zool.*). (Especially in *Invertebrata*) a common duct for genital and excretory products.

neph'roid (*Bot.*). See **reniform.**

neph'rolithi'asis (*Med.*). The presence of stones in the kidney.

neph'rolithot'omy (*Surg.*). Removal of stones from the kidney through an incision in the kidney: the operation for doing this.

nephromix'ium (*Zool.*). A compound excretory tubule consisting of both ectoderm and mesoderm.

nephrop'athy (*Med.*). Any disease of the kidneys.

neph'ropexy (*Surg.*). The fixation, by operative measures, of a kidney which is abnormally movable. Cf. *nephrorrhaphy.*

neph'ropore (*Zool.*). See **nephridiopore.**

neph'ropto'sis (*Med.*). Movable kidney; **floating** kidney. An abnormally mobile kidney, associated with general displacement downwards of other abdominal organs.

nephropyeli'tis (*Med.*). Inflammation both of the substance of the kidney and of its pelvis.

nephror'rhaphy (*Surg.*). The fixation, by suture, of a displaced kidney. Cf. *nephropexy.*

neph'ros (*Zool.*). A kidney.—*adj.* **neph'ric.**

neph'roscleroʹsis (*Med*). Hardening and contraction of the kidney as a result of arteriosclerosis and of general increase of fibrous tissue in the substance of the kidney.

nephro'sis (*Med.*). A degeneration of the tubules of the kidney, associated with oedema of the tissues and albuminuria.

neph'rostome (*Zool.*). The ciliated funnel by which some types of nephridia and nephromixia open into the coelom.

nephros'tomy (*Surg.*). The surgical formation of an opening into the pelvis of the kidney for the drainage of urine.

neph'rotome (*Zool*). That region of the coelomic epithelium in each somite of a metameric animal that gives rise to the excretory tubes.

nephrot'omy (*Surg*). The making of an incision into the kidney.

nephrotox'in (*Med*). A poison or toxin which specifically affects the cells of the kidney.

nepionic, nē-pi-on'ik (*Zool.*). Said of the embryonic period in the life-history of an individual.

neps (*Textiles*). (1) The term applied in the cotton industry to small entanglements of fibres that cannot be unravelled; generally formed during the ginning process.—(2) Small lumps formed in cotton or wool fibres during carding.

Neptune (*Astron.*). The eighth planet of the solar system, in order of distance from the sun; discovered independently by Leverrier and Adams by deduction from the perturbations of Uranus; it has one satellite; its mass is about 17 times that of the earth, and its sidereal period 164·8 years.

Nereidifor'mia (*Zool.*). An order of *Phanerocephala*, comprising for the most part active predaceous forms with well-developed parapodia bearing dorsal and ventral cirri; there is an eversible buccal region, and the pharynx is armed with chitinous jaws; the tentacles and palps are well developed, and the peristomium usually bears cirri; includes the Sea-Mice and the Rag-Worms.

nerit'ic. Pertaining to, or found in, the *neritic zone* (q v.).

neritic environment, neritic facies (*Geol.*). Sediments that are deposited in the neritic zone of the sea floors and in epicontinental seas are of *neritic facies*, showing rapid alternations of the clay and sand grades; ripple marks and other characters indicate accumulation in shallow water, within reach of wave- and current-action. The former term is synonymous with *neritic zone*.

neritic zone (*Geol., Ocean*). That portion of the sea floor lying between low-water mark and the edge of the continental shelf, at a depth of about 100 fathoms.

Nernst lamp (*Illum.*). An electric lamp in which a rod of material, composed of a mixture of the oxides of certain rare metals, is caused to glow by the passage of a current through it.

Nernst theory (*Chem.*). An explanation of the development of electrode potentials, based on the supposition that an equilibrium is established between the tendency of the electrode material to pass into solution and that of the ions to be deposited on the electrode.

nervation, nervature (*Bot.*). See **venation.**—(*Zool.*) See **nervuration.**

nerve (*Anat., Zool.*). One of the branches of the central nervous system passing to an organ or part of the body: a nervure.—*adjs.* **nervous, neural.**

nerve (*Bot.*). A general name for the midrib and the larger veins of a leaf.

nerves (*Arch.*). The projecting ribs on a vault surface. Also called NERVURES.

nerve block (*Med.*). Production of insensibility of a part by injecting an anaesthetic into the nerve or nerves supplying it.

nerve canal (*Zool.*). An aperture in the root of a tooth through which the nerve may pass to the pulp.

nerve cell (*Zool.*). See **neurocyte.**

nerve centre (*Zool.*). An aggregation of nerve cells associated with a particular sense or function.

nerve ending (*Zool.*). The free distal end of a nerve or nerve fibre, generally with accessory parts forming a complex end-organ.

nerve fibre (*Zool.*). An axon.

nerve impulse (*Zool.*). The disturbance which passes along a nerve when it is stimulated.

nerve net (*Zool.*). The primitive type of nervous system found in *Coelenterata*, consisting of numerous multipolar neurocytes which form a net underlying and connecting the various cells of the body wall.

nerve plexus (*Zool.*). A network of interlacing nerve fibres.

nerve root (*Zool.*). The origin of a nerve in the central nervous system.

nerve trunk (*Zool.*). A bundle of nerve fibres united within a connective-tissue coat.

nervi nervo'rum (*Zool.*). Sensory nerve fibres received by a nerve trunk and usually terminating within the epineurium as end-bulbs.

nervico'lous (*Bot.*). Said of a parasitic fungus which grows on the veins of a leaf.

nervous system (*Zool*). The whole system of nerves, ganglia, and nerve endings of the body of an animal, considered collectively.

See **central—** **parasympathetic—**
sympathetic—

ner'vule (*Zool.*). A small branch of a nervure.

nervura'tion, nerva'tion, ner'vature (*Zool.*). The arrangement of the nervures in an Insect wing.

ner'vure (*Zool.*). One of the chitinous struts which support and strengthen the wings of an Insect.

nervures (*Arch.*). See **nerves.**

nervus lateralis (*Zool.*). See **lateralis.**

Nessler's solution (*Chem.*). Used in the analysis of water for the estimation of free and combined ammonia. It is a solution of mercuric iodide in potassium iodide, made alkaline with sodium or potassium hydroxide.

nest (*Glass*). A cushion upon which glass is placed to be cut with a diamond.

nest epiphyte (*Bot.*). An epiphyte which develops a tangle of stems, roots, and leaves among which humus collects, and is utilised by the plant.

nestoca'lyx (*Zool.*). The bell-shaped swimming-organ of a hydrozoan, as a medusa or jellyfish.

Nestorite (*Plastics*). A thermo-setting plastic of the phenol-cresol-formaldehyde type.

net knot (*Cyt.*). A small accumulation of chromatin, particularly at the intersections of the nuclear reticulum.

net-veined (*Bot.*). Having the veins running in irregular courses, anastomosing at times, and all together forming a network.

network (*Elec. Comm.*). Short for ***electrical-transmission network,*** i.e. a group of electrical elements connected together for the purpose of satisfying specified transmission requirements.—(*Elec. Eng.*) A set of interconnected electrical conductors; e.g. the feeders and distributors of an electric power system.

See **active—**
balanced—
basic—
bridge—
bridged-T—
building-out—
constant-k—
constant-resistance—
delay—
delta—
dissipative—
distorting—
equalising—
equivalent T- (or π)**—**
inverse—
L-type—
ladder—
lattice—
linear—
m-derived—
mesh—
non-dissipative—
non-linear—
passive—
pre-distorting—
T- —
unbalanced—
Y—

network structure (*Met.*). The type of structure formed in alloys when one constituent exists in the form of a continuous network round the boundaries of the grains of the other. Even if the grains included in the cells are themselves duplex, they are regarded as individual grains.

net′rum (*Cyt.*). A minute spindle which arises within the centrosome during the division of the centriole.

netted (*Bot.*). (1) Covered with lines forming a network.—(2) Forming a network.

nettle-cell (*Zool.*). See **cnidoblast.**

Nettlestone Beds (*Geol.*). A group of marls and sandy and shelly limestones of Oligocene age found near Whitecliff Bay, Isle of Wight.

Neumann lamellae, noi′man (*Met.*). Straight, narrow bands parallel to the crystallographic planes in the crystals of metals that have been subjected to deformation by sudden impact. They are actually narrow twin bands, and are most frequently observed in iron.

neur-, neuro- (Greek *neuron*, nerve). A prefix used in the construction of compound terms; e.g. *neurotendinous*, pertaining to nerves and tendons.

neu′rad (*Zool.*). Situated on the same side of the vertebral column as the spinal cord: hence, dorsal.

neu′ral (*Zool.*). See **nerve.**

neural arch (*Zool.*). The skeletal structure arising dorsally from a vertebral centrum, formed by the neurapophyses and enclosing the spinal cord.

neural canal (*Zool.*). The space enclosed by the centrum and the neural arch of a vertebra, through which passes the spinal cord.

neural crest (*Zool.*). In a Vertebrate embryo, a band of cells lying parallel and close to the nerve cord which will later give rise to the ganglia of the dorsal roots of the spinal nerves.

neural folds (*Zool.*). See **medullary folds.**

neural groove (*Zool.*). See **medullary groove.**

neural plate (*Zool.*). In *Chelonia*, a median row of bony plates forming part of the carapace: medullary plate: neurapophysis.

neural spine (*Zool.*). The median dorsal vertebral spine, formed by the fusion of the neurapophyses above the neural canal.

neural′gia (*Med.*). Paroxysmal intermittent pain along the course of a nerve, arising from various causes.—*adj.* **neuralgic.** See also **tic douloureux.**

neurapoph′yses (*Zool.*). A pair of plates arising dorsally from the vertebral centrum, and meeting above the spinal cord to form the neural arch and spine.—*sing.* **neurapophysis.**

neurasthe′nia (*Psycho-an.*). A psychoneurosis in which the sexual drive is completely repressed at the expense of a large output of mental energy, resulting in extreme tiredness and lassitude, so that sleep and relaxation are not effective. Originally classified by Freud as one of the true neuroses.

neurax′is (*Zool.*). See **axon.**

neurec′tomy (*Surg.*). Surgical excision of part of a nerve.

neurenter′ic canal (*Zool.*). A temporary passage connecting the cavity of the nerve cord and the archenteron in the early embryonic stages of some *Chordata.*

neurilem′ma (*Anat.*, *Zool.*). See **neurolemma.**

neurine (*Chem.*). $CH_2{:}CH{\cdot}N(CH_3)_3OH$, trimethylvinylammonium hydroxide, obtainable from brain substance and from putrid meat; related to *choline* (q.v.), into which it can be transformed. It is a ptomaine base.

neuri′tis (*Med.*). Inflammation of a nerve. For *multiple neuritis*, see **polyneuritis**; for *optic neuritis*, see **papillitis.**

neu′robiotax′is (*Zool.*). The tendency shown by nerve cells to migrate towards the source of the impulses which they most frequently receive.

neuroblasto′ma (*Med.*). A malignant tumour composed of primitive nerve cells, arising in the adrenal gland or in connexion with sympathetic nerve cells.

neu′roblasts (*Zool.*). Cells of ectodermal origin which give rise to neurocytes.

neurocir′rus (*Zool.*). In *Polychaeta*, a cirrus borne by the neuropodium.

neu′rocoel, —sēl (*Zool.*). The spinal canal.

neurocra′nium (*Zool.*). The brain-case and sense capsules of a Vertebrate skull. Cf. *viscerocranium.*

neu′rocyte (*Zool.*). A nerve cell, consisting of a cell-body and cell-processes.

neuro-epithe′lium (*Zool.*). A layer of superficial cells specialised for the reception of stimuli.

neurofi′brils (*Zool.*). Fine fibrils which run in parallel bundles in the cell-processes and form an intricate plexus in the cell-body.

neurofibro′ma (*Med.*). A tumour composed of fibrous tissue derived from the connective-tissue sheath of a nerve. See **molluscum fibrosum.**

neurofibromato′sis (*Med.*). Von Recklinghausen's disease; multiple fibromata. See **molluscum fibrosum.**

neurofi′brosi′tis (*Med.*). Interstitial neuritis. Inflammation of the connective tissue which surrounds and binds together large nerve trunks (e.g. the sciatic nerve).

neurogen′esis (*Zool.*). The development and formation of nerves.

neurogen′ic (*Zool.*). Activity of a muscle or gland which is dependent on continued nervous stimuli.

neu′roglia (*Zool.*). The supporting tissue of the brain and spinal cord of Vertebrates, composed of much-branched fibrous cells which occur among the nerve cells and fibres.

neu′rohypoph′ysis (*Zool.*). See **pars nervosa.**

neuroker′atin (*Chem.*). A protein forming part of the nerve and brain substance.

neurolem′ma or **neurilemma** (*Zool.*). A thin homogenous sheath investing the medullary sheath of a medullated nerve fibre; sheath of Schwann.

neurol′ogy. The study of the nervous system.

neu′rolymphomato′sis (*Vet.*). An inherited disease of certain strains of fowls.

neu′romasts (*Zool.*). In lower *Icthyopsida*, collections of sense-cells in which the element of the lateralis nerve terminate; sense-hillocks.

neu′romere (*Zool.*). In metameric animals, the portion of the central nervous system contained within one somite.

neuromus′cular (*Zool.*). Pertaining to nerve and muscle, as a myoneural junction.

neuron, neurone (*Zool.*). A nerve cell and its processes, regarded as an anatomically independent element.

neu′ronemes (*Zool.*). In some *Ciliophora*, filaments, believed to be of a nervous nature, running parallel with and external to the myonemes.

neuroneph′roblast (*Zool.*). In a segmenting ovum, a cell which will later contribute to the nerve cord and nephridia.

neuroni′tis (*Med.*). Inflammation (or degeneration) of neurons.

neuronopha′gia (*Med.*). The destruction of diseased nerve cells by white-blood cells and by microglial cells.

neuropo′dium (*Zool.*). In *Polychaeta*, the ventral lobe of a parapodium.

neu′ropore (*Zool.*). The anterior opening by which the cavity of the central nervous system communicates with the exterior.

Neurop′tera (*Zool.*). An order of *Endopterygota* in which there are usually two pairs of similar transparent net-veined wings; the mouth-parts are adapted for biting; the larva is predaceous and usually active, and possesses suctorial mouth-parts. Lace Wings, Ant Lions, Butterfly

Hawks, Mealy Wings, Stink Flies, Scorpion Flies. By some entomologists now split into several orders.

neuro'sis (*Med.*). Any one of a group of diseases thought to be due to disordered function of the involuntary nervous system, shown by instability of the circulatory system.—(*Psycho-path.*) A psychological disorder resulting from a conflict of repressed infantile instinctive demands with those of adult society. Freud particularly distinguishes three pure forms of actual neurosis, as distinct from psychoneurosis, viz. melancholia, anxiety neurosis, and hypochondria, in which the causation is physical rather than psychical.

neurosurgery (*Surg.*). That part of surgical science which deals with the nervous system.

neurosy'napse (*Zool.*). See **synapse.**

neurosyph'ilis (*Med.*). Syphilitic infection of the nervous system.

neurotro'pic (*Med.*). Having a special affinity for nerve cells; e.g. *neurotropic* virus.

neurotro'pism (*Zool.*). The tendency to mutual attraction shown by masses of nervous tissue under suitable conditions.

neus'ton (*Ecol.*). Aquatic animals associated with the surface film.

neuter (*Bot.*). (1) Apparently sexless; said of certain strains of fungi which normally show sexuality.—(2) Said of a flower in which the androecium and gynaeceum are non-functional or absent.

neuter, neutral (*Zool.*). Without sex: lacking functional sexual organs: neither male nor female: a sexless animal.

neutral (*Elec. Eng.*). See **neutral point, neutral conductor.**

neutral (*Photog.*). Possessing no colour or hue; grey.

neutral auto-transformer (*Elec. Eng.*). See **earthing reactor.**

neutral axis (*Elec. Eng.*). A term used to denote the diametral plane in which the brushes of a commutator machine should be situated in order to give perfect commutation.

neutral axis (*Eng.*). In a beam subjected to bending, the line of zero stress—a transverse section of the longitudinal plane, or neutral surface, which passes through the centre of area of the section.

neutral compensator (*Elec. Eng.*). See **earthing reactor.**

neutral (or **middle**) **conductor** (*Elec. Eng.*). The middle wire of a d.c. *three-wire system* (q.v.) or a distribution system, or the wire of a polyphase distribution system which is connected to the neutral point of the supply transformer or alternator. Sometimes called the NEUTRAL (or MIDDLE) WIRE or the NEUTRAL. Cf. *outer.*

neutral equilibrium (*Mech.*). See **equilibrium (neutral).**

neutral grey filter (*Photog.*). A filter which absorbs all visible rays to the same extent, and therefore does not change the collective hue of any complex colour passed through.

neutral point or neutral (*Elec. Eng.*). The point at which the windings of a polyphase star-connected system of windings are connected together. Also, the mid-point of the neutral zone of a d.c. machine.

neutral solution (*Chem.*). An aqueous solution which is neither acidic nor alkaline. It therefore contains equal quantities of hydrogen and hydroxyl ions and has a pH-value of 7.

neutral surface (*Eng.*). See **neutral axis.**

neutral-tongue relay (*Elec. Comm.*). A relay for cable telegraphy in which the tongue is maintained in a central position by springs, being moved to either of the contacts by a current in the appropriate direction.

neutral wedge filter (*Photog.*). A neutral grey filter, originally a wedge of grey glass, which introduces a continuously variable attenuation of light, depending on the density or thickness introduced into the beam, without altering the relation between hues in the transmitted light.

neutral zone (*Elec. Eng.*). That part of the commutator of a d.c. machine in which, when the machine is running normally, the voltage between adjacent commutator bars is approximately zero.

neu'tralator (*Elec. Eng.*). See **earthing reactor.**

neutralisation (*Chem*). The interaction of an acid and a base with the formation of a salt. In the case of strong acids and bases, the essential reaction is the combination of hydrogen ions with hydroxyl ions to form water molecules.

neutralisation (*Radio*). The counteracting of detrimental effects of anode-grid capacitance in triode amplifying circuits by the provision of a second path, through a neutralising or *balancing condenser* (q.v.), between the anode and grid circuits. By this method coupling between the two circuits is effected in reverse phase to that produced by the inter-electrode capacitance. Also called BALANCING.

neutralised series motor (*Elec. Eng.*). See **compensated series motor.**

neutralising (*Paint.*). The process of preparing cement surfaces which are to be painted, a chemical preparation being applied to neutralise the lime.

neutralising capacitance, neutralising condenser (*Radio*). See **balancing capacitance.**

Neutrodyne (*Radio*). A registered trade-name for one form of neutralised high-frequency amplifier.

neutrodyne capacitance (*Radio*). See **balancing capacitance.**

neutron (*Phys.*). An uncharged particle of mass equal to a proton, which probably goes to build up atomic nuclei.

neutrope'nia (*Med.*). Abnormal diminution in the number of neutrophil leucocytes in the blood.

neu'trophil (*Physiol.*). (1) Stainable by neutral dyes.—(2) A white-blood cell whose granular protoplasm is stainable with neutral dyes; also called POLYMORPHONUCLEAR LEUCOCYTE.

neutrophil'ia (*Physiol.*). An increase in the number of neutrophils in the blood.

neutroson'ic receiver (*Radio*). A supersonic heterodyne receiver employing neutralised triode amplifiers for the intermediate frequency.

nevad'ite (*Geol.*). An acid lava (rhyolite) containing an abnormally large quantity of phenocrysts, with correspondingly little groundmass.

névé (*Geol.*). See **firn.**

Nevile and Winther's acid (*Chem.*). 1-Naphthol-4-sulphonic acid, an intermediate for dyestuffs.

nevus (*Med.*). See **naevus.**

new moon (*Astron.*). The instant when the moon is directly in line with the earth and sun, between the two, in elongation 0°, when her illuminated hemisphere is wholly invisible.

New Red Sandstone (*Geol.*). A name frequently applied to the combined Permian and Triassic Systems, and particularly applicable in N.W. England, where the palaeontological evidence is insufficient to allow of their separation. The term reflects the general resemblance between the rocks comprising these two systems and the Old Red Sandstone of Devonian age.

new star (*Astron.*). See **nova.**

New Style (*Astron., etc.*). A name given to the system of date-reckoning established by the *Gregorian Calendar* (q.v.).

New Zealand greenstone (*Min.*). Nephritic 'jade' of gemstone quality, from New Zealand.

Newark Series (*Geol.*). Continental strata of Upper Triassic age in the U.S.A., consisting essentially of red sandstones, shales, arkoses, and conglomerates, some 14,000 to 18,000 ft. thick;

they include black shales with fish remains, thin coal-seams in the Rhaetic of Virginia and N. Carolina, and basaltic flows and sills.

Newbourn Crag (*Geol*.). A local group of soft sandy rocks which occur in the middle of the Pliocene System in East Anglia.

Newcastle Beds or **Newcastle-under-Lyme Group** (*Geol.*). A local series of grey shales and sandy beds which belong to the Staffordian Coal Measures of North Staffordshire.

Newcastle disease (*Vet.*). A contagious infection of fowls, resembling fowl pest.

newel (*Join.*). An upright post fixed at the foot of a stair or at a point of change of direction and used as a support for a balustrade.

newel cap (*Join.*). An ornamental finish planted on the upper end of a newel post.

newel drop (*Join.*). An ornamental finish on the lower end of a newel, above ground-level.

newel joints (*Join.*). The joints connecting the newel and the hand-rail or string.

Newman Limestone (*Geol.*). A thick group of limestones, about 3300 ft. in thickness, referred to the Upper Mississippian of Virginia.

Newnam hearth (*Met*.). A modified Scotch hearth in which poking or rabbling is done mechanically.

newsprint (*Paper*). Cheap-quality printing paper, usually supplied in reels, for newspaper purposes; composed largely of mechanical or ground wood-pulp with a relatively small admixture of strong sulphite wood pulp.

newsreel (*Cinema*). A motion-picture film depicting items of news and of current interest: a theatre where such films occupy most of the programme.

Newton's disc (*Optics*). A motor-driven disc with sectors of primary colours, which appears white on fast rotation and with white illumination, thus demonstrating the synthesis of colour vision.

Newton's law of cooling (*Heat*). The rate of cooling of a hot body which is losing heat both by radiation and by natural convection is proportional to the difference in temperature between it and its surroundings. The law does not hold for large temperature excesses.

Newton's rings (*Light*). Circular concentric interference fringes seen surrounding the point of contact of a convex lens and a plane surface. Interference occurs in the air film enclosed between the two surfaces. If r_n is the radius of the nth ring, R the radius of curvature of the lens surface, and λ the wavelength, $r_n = \sqrt{nR\lambda}$.

Newtonian telescope (*Astron.*). A form of reflecting telescope due to Newton, in which the object is viewed through an eye-piece in the side of the tube, the light reflected from the main mirror being deflected into it by a small plane-mirror inclined at 45° to the axis of the telescope and situated on the axis just inside the principal focus.

Ni (*Chem.*). The symbol for *nickel*.

Niagara Limestone (*Geol.*). See **Lockport Limestone.**

Niagara Series or **Niagaran** (*Geol.*). Strata of Silurian age typically exposed in the Niagara Gorge section; includes the Medina Group below, and the Clinton, Rochester, and Lockport beds.

nib (*Build.*). A small projection, sometimes continuous, formed on the under-side at the top of each tile, enabling the tile to be hung on battens. Also called a COG.

nib (*Tools*). The point of a crowbar.

nibs (*Paint.*). Specks of solid matter in varnish.

nib rule (*Plast.*). A straightedge used to guide the projecting nib on a horsed mould when running a cornice.

nic'colite (*Min.*). Arsenide of nickel, crystallising in the hexagonal system. It usually contains a little iron, cobalt, and sulphur and is one of the chief ores of metallic nickel. Also called COPPER NICKEL, KUPFERNICKEL.

niche (*Build.*). A recess in a wall surface, often to accommodate a statue, etc.

niche (*Ecol.*). A term used to describe the status of an animal in its community, i.e. its biotic and trophic relationships.

niched column (*Build.*). A column set back in a wall with a clear space between it and the wall.

Nicholson hydrometer (*Phys.*). A hydrometer of the constant-displacement type, which can be used for determining the specific gravity of a solid.

Ni'chrome (*Met.*). Trade-name for heat-resisting nickel-chromium alloys made by Driver-Harris Co.; contain 10-20% chromium and 80-90% nickel. Sometimes used generally to denote nickel-chromium alloys.

nick (*Carp., Join., etc*.). A small cut made at a particular point to facilitate starting a kerf.

nick (*Typog.*). The groove in the shank of a type letter. It aids the compositor in placing the type correctly in the stick, and in identifying the fount; in Monotype it distinguishes the foot of a letter from the top, as in u, n, d, p, etc.

nickel (*Met.*). A silver-white metallic element. Chemical symbol, Ni. At. wt. 58·69, at. no. 28, sp. gr. at 20° C. 8·85, m.p. 1450° C., specific electrical resistivity at 20° C. 10·9 microhms per c.c. Used pure for electroplating, coinage, and in chemical and food-handling plant. See also **nickel alloys.**

nickel alloys (*Met.*). Nickel is the main constituent in Monel metal, Permalloy, and nickel-chromium alloys. It is also used in cupro-nickel, nickel-silver, various types of steel and cast-iron, brass, bronze, and light alloys.

nickel antimony glance (*Min.*). Sulphantimonide of nickel, crystallising in the cubic system. Also called ULLMANITE.

nickel arsenic glance (*Min.*). See **gersdorffite.**

nickel bloom (*Min*.). See **annabergite.**

nickel carbonyl (*Chem.*). $Ni(CO)_4$. A volatile compound of nickel, formed by passing carbon monoxide over the heated metal. The compound is decomposed into nickel and carbon monoxide by further heating. Used on a large scale in industry for the production of nickel from its ores by the Mond process.

nickel-chromium steel (*Met.*). Steel containing nickel and chromium as alloying elements. 1·5% to 4% nickel and 0·5% to 2% chromium are added to produce an alloy of high tensile strength, hardness, and toughness. Used for highly stressed automobile and aero-engine parts, for armour plate, etc.

nickel-iron-alkaline accumulator (*Elec. Eng*.). An accumulator in which the positive plate consists of nickel hydroxide enclosed in perforated steel tubes, and the negative plate consists of iron or cadmium also enclosed in perforated steel tubes. The electrolyte is potassium hydrate, and the voltage 1·2 per cell. It is lighter than a lead accumulator. Also called EDISON ACCUMULATOR, NI-FE ACCUMULATOR.

nickel silver (*Met.*). See **German silver.**

nickel steel (*Met.*). Steel containing nickel as an alloying element. Varying amounts, between 0·5% and 6·0%, are added to increase the strength in the normalised condition, to enable hardening to be performed in oil or air instead of water, or to increase the core strength of carburised parts.

nick'eline (*Min.*). An old term for *niccolite.*

nicker (*Carp.*). The side wing of a *centre-bit* (q.v.) which scribes the boundary of the hole to be cut.

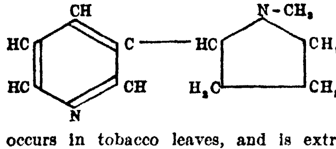
Niclad (*Met.*). Composite sheets made by rolling together sheets of nickel and mild steel, to obtain the corrosion resistance of nickel with the strength of steel.

Niclausse boiler, nē-klōs (*Eng.*). A French marine boiler which consists of a horizontal water and steam drum from which vertical double headers are suspended, carrying banks of *field tubes* (q.v.) slightly inclined downwards.

Nicol prism (*Light*). A device for obtaining plane-polarised light. It consists of a crystal of Iceland spar which has been cut and cemented together in such a way that the ordinary ray is totally reflected out at the side of the crystal, while the extraordinary plane-polarised ray is freely transmitted.

nicopyrite (*Min.*). See **pentlandite.**

nic'otine (*Chem.*) An alkaloid of the pyridine series, $C_{10}H_{14}N_2$, having the constitutional formula:



It occurs in tobacco leaves, and is extremely poisonous. It is a colourless oil, of nauseous odour; b.p. 246° C. (730 mm.).

nic'titating (*Zool.*). Winking; said of the third eyelid of the Vertebrates, which by its movements keeps clean the surface of the eye.

nidamen'tal (*Zool.*). Nest-forming; said of glands which secrete material for the formation of a nest or an egg-covering.

nida'tion (*Zool.*). In the oestrous cycle of Mammals, the process of renewal of the lining of the uterus between the menstrual periods.

nidged ashlar (*Masonry*). *Nigged ashlar* (q.v.).

nidic'olous (*Zool.*). Said of Birds which remain in the parental nest for some time after hatching.

nidification or **nidulation** (*Zool.*). The process of building or making a nest.

nidifu'gous (*Zool.*). Said of Birds which leave the parental nest soon after hatching.

ni'dus (*Zool.*). A nest: a small hollow resembling a nest: a nucleus.

niello, ni-el'lo (*Dec.*). A method of decorating metal. Sunk designs are filled with an alloy of silver, lead, and copper, with sulphur and borax as fluxes, and fired.

Ni-Fe accumulator (*Elec. Eng.*). Trade-name of a *nickel-iron-alkaline accumulator.*

nigged ashlar (*Masonry*). A block of stone dressed with a pointed hammer.

nigger (*Cinema.*). Any adjustable panel which is used to cut off stray light which might enter the camera lens and cause fog.

night bell (*Teleph.*). A bell used in telephone exchanges to warn operators that a subscriber is requiring attention at a position which is vacated.

night-blindness (*Med.*). See **nyctalopia.**

night bolt (*Join.*). See **night latch.**

night chair (*San. Eng.*). A form of earth closet designed for use in the sick-room.

night error, night effect (*Radio*). The error in the bearings given by a radio direction finder at night time; produced by waves reflected by the Heaviside layer; especially prominent at short wavelengths. Preferably termed *polarisation error* (q.v.).

night latch (*Join.*). A lock whose bolt is key-operated from the outside and knob-operated from the inside, but which is fitted with a device for preventing operation from either side.

nigres'cent (*Bot.*). Becoming blackish.

nig'ro-punc'tate (*Bot.*). Marked with black dots.

ni'grosines (*Chem.*). Diphenylamine dyestuffs, used as black pigments, prepared by heating nitrobenzene or nitrophenol, aniline, and aniline hydrochloride with iron filings.

nimbus (*Meteor.*). A dense layer of dark shapeless cloud with ragged edges, from which steady rain or snow usually falls.

ni'obite (*Min.*). See **columbite.**

nio'bium (*Met.*). See **columbium.**

Ni'obrar'a Limestone (*Geol.*). A member of the Upper Coloradoan (Senonian) strata, which follows the Benton Shales and Limestone in the Gulf States of N. America.

Nipkow disc (*Television*). A rotating disc having a series of apertures arranged in the form of a spiral around the circumference; used for mechanical scanning.

nippers (*Masonry*). See **stone tongs.**

nippier (*Mining*). See **clipper.**

nipping (*Bind.*). See **smashing.**

nipple (*Eng., Plumb., etc.*). (1) A short length of externally threaded pipe for connecting two lengths of internally threaded pipe.—(2) A small drilled bush, sometimes containing a non-return valve, screwed into a bearing for the supply of lubricant by a *grease-gun* (q.v.).

nipple (*Zool.*). The mamma or protuberant part of the mammary gland in female Mammals, bearing the openings of the milk-forming glands.

Ni-resist (*Met.*). A cast-iron consisting of graphite in a matrix of austenite. Contains carbon 3%, nickel 14%, copper 6%, chromium 2%, and silicon 1·5%. Has a high resistance to growth, oxidation, and corrosion.

Nissl bodies (*Zool.*) Angular bodies of granular appearance occurring in the cell-body of a neurocyte; they stain deeply with basic dyes.

Nissl degeneration (*Zool.*). Degenerative changes associated with chromatolysis, occurring in the cell-body of a neurocyte the axis-cylinder of which has been severed.

niter. See **nitre.**

nit'idous (*Bot.*). Lustrous.

ni'ton (*Chem.*). The original name for radium emanation, *radon.*

Nitral'loy (*Met.*). Steel specially developed for nitriding (which is not effective with ordinary steels). Contains carbon 0·2-0·3%, aluminium 0·9-1·5%, chromium 0·9-1·5%, and molybdenum 0·15-0·25%.

ni'tramines (*Chem.*). Amines in which an amino-hydrogen has been replaced by the nitro group. They have the general formula $R{\cdot}NH{\cdot}NO_2$.

ni'trates (*Chem.*). Salts formed by the action of nitric acid on metallic oxides, hydroxides, and carbonates. Readily soluble in water; decompose when heated. The nitrates of polyhydric alcohols and the alkyl radicals explode with violence.

nitrate bacteria (*Bot.*). Soil-inhabiting bacteria which convert nitrites into nitrates.

nitrate film (*Cinema.*). Cinematograph standard film using cellulose nitrate as a base; commercially more advantageous than acetate or non-flam, though explosive at a low temperature.

nitration (*Bacteriol., Bot.*). The conversion of nitrites into nitrates by the action of bacteria, being the final stage of nitrification in the soil.

nitre (*Min.*). *Potassium nitrate* (q.v.), crystallising in the orthorhombic system. Also called SALTPETRE. See also **Chile nitre, soda nitre.**

ni'tric acid (*Chem.*). HNO_3. Occurs in rain water during thunder-storms. Its salts, nitrates, are widely distributed. Obtained directly from the air by various processes; also by catalytic oxidation of ammonia gas. Used for dissolving metals (gold, platinum, and palladium are unattacked) and for etching, in the manufacture of nitrates, sulphuric acid, and explosives. Strong oxidising agent. Forms a constant-boiling mixture with water; b.p. 78° C. Also called (in concentrated form) AQUA FORTIS.

nitric anhydride (*Chem.*). N_2O_5. Dissolves in water to give nitric acid.

nitric oxide (*Chem.*). NO. Colourless gas. In contact with air it forms reddish-brown fumes of nitrogen peroxide.

nitrides (*Chem.*). Compounds of metals with nitrogen. Usually prepared by passing nitrogen or gaseous ammonia over the heated metal.

ni'triding, nitrogen case-hardening (*Met.*). A process for producing hard surface on special types of steel by heating in gaseous ammonia. Components are finish-machined, hardened and tempered, and heated for about 60 hours at 520° C. Case is about 0·02 in. deep and surface hardness is 1100 V.P.N. See **Nitralloy.**

nitrification (*Chem.*). The treatment of a material with nitric acid.—(*Bacteriol., Bot.*) The conversion of nitrogenous matter into nitrates by bacteria, especially in the soil. See **ammonisation, nitration, nitrosation.**

nitrifying bacteria (*Bot.*). Soil bacteria which are able to bring atmospheric nitrogen into combination and use it in their nutrition.

ni'triles (*Chem.*). Alkyl cyanides of the general formula R·C:N. When hydrolysed they yield carboxylic acids or the corresponding ammonium salts. When reduced they yield amines. Numerous additive reactions are possible to the triple bond.

nitrites (*Chem.*). Salts or esters of nitrous acid, O.NOH.

nitrite bacteria (*Bot.*). Soil-inhabiting bacteria which form nitrites from compounds of ammonia.

ni'tritoid crisis (*Med.*). A reaction following the injection of arsphenamine, in which flushing of the face is associated with difficulty of breathing.

nitroben'zene (*Chem.*). $C_6H_5{\cdot}NO_2$, a yellow liquid with an odour of bitter almonds, m.p. 5° C., b.p. 208° C., sp. gr. 1·2. It is obtained by the action of a mixture of concentrated sulphuric acid and nitric acid on benzene. When reduced it yields aniline.

nitrocel'luloses (*Chem.*) Cellulose nitrates. They are the nitric acid esters of cellulose, and are formed by the action of a mixture of nitric and sulphuric acids on cellulose. The cellulose can be nitrated to a varying extent ranging from two to six nitrate groups in the molecule. Nitrocelluloses with a low nitrogen content, up to the tetranitrate, are not explosive, and are used in the lacquer and artificial silk industries, etc. They dissolve in ether-alcohol mixtures, and in so-called lacquer solvents, e.g. butyl acetate, etc. A nitrocellulose with a high nitrogen content is guncotton, an explosive. The principal nitrocellulose plastic is *celluloid* (q.v.).

nitro derivatives (*Chem.*). Aliphatic or aromatic compounds containing the group $-NO_2$. The aliphatic nitro derivatives are colourless liquids which are not readily hydrolysed, but have acidic properties, e.g. the primary and secondary aliphatic nitro derivatives can form metallic compounds. Aromatic nitro derivatives are easily formed by the action of nitric acid on aromatic compounds. The nitro groups substitute in the nucleus and only exceptionally in the side chain.

ni'trogen (*Chem.*). A non-metallic element in the fifth group of the periodic system. At. no. 7, at. wt. 14·008, valencies 3, 5; symbol N. It is a colourless, odourless, chemically relatively inert, diatomic gas; m.p. −209·86° C., b.p. −195·8° C., density 1·25055 gms. per litre at N.T.P. It constitutes about 78% by volume and 75·5% by weight of the atmosphere; it occurs combined as nitrates (e.g. in Chile), as ammonium salts, in the soil and in all living matter. The gas is obtained from liquid air and is used in gas-filled electric lamps; large quantities are fixed by various methods.

nitrogen bases (*Chem.*). *Amines* (q.v.).

nitrogen case-hardening (*Met.*). See **nitriding.**

nitrogen chlorides (*Chem.*). Three nitrogen chlorides, NH_2Cl, $NHCl_2$, and NCl_3 produced by the chlorination of ammonium ions. Unstable and explosive.

nitrogen cycle (*Bacteriol.*). The sum total of the transformations undergone by nitrogen and nitrogenous compounds in nature in relation to living organisms.

nitrogen dioxide (*Chem.*). *Nitrogen peroxide* (q.v.).

nitrogen fixation (*Bot., Chem.*). See **fixation of nitrogen.**

nitrogen pentoxide (*Chem.*). See **nitric anhydride.**

nitrogen peroxide (*Chem.*). NO_2. Oxidising agent. Formed when one volume of oxygen is mixed with two volumes of nitric oxide. Below 17° C. the formula is N_2O_4 and the molecule is colourless. Decomposed by water, forming a mixture of nitric and nitrous acids.

nitrogen tetroxide (*Chem.*). N_2O_4. See **nitrogen peroxide.**

nitrogen trifluoride (*Chem.*). NF_3. Formed by the action of fluorine on ammonia. Colourless gas; stable; insoluble in water.

nitrogen trihydride (*Chem.*). Ammonia, NH_3.

nitroglyc'erine (*Chem.*). $C_3H_5(ONO_2)_3$, a colourless oil; m.p. 11°-12° C.; insoluble in water; prepared by treating glycerine with a cold mixture of concentrated nitric and sulphuric acids. It solidifies on cooling, and exists in two physical crystalline modifications. In thin layers it burns without explosion, but explodes with tremendous force when heated quickly or struck.

Ni'trolime (*Chem.*). Trade-name for an artificial fertiliser consisting of calcium cyanamide.

nitro-metals (*Chem.*). Metals which unite with nitrogen peroxide to give metallic nitroxyls.

nitrometer, Lunge (*Chem.*). See **Lunge nitrometer.**

nitrometh'ane (*Chem.*). CH_3NO_2, a liquid; b.p. 99°-101° C.; prepared from chloro-acetic acid and sodium nitrite.

ni'tron (*Chem.*). 1,4-Diphenyl-3,5-*end*anilodihydrotriazole. It forms an insoluble salt with nitric acid, and serves as a reagent for the quantitative estimation of nitric acid.

nitrophi'lous (*Bot.*). Said of plants which occur characteristically in places where there are good supplies of nitrogenous compounds.

nitroprus'sides (*Chem.*). Formed by the action of nitric acid on either ferro- or ferricyanides. Also called NITROSOFERRICYANIDES.

nitrosation (*Bacteriol., Bot.*). The conversion of ammonium salts into nitrites by the action of bacteria, being the second stage in nitrification in the soil.

nitro'so compounds (*Chem.*). Compounds containing the monovalent radical $-NO$.

nitrosoferricy'anides (*Chem.*). See **nitroprussides.**

nitrososulphuric acid (*Chem.*). See **chamber crystals.**

nitrotol'uenes (*Chem.*). $CH_3{\cdot}C_6H_4{\cdot}NO_2$. On nitration of toluene a mixture of *o*- and *p*-nitrotoluene is obtained with very little *m*-nitrotoluene. *o*-Nitrotoluene, a liquid, has a b.p. 218° C.; *p*-nitrotoluene crystallises in large crystals; m.p. 54° C., b.p. 230° C.

nitrous acid (*Chem.*). The pale-blue unstable solution obtained by precipitating barium nitrite with dilute sulphuric acid is supposed to contain nitrous acid, HNO_2.

nitrous oxide (*Chem.*). Laughing gas, N_2O. A colourless gas with a sweetish odour and taste, soluble in water, alcohol, ether, and benzene. Nitrous oxide is endothermic, and supports combustion better than air. The gas is manufactured by the decomposition of ammonium nitrate by heat, and purified by passage through solutions of ferrous sulphate, caustic potash, and milk of lime. It is used for producing anaesthesia of short duration.

nitrox'yl (*Chem.*). The radical $-NO_2$ when attached to a halogen atom or a metal. Compounds containing the group are called *nitroxyls*.

niv'eous (*Bot.*). Snowy-white.

No. 606 (*Chem.*). Salvarsan.

No. 914 (*Chem.*). Neosalvarsan.

no bottom, no top (*Acous.*). Sounds which, when reproduced, are attenuated in the low or/and high audio-frequency range are said to have *no bottom* or/and *no top*.

no-load characteristic (*Elec. Eng.*). See **open-circuit characteristic.**

no-load current (*Elec. Eng.*). The current taken by a transformer when it is energised but is giving no output, or by a motor when it is running but giving no mechanical load.

no-load loss (*Elec. Eng.*). The losses taking place in a motor or transformer when it is operating but giving no output.

no-throw (*Textiles*). The name for silk thread to which the twist imparted has been just sufficient to bind together the filaments composing it.

no top (*Acous.*). See under **no bottom.**

no-voltage release (*Elec. Eng.*). A relay or similar device which causes the circuit to a motor or other equipment to be opened automatically if the supply voltage fails.

noble gases (*Chem.*). See **rare gases.**

noble metals (*Met.*). Metals, such as gold, silver, platinum, etc., which have a relatively positive electrode potential, and which do not enter readily into chemical combination with non-metals. They have high resistance to corrosive attack by acids and corrosive agents, and resist atmospheric oxidation. Cf. *base metal.*

nocardi'asis (*Med.*). Infection (usually of the lungs) with any one of a number of spore-forming fungi of the genus *Nocardia.*

nocicep'tive (*Zool.*). Sensitive to pain.

noctilu'cent (*Zool.*). Phosphorescent: light-producing.

Noc'tovision (*Television*). Trade-name for a system of television in which the light-sensitive elements respond to infra-red light, and can therefore be operated in apparent darkness.

nocturnal (*Zool., etc.*). Active at night.

nodal gearing (*Eng.*). The location of gear-wheels, e.g. between a turbine and propeller shaft, at a nodal point of the shaft system with respect to torsional vibration.

nodal point (*Radio*). A point in a high-frequency circuit where the current is a maximum and the voltage a minimum, or vice-versa. Also called NODE.

nodal points of a lens (*Light*). Two points on the principal axis of a lens or lens system such that an incident ray of light directed towards one of them emerges from the lens as if from the other, in a direction parallel to that of the incident ray. For a lens having the same medium on its two sides the nodal points coincide with the principal points.

nodaliser (*Elec. Comm.*). An arrangement for adjusting a minimum effect in an electrical circuit, such as hum in an amplifier, or interfering current in a bridge.

node (*Acous.*). The location where the interference between two or more progressive sound-waves results in a stationary wave, with either the sound pressure or particle velocity zero or a minimum.

node (*Bot.*). The place where a leaf is attached to a stem; it is sometimes swollen.

node (*Phys.*). A point of minimum displacement in a system of stationary waves. The nodes are spaced half a wavelength apart. See **antinode.**

node (*Radio*). See **nodal point.**

nodes (*Astron.*). The two points, diametrically opposite each other, in which the orbit of a heavenly body cuts some great circle, the ecliptic in the case of the moon and planets. The *ascending* and *descending* nodes are distinguished by the body's passage to north or south of the reference plane in question.

Noden-Bretteuneau (*Build.*). The name of an electrical process for preserving timber.

nod'ose (*Bot.*). Bearing knot-like swellings.

nod'ular or **nod'ulose** (*Bot.*). Bearing local thickenings; said especially of an elongated plant member.

nodular structures (*Geol.*). Spheroidal, ovoid, or irregular bodies often encountered in both igneous and sedimentary rocks, and formed by segregation about centres. See, for example, **clay ironstone, doggers, flint, septaria.**

nod'ule (*Bot.*). (1) Any small rounded structure on a plant.—(2) A swelling on a root inhabited by symbiotic bacteria.

no'dus (*Zool.*). In Insects, a joint or swelling formed by the union of two nervures.

nog (*Build.*). A block of wood the size of a brick, built into a wall to provide a substance to which joinery, such as skirtings, may be nailed.

nogging (*Build.*). The filling in with bricks of the spaces between timbers in walls and partitions.

nogging-piece (*Build.*). A timber in a brick-nogging wall or partition.

noil (*Worsted*). Short fibre extracted from wool in the process of combing; used for blending in the woollen trade.

noise (*Acous.*). Sounds which are objectionable to some persons and which may or may not have significance. Technically defined as that class of sounds which do not exhibit clearly defined frequency components, but comprise a frequency spectrum of energy. See also **loudness level, phon.**

See **aircraft—**
babble—
frame—
frying—
ground—
Johnson—
line—
room—
Schottky—
sprocket—
surface—
thermal agitation—

noise audiogram (*Acous.*). An audiogram taken in the presence of a specified noise.

noise audiometer (*Acous.*). An audiometer which measures the threshold of hearing of a deaf person's ear, the other ear, or both ears, being subjected to a standardised noise in addition to the test sound.

noise level (*Acous.*). The same as *loudness level* (q.v.); applied to noise.

noise-meter (*Acous.*). Any form of meter which allows the operator to measure, either objectively or subjectively, the loudness of a specified sound on the phon scale.

See **objective—** **subjective—**

noiseless recording (*Acous.*). The practice of making the sound-track on a positive sound-film as dense as possible, consistent with the accommodation of the modulation, in order to keep the photographic noise level as far below the recorded level as possible.

noma (*Med.*). See **cancrum oris.**

nomeris'tic (*Zool.*). (Of metameric animals) having a definite number of somites.

nominal (*Textiles*). A term used in the cotton industry for a cloth that differs slightly from the quality particulars indicated.

nominal horse-power (*Eng.*). An obsolete method of rating steam-engines, devised by Watt;

based on a fixed mean effective pressure and piston speed.

nominal section (*Elec. Comm.*). A network which is equivalent to a section of transmission line, based on the assumption of lumped constants.

nomotagmo'sis (*Zool*). In metameric animals, the formation of definite regions (tagmata) of the body by the differentiation of a definite number of somites.

non-, nona- (*Chem.*). Containing nine atoms, groups, etc.

no'nane (*Chem.*). C_9H_{20}, a paraffin hydrocarbon; m.p. −51° C., b p. 150° C., sp. gr. 0·72.

non-association cable (*Elec. Eng.*). Cable which is not manufactured or designed in accordance with the standards of the Cable Makers' Association.

non-bearing wall (*Build.*). A wall carrying no load apart from its own weight.

non-cadu'cous (*Zool.*). See **indeciduate.**

non-coded call-indicator working (*Auto. Teleph.*). The direct operation of the display panel in a call indicator system by the original trains of impulses.

non-conjunction (*Cyt.*). The complete failure of synapsis.

non-directional microphone (*Acous*) A microphone which has a uniform polar response for all useful audio frequencies.

non-disjunction (*Cyt.*). Failure of two chromosomes to disjoin in meiosis.

non-dissipative network (*Elec. Comm.*). A network designed as if the inductances and condensers are free from dissipation, and constructed with components of minimum loss.

non-essential organs (*Bot.*). Sepals and petals.

non-ferrous alloy (*Met.*). See **alloy (non-ferrous).**

non-flam film (*Cinema*). See **safety film.**

non-inductive load (*Elec. Eng.*). See **non-reactive load.**

non-inductive resistor (*Elec. Eng.*). A resistor having a negligible inductance.

non-intermittent camera (*Photog.*). A cinematograph camera in which the film is in continuous motion, the separate images being formed by a train of lenses.

non-linear distortion (*Elec. Comm.*). That form of amplitude distortion in which alien tones are introduced by the non-linear response of part of a communicating system.

non-linear distortion factor (*Elec. Comm.*). The root of the ratio of the powers associated with the alien tones to the powers associated with the wanted tones in the output of a non-linear distorting device.

non-linear network (*Elec. Comm.*). A network in which the electrical elements are not all linear with varying current, as rectifying thermionic valves.

non-linear resistance (*Elec. Comm.*). Any device in which there is not a linear relation between the applied voltage and the consequent current—a special requirement in modulators and demodulators, such as thermionic valves and crystal and metal-oxide rectifiers.

non-locking key (or **relay**) (*Elec. Comm.*). A key (or relay) which returns to its unoperated condition when the hand is removed, or the current ceases, usually by the action of a spring, which is extended on operation. The key is said to *restore*, and the relay to *fall off.*

non-magnetic steel (*Elec. Eng.*). A steel, containing about 12% of manganese, which does not exhibit magnetic properties.

non-magnetic watch (*Horol.*). A watch so constructed that its performance is not affected by magnetic fields. Usually, the balance, balance spring, roller, and fork are made of a non-magnetic alloy.

non-medullated (*Zool.*). See **amyelinate.**

non-metal (*Chem.*). An element which readily forms negative ions, often in combination with other non-metals. Non-metals are generally poor conductors of electricity.

non-metallic inclusions (*Met.*). See **inclusions.**

non'oses (*Chem.*). A group of monosaccharoses, containing nine oxygen atoms in the molecule, e.g. $HO\ CH_2{\cdot}(CHOH)_7{\cdot}CHO$.

nonpareil, non-par-el' (*Typog.*). The old name for a type-size now standardised as 6-point.

non-polarised relay (*Elec. Comm.*). A relay in which there is no magnetic polarisation. The operation depends on the square of the current in the windings, and is therefore independent of direction.

non-reactive load (*Elec. Eng.*). A load in which the current is in phase with the voltage across its terminals.

non-sensibility (*Bot*). The ability of a plant to support the development of a parasite without showing marked signs of disease.

non-sequence (*Geol.*). A break in the continuity of the stratigraphical column, less important and less obvious than an unconformity, and deduced generally on palaeontological evidence.

non-slip or **non-skid** (*Build., Civ. Eng.*). A term applied to road, floor, or other surfaces specially prepared to minimise slipping tendencies.

non-speaking stop (*Acous.*). See **speaking stop.**

non-synchronous motor (*Elec. Eng.*). An a c motor which does not run at synchronous speed, e.g. an induction motor or an a.c. commutator motor. Also called ASYNCHRONOUS MOTOR.

non-tension joint (*Elec. Eng.*). A joint in an overhead transmission line conductor which is designed to carry full-load current but not to withstand the full mechanical tension of the conductor.

non-uniform flow (*Hyd.*). Flow in a channel when the water surface is not parallel to the invert.

non-valent (*Chem.*). See **zero-valent.**

non-vi'able (*Bot., Zool*). Incapable of surviving.

noon (*Astron.*). The instant of the sun's upper culmination at any place. See also **mean noon, sidereal noon.**

Nord'hausen sulphuric acid (*Chem.*). See **fuming sulphuric acid.**

nord'markite (*Geol.*). A type of quartz-bearing soda-syenite, described originally from Nordmarken in Norway; consists essentially of microperthites, aegirine, soda amphibole, and accessory quartz.

Norfolk (or **Canadian**) **latch** (*Join.*). A latch in which the fall bar is actuated within the limits of the keeper by a lifting lever passing through a slot in the door and operated by the pressure of the thumb at one end.

nor'ite (*Geol.*). A coarse-grained igneous rock of basic composition consisting essentially of plagioclase (near labradorite in composition) and orthopyroxene. Other coloured minerals are usually present in varying amount, notably clinopyroxene, which, however, must not exceed half of the total pyroxene content.

norm. The value of a quantity or of a state which is statistically most frequent.—(*Geol.*) The composition of an igneous rock expressed in terms of standard mineral molecules, calculated from the chemical analysis as stated in terms of percentages of oxides. Cf. *mode.*

normal (*Bot., etc.*). Quite ordinary in structure and all other respects.

normal (*Chem.*). Containing an unbranched chain of carbon atoms; e.g. *normal* propyl alcohol is $CH_3{\cdot}CH_2{\cdot}CH_2{\cdot}OH$, whereas the isomeric *iso*propyl alcohol, $(CH_3)_2{:}CH{\cdot}OH$, has a branched chain.

normal (*Maths., etc.*). The *normal* to a line or surface is a line drawn perpendicular to it.

normal (*Psychol.*). Said of one who is well adjusted to himself and to the outside world.

normal bend (*Elec. Eng.*). A section of conduit bent to a moderately large radius; used in an electrical installation for connecting two other pieces of conduit which are at right-angles to each other.

normal calomel electrode (*Chem.*). A calomel electrode containing normal potassium chloride solution.

normal electrode potential (*Chem.*). See **standard electrode potential.**

normal element (*Chem.*). A *standard cell* (q.v.).

normal fault (*Geol.*). A fracture in rocks along which relative displacement has taken place under tensional conditions, the *fault* (q.v.) hading to the downthrow side. Cf. *reversed fault.*

normal order of crystallisation (*Geol.*). A term which perpetuates a misconception. There is no generally applicable order of crystallisation, but for any particular rock the study of thin sections enables the observer to deduce the order in which the minerals *finished* crystallising. The order in many rocks is: accessories, mafic minerals in the order olivine, orthopyroxenes, clinopyroxenes, amphiboles, micas, overlapping with plagioclase, orthoclase, quartz; but there are many exceptions.

normal polarisation (*Radio*). The state of polarisation of an electromagnetic wave radiated from a vertical antenna, when measured on the ground at not too great a distance from the transmitter. The electric component is vertical, and the magnetic component horizontal.

normal salts (*Chem.*). Salts formed by the replacement by metals of all the replaceable hydrogen of the acid.

normal segregation (*Met.*). A type of segregation in which the content of impurities and inclusions tends to increase from the surface to the centre of cast metals. Of special importance in steel, in which phosphorus, sulphur, and oxide inclusions segregate in this way. See also **inverse segregation.**

normal sensitivity (*Elec. Eng.*). See **factor of merit.**

normal solution (*Chem.*). A solution made by dissolving the gram-equivalent weight of a substance in sufficient distilled water to make a litre of solution.

normal temperature and pressure (*Chem.*). See **N.T.P.**

normalising (*Met.*). A heat-treatment applied to steel. Involves heating above the critical range, followed by cooling in air. Is performed to refine the crystal structure and eliminate internal stress.

normality (*Chem.*). The concentration of a solution expressed in gram-equivalents of active material per litre of solution.

normally aspirated engine (*I.C. Engs.*). An unsupercharged or unboosted petrol or oil engine.

nor′moblast (*Zool.*). A stage in the development of an erythrocyte from an erythroblast when the nucleus has become reduced in size and the cytoplasm contains much haemoglobin.

nor′te (*Meteor.*). See **norther.**

north light roof (*Struct.*). A pitched roof with unequal slopes, of which the steeper is glazed and arranged to receive light from the north.

north pole (*Elec.*). See **pole.**

Northampton Sands (*Geol.*). A local group of sandstones containing ironstone beds; found in the Middle Jurassic strata of Northamptonshire.

norther or norte, nor′tā (*Meteor.*). A dry cold wind blowing from the north over the Gulf of Mexico, Valparaiso, or Table Bay.

Northern Lights (*Astron.*). See **Aurora Borealis.**

northing (*Surv.*). A north latitude.

Northrup furnace (*Elec. Eng.*). See **coreless induction furnace.**

Norton's theorem (*Elec. Comm.*). A source can be considered as a constant current generator, the current being equal to the short-circuit current, in parallel with an impedance which equals the source impedance. See **Thévénin's theorem.**

Norusto (*Paint.*). Trade-name for a preservative paint for iron surfaces.

Norwich Crag (*Geol.*). A group of sands, clays, and gravels found near Norwich and belonging to the Middle Pliocene Series.

Norwich (or **straight**) **tie** (*Weaving*). The tying up of the harness in a jacquard loom so that the jacquard machine and its card cylinder are parallel to the comberboard. See **London tie.**

nose dive (*Aero.*). See **dive.**

nose heaviness (*Aero.*). The state in which the combination of the forces acting upon an aircraft in flight is such that it tends to pitch downwards by the nose.

nose-key (*Join.*). One of the small wedges used in the operation of foxtail wedging.

nose ribs (*Aero.*) Small intermediate ribs, usually from the front spar to the leading edge only, of planes and control surfaces. They maintain the correct wing contour under the exceptionally heavy air load at that part of the aerofoil.

nose-ring (*Vet.*). A hinged ring for transfixing the nasal septum of bulls as a means of restraint.

nose-suspension (*Elec. Eng.*). A method of mounting a traction motor, by supporting one side of it on the axle and the other side on the framework of the truck.

no′sean or **no′selite** (*Min.*). Silicate of sodium and aluminium with sodium sulphate, crystallising in the cubic system. Occurs in extrusive igneous rocks which are rich in alkalies and deficient in silica, e.g. phonolite.

nosing (*Build.*). The exposed edge of the tread of a step, often rounded and projecting beyond the riser. See **line of nosings.**—(*Join.*) A bead on the edge of a board, making it half-round.

nosing motion (*Cotton Spinning*). A motion on the mule spinning frame which, as the diameter lessens, increases the speed of the tapering spindle on which a cop is being wound.

nosol′ogy (*Med.*). Systematic classification of diseases: the branch of medical science which deals with this.

nosopho′bia (*Med.*). Morbid fear of contracting disease.

Noss Series (*Geol.*). A group of flaggy sandstones and grey shales, of Upper Devonian age, found in Shetland and the island of Noss.

nostrils (*Anat., Zool.*). The external nares.

not (*Paper*). The unglazed, rough surface of drawing-papers which have not been highly pressed. Intermediate between *hot-pressed* and *rough.*

notch (*Carp.*). A groove cut in the side of one timber to receive the side of another timber.

notch (*Elec. Eng.*). A term often used to denote any of the various positions of a controller.

notch board (*Carp.*). A notched board carrying the treads and risers of a staircase.

notch brittleness (*Met.*). Susceptibility to fracture in the Izod or Charpy tests without absorbing much energy.

notch plate (*Civ. Eng.*). A vertical barrier, with a notch cut in its upper edge, placed across the current of a stream. Used as a means of gauging the flow over the notch by measurement of the head of water above it.

notch sensitivity (*Met.*). The extent to which the endurance of metals, as determined on smooth and polished specimens, is reduced by surface discontinuities, such as tool marks, notches, and changes in section, which are common features of actual components. It tends to increase with the hardness and endurance limit.

notch toughness (*Met.*). The energy in ft. lbs. required to break standard specimens under the standard conditions realised in the Izod or the Charpy test. It may also mean the opposite of *notch brittleness* (q.v.).

notched-bar test (*Met.*). A test in which a notched metal specimen is given a sudden blow by a striker carried by a pendulum or a falling weight and the energy absorbed in breaking the specimen is measured. Also called IMPACT TEST. See also **Izod test, Charpy test, Fremont test.**

notching (*Carp.*). The process of jointing timbers together by fitting one or both into a notch cut in the other.

notching (*Civ. Eng.*). The method of excavating cuttings for roads or railways in a series of steps worked at the same time.

notching adze (*Carp.*). An adze with a nearly straight cutting edge; used for cutting notches in timbers.

notching (or **linking**) **up** (*Eng.*). Movement of the gear-lever of a locomotive or steam-engine towards the centre of a notched quadrant, to decrease the valve travel and shorten the cut-off.

note (*Acous.*). An identifiable musical tone, whether pure or complex.

See **hum**— **strike**— **wolf**—*

note magnifier (*Radio*). An obsolete term for the audio-frequency amplifier following the detector in a radio receiver.

note tuning (*Radio*). A method of obtaining additional freedom from interference in a radio-telegraph receiver designed for the reception of spark or I.C.W. transmission; the post-detector circuits are tuned to the audio-frequency note of the transmitter.

Notgrove Freestone (*Geol.*). A limestone of Middle Jurassic age occurring in the Cotteswold Hills in Gloucestershire; has been much used for building purposes.

Nothe Beds (*Geol.*). A thin bed of sandstone of Upper Jurassic age found on the Dorset coast.

no'tochord (*Zool.*). In *Chordata*, skeletal rod formed of turgid vacuolated cells and originating from the endoderm of the mid-dorsal line of the archenteron.—*adj.* **notochor'dal.**

notocir'rus (*Zool.*). In *Polychaeta*, a cirrus borne by the notopodium.

notonec'tal (*Zool.*). Swimming in an inverted position with the ventral surface uppermost.

notopo'dium (*Zool.*). In *Polychaeta*, the dorsal lobe of a parapodium.

Notos'traca (*Zool.*). An order of mainly fresh-water *Branchiopoda* in which there is a broad shield-like carapace and a pair of sessile crescentic eyes; the second antennae are vestigial; there are very numerous pairs of trunk limbs; the caudal furca are long and jointed. Tadpole Shrimps.

no'tum (*Zool.*). The tergum of *Insecta.*—*adj.* **no'tal.**

nova (*Astron.*). A star which makes a sudden appearance in the sky, generally decreasing rapidly in brightness after its first outburst. Also called NEW STAR, TEMPORARY STAR.

Novachord (*Acous.*). An electronic musical instrument using a single keyboard, sustaining and swell pedals. Lever stops regulate the wave-form and envelope of the current applied to the loudspeaking radiators, the frequencies of the notes being divided by multivibrators from frequencies generated for the highest chromatic octave.

novac'ulite (*Geol.*). A fine-grained or crypto-crystalline rock composed of quartz or other forms of silica, with accessory feldspar or garnet. Used as a whetstone.

No'vocaine (*Chem.*). $H_2N{\cdot}C_6H_4{\cdot}CO{\cdot}O{\cdot}CH_2{\cdot}CH_2{\cdot}N(C_2H_5)_2, HCl$, the hydrochloride of diethylaminoethyl *p*-aminobenzoate. Colourless needles; m.p. 156° C.; a widely used local anaesthetic. A trade-name.

Novoid (*Build.*). Trade-name for a powder having a colloidal silica basis; used for making cement surfaces water-, oil-, and acid-proof.

Novolak (*Chem.*). Trade-name for the soluble, fusible, resinous products obtained by the condensation of phenols with formaldehyde.

nozzle. An outlet tube through which a discharge of fluid finally passes.

nozzle (*Eng.*). (1) In impulse turbines, specially shaped passages for expanding the steam, thus creating kinetic energy of flow with minimum loss.—(2) In oil engines, orifices, open or controlled by the injection valve, through which the fuel is sprayed into the cylinder. See also **convergent-divergent nozzle.**

N.P.D. (*Astron.*). See **polar distance.**

N.R.M.E. (*Build.*). Abbrev. for *notched, returned, and mitred ends.*

N.S. (*Astron., etc.*). Abbrev. for *New Style* (q.v.).

Nt (*Chem.*). The symbol for *niton.*

N.T.P. (*Chem.*). An abbrev. for *normal temperature and pressure*, i.e. 0° C. and 760 mm. of mercury.

N.T.S. Abbrev. for *not to scale*; used by draughtsmen on some drawings.

N.U. tone (*Teleph.*). See **number-unobtainable tone.**

Nubian Sandstone (*Geol.*). The basal member of the Cretaceous System in Egypt, deposited in the southern part of the Tethys. By its disintegration it has formed the great Libyan desert.

nucel'lar budding (or **embryony**) (*Bot.*). The formation of an embryo from cells of the nucellus and not from the fertilised egg.

nucel'lus (*Bot.*). A mass of thin-walled cells occupying the middle of an ovule, protected by the integument or integuments, and containing the embryo sac.

nu'chal (*Zool.*). Pertaining to, or situated on, the back of the neck.

nuchal bone (*Zool.*). In Sturgeons and their allies, a posterior unpaired membrane bone of the skull situated just behind the dermoccipital.

nuchal cartilage (*Zool.*). In some *Cephalopoda*, a thin plate of cartilage situated at the back of the neck.

nuchal flexure (*Zool.*). In developing Vertebrates, the flexure of the brain occurring in the hinder part of the medulla oblongata, which bends in the same direction as the primary flexure.

nuchal organ (*Zool.*). In *Polychaeta*, one of a pair of ciliated pits on the surface of the prostomium, believed to be olfactory in function: in branchiopod *Crustacea*, a group of sensory cells containing refractive bodies occurring on the upper side of the head, the function of which is unknown.

nuchal plate (*Zool.*). In *Chelonia*, the most anterior median plate of the carapace.

nuciv'orous (*Zool.*). Nut-eating.

nu'clear, nu'cleate, nucle'ic, nucle'iform. *Adjs.* from *nucleus.*

nuclear budding (*Cyt.*). Production of two daughter nuclei of unequal size by constriction of the parent nucleus.

nuclear chemistry (*Chem.*). The study of reactions in which new elements are produced.

nuclear division (*Cyt.*). See **mitosis, meiosis, amitosis.**

nuclear fragmentation (*Cyt.*). The formation of two or more portions from a nucleus by direct break up, and not by mitosis.

nuclear membrane (*Cyt.*). The delicate bounding membrane of the nucleus separating nucleoplasm from cytoplasm.

nuclear plate (*Cyt.*). The aggregation of chromosomes in the equatorial plane during mitosis or meiosis.

nuclear retic'ulum (*Cyt.*). A meshwork of delicate threads of chromatin seen in stained preparations of metabolic nuclei.

nuclear sap (*Cyt.*). See **karyolymph.**

nuclear spindle (*Cyt.*). The fusiform structure, composed of fine fibrils arranged longitudinally and converging at the poles, which appears in the cytoplasm of a cell surrounding the nucleus during mitosis and meiosis.

nuclear stain (*Micros.*). A stain which will pick out the nuclei in a tissue or organ in a different colour or shade.

nuclear symbols (*Chem.*). See **isotopic symbols.**

nu'cleases (*Chem.*). Enzymes inducing hydrolysis of nucleic acid.

nu'cleate (*Biol.*). Possessing a nucleus or nuclei. —(*Bot.*) An old term meaning *guttate.*

nuclei. *Pl.* of *nucleus.*

nuclei (*Met.*). Points at which crystals begin to grow during solidification. In general, they are minute crystal fragments formed spontaneously in the melt, but frequently non-metallic inclusions act as nuclei. See also **crystal nuclei.**

nucle'ic acid (*Chem.*). The acid component of nucleoproteins, from which it can be obtained by complete hydrolysis. It is a complex acid, composed of phosphate radicals, carbohydrates, and purine and pyrimidine bases.

nu'clein (*Chem.*). A product of the partial hydrolysis of nucleoproteins, consisting of a protein molecule attached to a molecule of nucleic acid.

nu'cleo- (Latin, *nucleus*). A prefix used in the construction of compound terms; e.g. *nucleomicrosome*, a microsome occurring within the nucleus.

nucleochyle'ma (*Cyt.*). See **nuclear sap.**

nucleohy'aloplasm (*Zool.*) See **nuclear sap.**

nu'cleolate (*Bot.*). Said of a spore which contains one or more conspicuous oil-drops.

nucleolin'i (*Cyt.*). Special particles occurring within the nucleolus which do not disappear during mitosis.

nucleo'lo-centrosome (*Cyt.*). A prominent deeply staining body found in the nucleus in some lower plants.

nucleo'lus (*Cyt.*). A homogenous spherical body occurring within a cell-nucleus.—*adj.* **nucleo'lar.**

nu'cleome (*Bot.*). The whole of the nuclear substance in a protoplast.

nu'cleoplasm (*Cyt.*). The dense protoplasm composing the nucleus of a cell. Cf. *cytoplasm.*

nucleoplas'mic ratio (*Cyt.*). The ratio between the volume of the nucleus and of the cytoplasm in any given cell.

nucleopro'teins (*Chem.*). A group of compounds containing a protein molecule combined with a nuclein. They are important constituents of the nuclei of living cells, e.g. blood corpuscles, yeast cells, etc., containing phosphoric acid. They are insoluble in water and in acids, but soluble in alkalis. On hydrolysis they yield a protein and a nuclein, and the latter yields on further hydrolysis a second protein and nucleic acid.

nucleus (*Astron.*). The term applied to the denser core of a tenuous body such as a comet, and to the starry condensations seen in gaseous nebulae.

nucleus (*Biol.*). The chief organ of the cell. It is a usually spheroidal cavity in the cytoplasm, bounded by a nuclear membrane and containing, bathed in nuclear sap, a complicated system of proteins disposed in the form of a network and/or of rounded nucleoli. This system of proteins appears to control the activities of the cell and to determine the transmission of inheritable characters when the nucleus divides.

nucleus (*Bot.*). (1) An old term for the nucellus.—(2) An old term for an oil-drop.—(3) See **centrum.**

nucleus (*Phys.*). The nucleus of an atom is thought to be positively charged and to contain practically all the mass of the atom. Its diameter is estimated at 10^{-13}-10^{-12} cm. It is probably composed of protons, electrons, and, perhaps, neutrons, the algebraic sum of whose charges equals the atomic number. See **atom, isotopes, Bohr theory.**

nucleus (*Zool.*). (1) Any nut-shaped structure.—(2) A nerve centre in the brain.—(3) In some *Hemimyaria*, a relatively small dark mass at the hinder end of the body, representing the oesophagus, stomach, and intestine.—(4) A collection of nerve cells on the course of a nerve or tract of nerve fibres.

nucleus pulpo'sus (*Zool.*). A gelatinous mass in the centre of an invertebral disc, representing the remnant of the notochord in the adults of higher Vertebrates.

Nu'da (*Zool.*). A subclass of *Ctenophora* the members of which do not possess tentacles.

nudation (*Bot.*). The formation, by natural or artificial means, of an area bare of plants.

nudibran'chiate (*Zool.*). Having the gills exposed, not within a branchial chamber.

nudicau'date (*Zool.*). Having the tail uncovered by fur or hair, as Rats.

nullip'ara (*Med.*). A woman who has never given birth to a child.—*adj.* **nullip'arous.**

nul'liplex (*Gen.*). Polyploid, but lacking the dominant of any given pair of allelomorphs.

number-unobtainable tone (*Teleph.*). The tone which is placed on a subscriber's line to indicate that the number demanded or dialled is not obtainable, either because it does not exist, or because, for the moment, there is an insufficiency of apparatus for connexion to be completed. Abbrev. **N.U. tone.**

numerical selector (*Auto. Teleph.*). One of the selectors which are controlled by impulses corresponding to the required number in the desired exchange, and not by the coded trains which are required for finding the exchange.

nummula'tion (*Zool.*). The tendency shown by erythrocytes to form rouleaux.

Nummulit'ic Limestone (*Geol.*). A thick bed of limestone, of Eocene age, composed mainly of foraminifera; stretches from the Alps through Persia to China.

nun's veiling (*Textiles*). A light-weight dress fabric, of plain weave, made from single Botany worsted yarns.

nu'natak (*Geol.*). An isolated mountain peak which projects through an ice sheet.

nuptial chamber (*Zool.*). The small burrow formed by a pair of sexual Termites initiating a new colony.

nuptial flight (*Zool.*). The flight of a virgin Queen Bee, during which she is followed by a number of males, copulation and fertilisation taking place in mid-air.

nurse (*Zool.*). A budding form in *Cyclomyaria.*

nurse balloon (*Aero.*). A balloon connected to another balloon or airship while grounded, to stabilise the gas pressure therein, or to act as a reservoir.

nurse cells (*Zool.*). Cells surrounding, or attached to, an ovum, probably to perform a nutritive function.

Nust (*Paint.*). Trade-name for a preservative paint for iron surfaces.

nut (*Bot.*). A hard, dry, indehiscent fruit formed from a syncarpous gynaeceum, and usually containing one seed. The term is used loosely for any fairly-large to large hard, dry, one-seeded fruit.

nut (*Eng.*). A metal collar, screwed internally, to fit a bolt; usually hexagonal in shape, but sometimes square or round.

See **castle—** **lock—**

nut (*Typog.*). See **en quad.**

nut-galls (*Chem.*). See **Aleppo galls.**

nu'tant (*Bot.*). Hanging with the apex downwards; nodding.

nutation (*Astron.*). A relatively short-period fluctuation in the precessional movement of the earth's pole about the pole of the ecliptic, by which the true celestial pole differs from its mean place by an amount resolved into two components, called respectively *nutation in longitude* and *nutation in obliquity.*

nutation (*Bot.*) The rotation in space of the apex of an axis which is growing in length.

nutlet (*Bot.*). A one-seeded portion of a fruit which fragments as it matures.

nu'tricism (*Zool.*). Any association between two animals which is beneficial to one partner only.

nutrient (*Med.*). Conveying, serving as, or providing nourishment. Nourishing food. For NUTRIENT ENEMA, see **enema.**

nutrient solution (*Bot.*). An artificially prepared solution containing some or all of the mineral substances used by a plant in its nutrition.

nutrition (*Zool.*). The process of feeding and the subsequent digestion and assimilation of food-material.—*adj.* **nu'tritive.**

N.V.M. (*Chem.*). An abbrev. for *non-volatile matter.*

N.W. (*Build.*). An abbrev. for *narrow widths.*

nyctalo'pia (*Med.*). Night blindness; moon blindness. Abnormal difficulty in seeing objects in the dark; due often to deficiency of vitamin A in the diet.

nyc'tanthous (*Bot.*). Said of flowers which open at night.

nyctinas'tic movements (*Bot.*). Movements of plants associated with the alternation of day and night, due to changes in temperature and illumination; sleep-movements.

nyctipelagic, —aj'ik (*Zool.*). Found in the surface waters of the sea at night only.

nyctitrop'ic (*Bot.*). A term referring to the position assumed by leaves, etc., at night.

nymph (*Zool.*). In *Acarina,* the immature stage intervening between the period of acquisition of four pairs of legs and the attainment of full maturity: in *Insecta,* a young stage of *Exopterygota* intervening between the egg and the adult, and differing from the latter only in the rudimentary condition of the wings and genitalia.

nym'phae (*Zool.*). See **labia minora.**

nystag'moid (*Med.*). Resembling nystagmus.

nystag'mus (*Med.*). An abnormal and involuntary to-and-fro movement of the eyeballs.

o- (*Chem.*). An abbrev. for *ortho-*, i.e. containing a benzene nucleus substituted in the 1.2 positions.

ω (*Chem.*). A symbol for specific magnetic rotation.

ω- (*Chem.*). A symbol indicating: (1) substitution in the side chain of a benzene derivative; (2) substitution on the last carbon atom of a chain, farthest from a functional group.

ω (*Elec. Comm., Elec. Eng., etc.*). The most frequently used symbol for *radian frequency* or *pulsatance*, i.e. frequency $\times 2\pi$.

② (*Build.*). Abbrev. for *two coats in oil.*

O (*Chem.*). The symbol for *oxygen.*

O- (*Chem.*). A symbol indicating that the radical is attached to the oxygen atom.

—Ω (*Chem.*). A symbol for the ultimate disintegration product of a radioactive series, an isotope of lead.

oak (*Timber*). A strong, tough, and heavy hardwood, very durable in exposed positions. Commonly used in constructional work for timber bridges, dock gates, heavy framing, piles, as well as for joinery.

oakum (*Plumb.*). Untwisted rope or hemp used for caulking joints.

oast (*Build.*). A hop-drying kiln.

oatmeal cloths (*Textiles*). Fabrics having a resemblance to oatmeal and a rough appearance; made with a crêpe type of weave from crossbred worsted yarns.

O.B. (*Elec. Comm.*). Abbrev. for *outside broadcast.*

ob- (*Bot.*). Prefix meaning *reversed, turned about.* Thus, *obclavate* is reversed *clavate*, i.e. attached by the broad and not the narrow end.

Obach cell, ŏ'bahh (*Elec. Eng.*). A dry primary cell having ingredients similar to the Leclanché cell—i.e. a carbon positive electrode surrounded by a depolariser of manganese dioxide paste—and having the electrolyte in the form of a paste of salammoniac, plaster of Paris, and flour.

Obach process (*Gutta Percha*). A process for deresinating raw gutta-percha; the solvent is lythene, a low-boiling fraction of petroleum.

obcompressed (*Bot.*). Flattened from front to back.

obcon'ic, obcon'ical (*Bot.*). Cone-shaped but attached by the point.

obdiplostem'onous (*Bot.*). Having two whorls of stamens, the members of the outer whorl placed opposite to the petals and not alternating with them.

obelisk (*Arch.*). A slender stone shaft, generally monolithic, square in section, and tapering towards the top, which is surmounted by a small pyramid.

O'bernetter's process (*Photog.*). The production of an intaglio copper plate by applying a film containing a silver chloride image, with subsequent electrolysis.

object glass or **objective** (*Light*). That lens in an optical instrument which is directed towards the object to be observed, of which it serves to form an image which may be examined with the eyepiece.

objective noise-meter (*Acous.*). A noise-meter in which the noise-level to be measured operates a microphone, amplifier, and detector, the last-named indicating the noise-level on the phon scale. The apparatus is previously calibrated with known intensities of the reference tone, 1000 cycles per second, suitable weighting networks and an integrating circuit being incorporated in the amplifier to simulate the relevant properties of the ear in appreciating noise.

objective prism (*Astron.*). One of the forms of prism spectroscope in which the prism is placed in front of instead of behind the objective, the light from the star passing through the prism and being drawn out into a spectrum without the use of a slit; hence the alternative term for this instrument, SLITLESS SPECTROSCOPE.

oblate. Globose, but noticeably wider than long.

obligate (*Bot., Zool.*). Compelled; without the power of choice of mode of life; as an *obligate* parasite, which is incapable of leading a free-living existence. Cf. *facultative.*

obligate saprophyte (*Biol.*). An organism which lives on dead organic material and cannot attack a living host.

oblique aerial photograph (*Surv.*). A photograph taken from the air, for purposes of aerial survey work, with the optical axis of the camera inclined from the vertical, generally at some predetermined angle.

oblique arch (*Civ. Eng.*). An arch whose axis is not normal to the face.

oblique division (*Bot.*). The development of a septum which is neither parallel to the longitudinal axis of the cell nor across it at right-angles.

oblique joint (*Carp., etc.*). An angle joint between pieces which are not mutually at right-angles.

oblique offset (*Surv.*). The horizontal distance measured to a point from a main survey line in a direction which is not at right-angles to the latter.

oblique plane (*Bot.*). Any plane of a flower other than the median and lateral planes.

oblique system (*Crystal.*). See **monoclinic system.**

obliquity of the ecliptic (*Astron.*). The angle at which the earth's orbital plane, or the ecliptic, is inclined to the earth's equatorial plane, or the celestial equator; it amounts to 23° 27′ 8·26″ and is very slowly decreasing.

obliquus, ob-lē'kwus (*Zool.*). An asymmetrical or obliquely placed muscle.

obliterating paint (*Paint.*). A special dense *flatting* (q.v.) used over a primary coat to give a ground for a final coat of glossy paint or enamel.

obliteration (*Bot.*). The crushing and closing up of tubular elements within a plant by the pressure set up by new elements as they develop.

obliterative coloration (*Zool.*). A type of coloration shown by many animals that are usually subject to light striking them from above; the upper parts of the body are dark-coloured (to counteract the greater intensity of light on those parts), and shade gradually into the light-coloured lower parts.

oblong (*Bot.*). Elliptical, blunt at each end, having nearly parallel sides, and two to four times as long as broad.

O.B.M. (*Surv.*). Common abbrev. for *Ordnance Bench Mark.*

ob'ovate' (*Bot.*). Having the general shape of the longitudinal section of an egg, not exceeding twice as long as broad, and with the greatest width slightly above the middle; hence, attached by the narrower end.

ob'ovoid' (*Bot.*). Solid, egg-shaped, and attached by the narrower end.

obscuration (*Paint.*). The area which a given quantity of paint will cover without thinning unduly.

obscure (*Bot.*). Said of venation which is very little developed, so that hardly more than the midrib can be seen.

obscured glass (*Build.*). Glass which is so treated as to render it not transparent.

obsession (*Psycho-path.*) The morbid persistence of an idea in the mind, against the wish of the obsessed person.

obsessional neurosis (*Psycho-path.*). A functional nervous disorder characterised by a need to perform routine patterns of behaviour, in an attempt to solve the strong underlying unconscious conflicts—e.g. repeated handwashing, repeated confirmation of locked doors, ceremonial routines performed periodically each day. A high degree of doubt is present about everything in the minds of those individuals. This neurosis arises from an emotional arrest at a pregenital anal phase of development, and shows the corresponding character traits. See **anal-erotic individual, anal-sadistic.**

obsid'ian (*Geol.*). A volcanic glass of granitic composition, generally black with vitreous lustre and conchoidal fracture; occurs at Mt. Hecla in Iceland, in the Lipari Isles, and in the Yellowstone Park, U.S.A. A green silica glass found in ploughed fields in Moravia is cut as a gemstone and sold under the name *obsidian*. True obsidian is used as a gemstone and is often termed ICELAND AGATE.

obstetrician. A medically qualified person who practises obstetrics.

obstetrics. That branch of medical science which deals with the problems and management of pregnancy and labour.

obstipation (*Med.*). Severe and intractable constipation.

ob'struent (*Med.*). Obstructing: that which obstructs: an astringent drug.

obtect (*Zool.*). Said of pupae which have the wings and legs glued to the body and which are therefore incapable of movement.

obturation (*Artillery*). The method used for preventing the escape of gas to the rear when firing. It is achieved by the cartridge case in Q.F. guns and by an asbestos pad in B.L. guns.

ob'turator (*Zool.*). Any structure which closes off a cavity; e.g. all the structures which close the large oval foramen formed by the ischio-pubic fenestra: the foramen itself.

obturator fissure (*Zool.*). In Birds, a space between the ischium and the pubis which serves for the passage of the obturator nerve and corresponds to the obturator foramen in Mammals.

obtu'silin'gual (*Zool.*). Having a short blunt tongue.

obvol'vent (*Zool.*). Folded downwards and inwards, as the wings in some Insects.

occasional species (*Bot.*). A species which is found from time to time in a given plant community but is not a regular member of that community.

occidental topaz (*Min.*). A trade name for certain yellow-coloured varieties of quartz used as semi-precious gemstones. See also **Spanish topaz.**

occipital, ok-sip'— (*Zool*). A bone of the Vertebrate skull, one of the *occipitalia* (q.v.): pertaining to the occiput.

occipita'lia (*Zool.*). A set of cartilage bones forming the posterior part of the brain-case in the Vertebrate skull.

oc'ciput (*Zool.*). In Insects, the part of the epicranium between the vertex and the neck: the occipital region of the Vertebrate skull forming the back of the head.—*adj.* **occipital.**

occlusion (*Bot.*). The blocking of a stoma by the ingrowth of parenchymatous cells into the sub-stomatal cavity.—(*Zool.*) Closure of a duct or aperture.

occlusion (*Chem.*). The retention of a gas or a liquid in a solid mass or on the surface of solid particles; especially the retention of gases by solid metals.

occlu'sor (*Zool.*). A muscle which by its contraction closes an operculum or other movable lid-like structure.

occultation (*Astron.*). The hiding of one celestial body by another interposed between it and the observer, as the hiding of the stars and planets by the moon, or the satellites of a planet by the planet itself.

occupancy (*Teleph.*). The fraction of time during which a circuit or switch is occupied in passing calls.

ocean. Any of the major expanses of salt water on the face of the globe.

ocean depths. The greatest depth (over 10,400 metres) discovered in the various oceans lies in the Pacific; depths of over 8500 metres and 7000 metres have been recorded in the Atlantic and the Indian Ocean respectively.

ocean temperatures. The mean surface temperature of the Pacific and Atlantic Oceans is 17° C.; that of the Indian Ocean 18° C. Maximum temperatures are respectively 32° C., 30° C., and 35° C.

o'ceanite (*Geol.*). A type of basaltic igneous rock occurring typically in the oceanic islands as lava flows; characterised by a higher percentage of coloured silicates (olivine and pyroxene), and a lower percentage of alkalies, than in normal basalt.

ocel'late (*Bot.*). Marked by a round patch different in colour from the ground.

ocel'lus (*Bot*). (1) An enlarged discoloured cell in a leaf.—(2) A swelling on the sporangiophore in some fungi; it may be able to perceive light.

ocellus (*Zool.*). A simple eye or eye-spot in *Invertebrata*: an eye-shaped spot or blotch of colour —*adj.* **ocel'late.**

ocher (*Paint.*). See **ochre.**

ochlopho'bia (*Med.*). Morbid fear of crowds.

ochra'ceous, o'chreous, o'chery (*Bot.*). Yellowish-brown.

ochre, ocher (*Paint.*). A natural earth pigment which mixes with clay and stains it yellow. The dried and ground clay is mixed with linseed oil or water to form paint.

och'rea, oc'rea (*Bot.*). A cup-shaped structure around a stem, formed from united stipules or united leaf bases.

ochroleu'cous (*Bot.*). Yellowish-white.

ochrono'sis (*Med.*). A rare condition in which a dark-brown or black pigment is deposited in the cartilages and other tissues of the body; associated often with alkaptonuria (in which homogentisic acid is present in the urine), and sometimes following the prolonged use of dressings of carbolic acid.

och'rophore (*Zool.*). See **xanthophore.**

ochrospo'rous (*Bot.*). Having yellow or yellow-brown spores.

octa- (*Chem.*). Containing eight atoms, groups, etc.

octahe'dral sulphur (*Chem.*). A crystalline form of sulphur which is octahedral in shape.

octahedral system (*Crystal.*). See **cubic system.**

octahedrite (*Min.*). A form of *anatase* (q.v.), crystallising in tetragonal bipyramids (*not* in octahedra—thus the name is a misnomer). It is usually of secondary origin, derived from other titanium-bearing minerals.

octahedron (*Crystal.*). A form of the cubic system which is bounded by eight similar faces, each being an equilateral triangle with plane angles of 60°.—*pl.* **octahedra.**

octam'erous (*Bot.*). Having parts in eights.

octane (*Chem.*). C_8H_{18}, a paraffin hydrocarbon.

There are eighteen compounds of this formula. The normal octane, a colourless liquid, b.p. 126° C., sp. gr. 0·702 at 20°, is found in petroleum. It has been synthesised.

octane number (*I.C. Engs.*). The percentage, by volume, of *iso*-octane (2,2,4-trimethylpentane) in a mixture of *iso*-octane and *normal* heptane which has the same knocking characteristics as the motor fuel under test; it serves as an indication of the knock-rating of a motor fuel.

octant division (*Bot.*). The division of an embryonic cell by walls at right-angles, giving eight cells.

octastyle (*Arch.*). A building having a colonnade of eight columns in front.

octava′lent (*Chem.*). Capable of combining with eight atoms of hydrogen or their equivalent.

octa′vo (*Print.*). A book having sixteen pages to the sheet; written 8*vo*.

octet (*Chem.*). An extremely stable group of eight electrons, formed in most cases of combination between atoms.

octode (*Thermionics*). A thermionic valve containing a cathode, anode, and six intermediate electrodes, used as a frequency changer in superheterodyne receivers. The first three electrodes, starting from the cathode, form the local oscillator system, and the remaining five constitute a pentode system whose emission varies at the frequency of the local oscillator.

octodecimo or **eighteenmo** (*Print.*). A book having thirty-six pages to the sheet; written 18*vo*.

octopod (*Zool.*). Having eight feet, arms, or tentacles.

Octop′oda (*Zool.*). An order of *Dibranchia* having eight normal arms, sessile suckers, no internal shell, and no lateral fins; living in crevices of rocks; carnivorous forms. Octopus.

oc′toses (*Chem.*). A group of monosaccharoses, containing eight oxygen atoms in the molecule; e.g. $HO \cdot CH_2 \cdot (CHOH)_6 \cdot CHO$.

octospo′rous (*Bot.*). Containing eight spores.

oc′tuple phantom circuit (*Teleph.*). A telephonic channel using two quadruple phantoms in parallel for both go and return speech channels.

ocul-, oculo- (Latin *oculus*, eye). A prefix used in the construction of compound terms; e.g. *oculo-nasal*, pertaining to the eye and to the nose.

oc′ular. An *eyepiece* (q.v.).

ocular (*Zool.*). Pertaining to the eye: capable of being perceived by the eyes.

ocular plates (*Zool.*). In *Echinoidea*, small plates occurring at the aboral end of each radius or ambulacral area.

ocular sclerites (*Zool.*). Annular sclerites surrounding the compound eye of each side in Insects.

oc′ulate (*Zool.*). Possessing eyes: having markings which resemble eyes.

oculist (*Med.*). One skilled in the knowledge and treatment of diseases of the eye.

o′culomo′tor (*Zool.*). Pertaining to, or causing movements of, the eye: the third cranial nerve of Vertebrates, running to the muscles of the eyeball.

oculus (*Build.*). A round window.

odd-side (*Moulding*). A cope rammed-up with a flat joint, to take the place of a *turn-over board* (q.v.), or rammed with dry sand, the parting joint made, and stoved, to act as a semi-permanent means of forming the joint on the drag, which is rammed-up on it.

odom′eter (*Ocean.*). A recording sheave used with line and weight sounders and other machines when it is necessary to know how much warp or wire has been paid out.—(*Surv.*) See **perambulator.**

Odona′ta (*Zool.*). An order of large- or medium-sized *Exopterygota* having two pairs of equal or subequal membranous wings; the antennae are small and inconspicuous but there is a pair of large compound eyes; the mouth-parts are adapted for biting; many species are brilliantly coloured; the immature forms are active, aquatic, and carnivorous, and usually show some adaptation for air-breathing. Dragon-flies, Damsel-flies.

odontal′gia (*Med.*). Toothache.

odon′tic (*Anat.*). Pertaining to the teeth.

odon′toblast (*Zool.*). A dentine-forming cell, one of the columnar cells lining the pulp-cavity of a tooth.

odon′toclast (*Zool.*). A dentine-destroying cell, one of the large multinucleate cells which absorb the roots of the milk-teeth in Mammals.

odontogeny, —toj′en-i (*Zool.*). The origin and development of teeth.

odon′tograph (*Eng.*). An approximate but practical method of setting out the profiles of involute gear-teeth, in which a pair of circular arcs is substituted for the true involute curve.

odon′toid (*Bot., Zool.*). Tooth-like.

odontoid process (*Zool.*). A process of the anterior face of the centrum of the axis vertebra which forms a pivot on which the atlas vertebra can turn.

odon′tolite (*Min.*). See **bone turquoise.**

odonto′ma. A term applied to any one of a variety of tumours that arise in connexion with the teeth.

odon′tophore (*Zool.*). The radula apparatus of *Mollusca*, comprising the radula, radula sac, and associated muscles and cartilages.

odontosto′matous (*Zool.*). Having jaws which bear teeth.

odorim′etry (*Chem.*). The measurement of the intensity and permanency of odours.

odor′iphore (*Chem.*). A group of atoms which confer an odour on a compound.

oedema or **edema,** *both* ē-dē′ma (*Bot.*). A large mass of unhealthy parenchyma.

oedema (*Med.*). Dropsy. Pathological accumulation of fluid in the tissue spaces and serous sacs of the body; sometimes the term is restricted to such accumulation in tissue spaces only. See also **Milroy's disease.**

oede′matous (*Med.*). Affected by oedema.

Oedipus complex (*Psycho-an.*). A Freudian name for a complex, present in all boys at an early age (often persisting into adult life), characterised by an unconscious rivalry for the mother's love, resulting in hostility to the father. Named from a circumstance in the legend of the Greek hero Oedipus. Cf. *Electra complex.*

oenan′thal (*Chem.*). Oenanthic aldehyde or *normal* heptylic aldehyde, $C_6H_{13} \cdot CHO$.

oe′nocytes (*Zool.*). In Insects, certain usually large cells which occur in groups in the pleural region of the abdomen; they are of ectodermal origin, and are believed to be ductless glands, secreting enzymes or hormones into the blood.

oe′nocytoids′ (*Zool.*). Rounded cells with homogenous acidophile protoplasm which do not exhibit phagocytosis, occurring in the haemolymph of Insects.

oersted, ėr′sted (*Elec. Eng.*). The name given to the c.g.s. electromagnetic unit of magnetising force. The name was at one time suggested (and is occasionally used) for the unit of reluctance.

oesophagec′tasis, oesophagecta′sia (*Med.*). Pathological dilatation of the oesophagus.

oesophagec′tomy (*Surg.*). Surgical removal of the oesophagus or part of it.

oesophagis′mus (*Med.*). See **achalasia of the cardia.**

oesophagi′tis (*Med.*). Inflammation of the oesophagus.

oesoph′agoscope (*Surg.*). An instrument for viewing the interior of the oesophagus.

oesoph'agospasm (*Med.*). See **achalasia of the cardia.**

oesoph'agosteno'sis (*Med.*). Pathological constriction of any part of the oesophagus.

oesophagostomi'asis (*Med.*). Infestation of the intestine with nematode worms of the genus *Oesophagostomum*; occurs in the tropics.

oesophago'stomy (*Surg.*). The surgical formation of an artificial opening into the oesophagus.

oesophagot'omy (*Surg.*). Surgical incision into the oesophagus.

oesoph'agus, esoph'agus (*Zool.*). In Vertebrates, the section of the alimentary canal leading from the pharynx to the stomach; usually lacking a serous coat and digestive glands; the corresponding portion of the alimentary canal in *Invertebrata.* —*adj.* **oesopha'geal.**

oestri'asis (*Vet.*). Infection of the nostrils of sheep and goats by the larvae of the sheep-nasal fly *Oestrus ovis.*

Oes'trin (*Physiol.*). A proprietary term denoting the follicular hormone *oestradiol** (q.v.).

oes'trogen, oes'trone (*Physiol.*). See Supplement.

oestroma'nia (*Vet.*) Nymphomania of animals.

oestrous cycle (*Physiol.*). In female Mammals, the succession of changes in the genitalia commencing with one oestrous period and finishing with the next.

oestrus, oestrum (*Zool.*). In female Mammals, the period of sexual desire and acceptance of the male occurring between prooestrum and metoestrum: more generally, the period of sexual desire.—*adj.* **oestral.**

office, central (*Teleph.*). See **central office.**

official, officinal, —fis'in-al (*Bot*). Used in medicine.

off colour (*Gems*). See under **first water.**

off-lap (*Geol.*). The dispositional arrangement of a series of conformable strata laid down in the waters of a shrinking sea, or on the margins of a rising landmass, so that the successive strata cover smaller areas than their predecessors. Cf. *overlap.*

off-peak load (*Elec. Eng.*). Load on a generating station or power supply system taken at times other than the time of the system peak load; e.g. during the night.

offset (*Bot.*). See **stolon.**

offset (*Build.*). A ledge formed at a place where part of a wall is set back from the general face of the wall.

offset (*Print.*). (1) A synonym for *set-off* (q.v.).—(2) Abbrev. for *offset printing.*

offset (*Surv.*). The horizontal distance measured to a point from a main survey line, in a direction at right-angles to the latter.

offset printing (*Print.*). A process in which the ink impression from a lithographic plate is received upon a rubber surface from which it is transferred to paper. The resilient rubber makes perfect contact even with paper of rough surface. Also called LITHO-OFFSET, OFFSET-LITHO.

offset rod (*Surv.*). A wooden pole painted in bands of different colours, each band being one foot or one link long so that the pole may be used for the measurement of short distances.

offset scale (*Surv.*). An instrument used in plotting detail from field notes of *offsets* (q.v.). It consists of a short graduated scale, often with its zero in the middle of the length.

offset tone-arm (*Acous.*). In a gramophone-record reproducer, a tone-arm which has been bent in order to minimise the effect of the arc which the needle normally traverses, as compared with the radial motion of the stylus which originally cut the track as a record.

off-shore dock (*Civ. Eng.*). A form of *self-docking dock* (q.v.) built in two equal-length sections of L-shaped end elevation, the side wall being connected to the shore by girders hinged at each end. Self-docking is effected by carrying one section in the lap of the other.

off-take lad (*Mining*). See **shackler.**

off the line (*Cinema.*). See under **on the line.**

O.F.H.C. (*Met.*). See **blister copper.**

O.G. (*Build.*). Abbrev. for *ogee.*

Ogden's method (*Chem.*). A method for estimating albumen in the urine, based on the appearance of a precipitate between the albuminous solution and concentrated nitric acid.

o'gee (*Arch.*). See **cyma.**

ogee arch (*Arch*). A pointed arch of which each side consists of a reverse curve.

oge'val arch (*Arch.*). An *ogee arch* (q.v.).

Ohio Shale (*Geol.*). Black shale formed in the Upper Devonian sea in Ohio, Michigan, and parts of Pennsylvania, and lying immediately beneath the basal members of the Mississippian System.

ohm (*Elec. Eng.*). The practical unit of resistance of an electrical circuit.

See **B.A.—** **legal—** **true—**
international— **thermal—**

Ohm's law (*Elec. Eng.*). The law governing the flow of a steady current in an electric circuit. It states that the voltage drop produced by the current is proportional to the magnitude of the current. Voltage divided by current defines resistance, which is constant with invariant temperature, except in special materials (see **Varistor**).

ohmic drop (*Elec. Eng.*). Voltage drop caused in a circuit owing to the current passing through the ohmic resistance of a circuit.

ohmic loss (*Elec. Eng.*). Loss in an electric circuit caused by the current passing through its resistance; equal to I^2R watts.

ohmic resistance (*Elec. Eng.*). See **d.c. resistance.**

ohm'meter (*Elec. Eng.*) An indicating instrument for giving a direct reading of the resistance of an electric circuit.

-oid (*Bot.*). Suffix meaning ***resembling, imitating.***

oidiomyco'sis, ō-id'— (*Vet.*). An infection of the mucous membrane of the mouth or crop of birds by the fungus *Oidium albicans.*

oidium, ō-id'i-um (*Bot*). One of a number of similar spores formed in a chain by the development of transverse septa in a hypha and the subsequent separation of the spores across the septa.

oik'oplast (*Zool.*). In *Larvacea*, one of the glandular ectoderm cells by which the test or capsule is secreted.

oils (*Chem.*). A group of neutral liquids comprising three main classes: (1) *fixed* (*fatty*) *oils*, from animal, vegetable, and marine sources, consisting chiefly of glycerides and esters of fatty acids; (2) *mineral oils*, derived from petroleum, coal, shale, etc., consisting of hydrocarbons; (3) *essential oils*, volatile products, mainly hydrocarbons with characteristic odours, derived from certain plants.

oils (*Diel.*). (As used in transformers, cables, switchgear.) See B.S.S. 148, 1933. Class A oils have a maximum sludge of 0·1% and may be used in transformers above 80° C. and in oil-switches above 70° C. Class B oils have a maximum of 0·8% and may be used in transformers up to 75° C.

oil absorption (*Chem.*). (A term usually applied to pigments.) The amount of linseed oil a pigment will absorb to reach a given consistency as determined by certain standards.

oil-blast circuit-breaker (*Elec. Eng.*). A form of oil circuit-breaker in which pressure set up by the gases produced as a result of the arc causes a blast of oil across the contact space, which ensures rapid extinction of the arc.

oil body (*Bot.*). A rounded mass of oily material occurring in the cell contents of many *Hepaticae.*

oil-break (*Elec. Eng.*). A term applied to switches, circuit-breakers, fuses, etc. to indicate that the circuit is opened under oil.

oilcloth. A waterproof material obtained by impregnating a cotton fabric with oxidised linseed or other oils. This process is performed in special oxidising chambers, under the action of heat. Transparent silk fabrics impregnated with oxidised oils are called *oilsilk*, and material with a cotton base *oiled cotton*. They are used for garments and as electrical insulating materials.

oil-cooled (*Eng., etc.*). Said of apparatus that is immersed in oil to facilitate cooling.

oil cooler (*I.C. Engs.*). A small air-cooled radiator used in aircraft and racing cars for cooling the lubricant after its return from the engine and before delivery to the oil tank.

Oildag (*Chem.*). Trade-name for a colloidal dispersion of graphite in oil, used for lubricating purposes; the graphite decreases the surface tension of the oil, thereby facilitating its flow and increasing its lubricating qualities. See **Aquadag.**

oil drop (*Bot.*). Any small droplet of oily substance included in the cytoplasm.

oil engines (*I.C. Engs.*). See **compression-ignition engines.**

oil-filled cable (*Cables*). This has a central duct, formed by an open spiral of steel tape, through which oil is fed to the cable. Gaseous voids and the consequent ionisation are thus eliminated. Used up to the highest voltages (220 kV). Development is due to Emanueli.

oilgas (*Chem.*). A gas of high calorific value, obtained by the destructive distillation of high-boiling mineral oils. It consists chiefly of methane, ethylene, acetylene, benzene, and higher homologues.

oil gland (*Zool.*). The preen gland or uropygial gland of Birds, a cutaneous gland forming an oil secretion used in preening the feathers.

oil hardening (*Eng.*). The hardening of cutting tools, etc., of high carbon content by heating and quenching in oil, resulting in a cooling less sudden than is effected by water, and reduced risk of cracking.

oil-hardening steel (*Met.*). Alloy steel which can be hardened by cooling in oil instead of in water. A typical example is carbon 0·3%, nickel 3·0%, and chromium 0·75%.

oil-immersed (*Elec. Eng.*). Said of electrical apparatus which is immersed in oil. See **oil-break, oil-cooled, oil-insulated.**

oil-impregnated paper (*Diel.*). Used for low and high voltage cables; the oil has resin in it to increase viscosity at working temperatures.

oil-insulated (*Elec. Eng.*). Said of electrical apparatus which is immersed in oil in order to facilitate its insulation.

oil-less circuit-breaker (*Elec. Eng.*). A circuit-breaker which does not use oil either as the quenching medium or for insulation purposes. See **air-blast circuit-breaker, expansion circuit-breaker.**

oil of bitter almonds (*Chem.*). See **bitter almond oil.**

oil of cloves (*Chem.*). See **cloves oil.**

oil of mirbane (*Chem.*). A commercial name for *nitrobenzene*.

oil of turpentine (*Dec.*). See **turpentine.**

oil of vitriol (*Chem.*). An old name for *sulphuric acid*.

oil paints. Pigments, with or without fillers, ground in oil as a vehicle or medium.

oil-pigment process (*Photog.*). The application of oil-pigment to a developed bichromate matrix by dabbing while moist.

oil-poor circuit-breaker (*Elec. Eng.*). A circuit-breaker which employs a very much smaller quantity of oil (about 10%) than an ordinary oil circuit-breaker. Certain types of impulse and expansion breakers are classed under this heading.

oil pressure relief valve (*Eng.*). A spring-loaded valve in the delivery side of a forced lubrication system, for relieving the pressure on the oil pump when the oil is cold and unduly viscous.

oil proofing (*Build.*). The process of making cement surfaces acid-resistant.

oil pump (*I.C. Engs.*). A small auxiliary pump, driven from an engine crankshaft, which forces oil from the sump or oil tank to the bearings; often of the gear type. See **gear pump.**

oil-quenched fuse (*Elec. Eng.*). A liquid-quenched fuse having oil as the quenching medium.

oil rectifier (*Automobiles*). An exhaust-heated still sometimes fitted in the oil-circulation system, through which the lubricant is pumped to remove fuel contamination.

oil ring (*I.C. Engs.*). A *scraper ring* (q.v.).

oil-shale (*Geol.*). One of the argillaceous rocks of sedimentary origin containing diffused hydrocarbons in a state suitable for distillation into paraffin and other mineral oils by the application of heat. See **shale oils.**

Oil Shale Group (*Geol.*). The middle division of the Lower Carboniferous rocks of the Midland Valley of Scotland, comprising several thousand feet of shales (including some which yield oil on destructive distillation), non-marine limestones, valuable coal-seams, and thick sandstones. It overlies the Cementstone Group and is succeeded by the so-called Carboniferous Limestone Series (of Scotland).

oilsilk. See under **oilcloth.**

oil sink (*Horol.*). The spherical recess around a pivot hole in a watch or clock plate. Its purpose is to act as a reservoir for the oil.

oil slip (*Carp., Join., etc.*). A small, shaped piece of oilstone used for putting an edge on gouges.

oilstone. A smooth stone used to impart a fine keen edge to a cutting tool, for which purpose it is first moistened with oil.

oil sump (or **pan**) (*I.C. Engs.*). The lower part of the crankcase of an automobile engine, which acts usually as an oil reservoir.

oil-switch (or **circuit-breaker**) (*Elec. Eng.*). The usual type of switch or circuit-breaker used on high and medium power a.c. circuits; the contacts are immersed in oil for insulating and arc-rupturing purposes.

oil tankers (*Ship Constr.*). Ships constructed for the carriage of oil in bulk, i.e. not barrelled. They are usually of abnormal structural types.

oil-transfer process (*Photog.*). A process involving the transference of an oil print to another support.

oil varnishes (*Diel.*). These contain a drying oil, resin, and driers. The oils used are linseed, china wood, soya bean, poppy-seed, cotton-seed, and castor-oil.

oiled cotton. See under **oilcloth.**

oiled paper (*Paper*). Paper impregnated with non-drying oil, e.g. oiled wrapping; or with linseed oil, e.g. oiled manilla.

oiled-silk tape (*Diel.*). Silk tape varnished with oil (linseed); used in cable joints for keeping spreaders in position.

oiling (*Textiles*). The process of sprinkling wool with oil or oil emulsion in some of the early stages of yarn manufacture, in order to prevent waste while being machined.

oiling ring (*Eng.*). A simple device commonly used to feed oil to a journal bearing. It consists of a light metal ring, larger in diameter than the shaft, and riding loosely thereon, located at the mid-point of the brasses, the upper brass being slotted to receive it. The ring dips into an oil reservoir in the base of the housing, and as it rotates, feeds oil to the brasses.

oilostatic cable (*Cables*). Three cores with an H-paper covering are drawn into a steel tube filled with oil under a pressure of 200 lb./in.^{2}

O'Kaycrete (*Build.*). A trade-name for a rapid-hardening cement.

ökotype, ē'kō-tīp (*Bot.*). See **ecotype.**

Old English (*Typog.*). The black-letter type in which early books were printed.

Old Face (*Typog.*). The earliest form of roman type, as this: Caslon.

Old Red Sandstone (*Geol.*). The continental facies of the Devonian System, comprising perhaps 40,000 ft. of red, brown, or chocolate sandstones, red and green marls, cornstones, breccias, flags, and conglomerates, yielding on certain horizons the remains of archaic fishes, eurypterids, plants, and rare shelly fossils. See **Downtonian, Dittonian, Brownstones, Farlovian.**

Old Style (*Astron., etc.*). A name given to the system of date-reckoning superseded by the adoption of the *Gregorian Calendar* (q.v.).

Old Style (*Typog.*). A type-face imitating the old style of roman letter used in the seventeenth century, as this: Old Style No. 2. It is the most generally used style of type-face in bookwork.

old woman's tooth (*Carp., Join., etc.*). The cutting iron of a router plane.

Oldbury Stone (*Geol.*). A local quartzite or cherty sandstone of Lower Cretaceous age occurring in the Folkestone Beds at Oldbury Hill near Ightham, Kent.

Oldham coupling (*Eng.*). A coupling permitting misalignment of the shafts connected. It consists of a pair of flanges whose opposed faces carry diametrical slots, and between which a floating disc is supported through corresponding diametral tongues arranged at right-angles.

old'hamite (*Min.*). Sulphide of calcium, usually found as cubic crystals in meteorites.

Oldhaven Beds (*Geol.*). A member of the so-called Lower London Tertiaries, consisting of fine-grained yellow sands, usually very richly fossiliferous, occurring sporadically in the Blackheath Beds below the London Clay in the eastern part of the London Basin.

olecra'non (*Zool.*). In land Vertebrates, a process at the upper end of the ulna which forms the point of the elbow.

o'lefines (*Chem.*). Hydrocarbons of the ethylene series, having the general formula C_nH_{2n}. They contain a double bond and are very reactive substances, forming derivatives by the addition of halogen, hydrogen, HCl, etc.

ole'ic acid (*Chem.*). $C_{18}H_{34}O_2$, a colourless liquid, m.p. 14° C. It is an unsaturated acid of the formula $CH_3{\cdot}(CH_2)_7{\cdot}CH{:}CH{\cdot}(CH_2)_7{\cdot}COOH$, and occurs as the glycerine ester in fatty oils. Oleic acid oxidises readily on exposure to the air, turns yellow and becomes rancid.

oleic acid series (*Chem.*). A group of unsaturated aliphatic acids of the general formula $C_nH_{2n-1}{\cdot}COOH$. Its most important members are acrylic acid, the crotonic acids, angelic acid, tiglic acid, oleic acid and erucic acid.

olein, ō'le-in (*Chem.*). A glycerine ester of oleic acid.

o'leobrom process (*Photog.*). The production of a pigment print from a bromide print, using rollers instead of brushes.

o'leocyst (*Zool.*). In some *Siphonophora*, a diverticulum of a nectocalyx containing a drop of oil.

o'leosome (*Bot.*). A large fatty inclusion in the cytoplasm of a cell.

oleotho'rax (*Med.*). The injection of oil into the pleural cavity (between the lung and the chest-wall) in order to compress the diseased lung.

o'leum (*Chem.*). A commercial name for *fuming sulphuric acid* (q.v.).

olfactom'etry (*Chem.*). See **odorimetry.**

olfac'tory (*Zool.*). Pertaining to the sense of smell: the first cranial nerve of Vertebrates, running to the olfactory organ.

olfactory lobes (*Zool.*). Part of the fore brain in Vertebrates, which is concerned with the sense of smell, and from which the olfactory nerves originate.

olfactory pit (*Zool.*). In Invertebrates, a small depression lined by sensory cells and subserving the sense of smell: in developing Vertebrates, a depression which will later give rise to one of the external nares.

olig-, oligo- (Greek *oligos*, few, small). A prefix used in the construction of compound terms; e.g. *oligacanthous*, having few spines.

oligae'mia, olige'mia (*Med.*). Diminution in the volume of the blood.

ol'igiste-iron (*Min.*). See **haematite.**

Ol'igocene (*Geol.*). The period of geological time which followed the Eocene period in the Tertiary era. Rocks of the Oligocene System are restricted in Britain to the Hampshire Basin and Isle of Wight. See **Bembridge Beds, Hamstead Beds, Osborne Beds.**

Ol'igochaeta, —kē'ta (*Zool.*). A class of *Annelida* of terrestrial or fresh-water habit, lacking parapodia but possessing conspicuous locomotor setae; without a distinct head; the perivisceral cavity is subdivided by septa; the individuals are hermaphrodite, with a limited number of gonads; development is direct. Earthworms.

ol'igoclase (*Min*). One of the plagioclase feldspars, consisting of the Albite (Ab) and Anorthite (An) molecules combined in the proportions of Ab, An_1 to Ab_7 An_3. It is found especially in the more acid igneous rocks.

oligocythae'mia, oligocythe'mia (*Med.*). Diminution in the number of red cells in the blood.

oligodendro'glia (*Zool.*). A type of small neuroglia cell occurring more frequently in white matter than in grey matter, containing no fibres and having no feet; more generally, a neuroglia cell.

oligodendroglio'ma (*Med.*). A cerebral tumour composed of oligodendroglia.

oligolec'tic (*Zool.*). (Of Bees) showing restricted choice of flowers when in search of nectar.

oligomenorrhoe'a, oligomenorrhe'a (*Med.*). Scantiness of the discharge during menstruation.

oligomer'ous (*Bot.*). Consisting of but few parts.

oligoneph'rous (*Zool.*). Having few Malpighian tubules.

ol'igopod (*Zool.*). (1) Having few legs or feet.—(2) Said of a phase in the development of larval Insects in which the thoracic limbs are large while the evanescent abdominal appendages of the polypod phase have disappeared.

oligopy'rene (*Zool.*). Said of spermatozoa in which the number of chromosomes is sub-normal. Cf. *eupyrene*.

oligosper'mia (*Med.*). Diminution, below the average, of the quantity of semen voided in an ejaculation.

oligospo'rous (*Bot.*). Containing only few spores.

oligoto'kous (*Zool.*). Bearing few offspring.

oligotro'phic (*Ecol.*). Said of a type of lake-habitat having steep and rocky shores and scanty littoral vegetation.

oligotro'phophyte (*Bot.*). A plant growing in a soil poor in soluble mineral salts.

oligozo'osper'mia (*Med.*). Diminution of the number of spermatozoa in the semen.

oligu'ria (*Med.*). Abnormally diminished secretion of urine.

oliph'agous (*Zool.*). Feeding on few different kinds of food; as phytophagous Insects which are limited to a few related food-plants.

oliva'ceous, olive (*Bot.*). Greyish-green with a touch of orange.

oliv'ary nucleus (*Zool.*). A wavy band of grey matter within the medulla oblongata, corresponding to the position of the olive.

olive (*Zool.*). In the medulla oblongata of higher Vertebrates, a prominence on the lateral aspect of each pyramid, corresponding to a wavy band of grey matter (the olivary nucleus) in the substance of the brain.—*adj.* **olivary.**

olive oil (*Chem.*). A pale-yellow or greenish oil obtained from the fruit of *Olea europea*; sp. gr. 0·91-0·92, acid value 1·9-5, saponification value 185-196, iodine value 77-88.

ol'ivenite (*Min.*). A hydrated arsenate of copper which crystallises in the orthorhombic system. It is a rare green mineral of secondary origin found in copper deposits.

oliver. The name for a simple form of power hammer used in some branches of chain-making.

ol'ivine (*Min.*). Orthosilicate of iron and magnesium, crystallising in the orthorhombic system, which occurs widely in the basic and ultramafic igneous rocks, and includes olivine-gabbro, olivine-dolerite, olivine-basalt, peridotites, etc. See **chrysolite.** The clear-green variety is used as a gemstone under the name *peridot.* For *olivine-nephelinite* see **nephelinite**; and for *iron-olivine* see **fayalite.**

olivine-nodules (*Geol.*). Xenolithic masses of olivine found in some basic igneous rocks, such as the Carboniferous basalts in Derbyshire, England.

olivine-rock (*Geol.*). See **dunite.**

Olson microphone (*Acous.*). The original ribbon microphone.

O.M. (*Chem.*). An abbrev. for *organic matter.*

omasi'tis (*Vet.*). Impaction of the omasum.

oma'sum (*Zool.*). See **psalterium.**

ombré (*Textiles*). The term for stripes that are produced by yarns of the same colour but different tones; a shaded effect.

ombrom'eter (*Meteor.*). A rain-gauge.

om'brophile (*Bot.*). A plant characteristic of a place where rain is abundant.

om'brophyte (*Bot.*). A plant inhabiting shady places.

omen'topex'y (*Surg.*). The stitching of the omentum to the abdominal wall in the treatment of cirrhosis of the liver.

omen'tum (*Zool.*). In Vertebrates, a portion of the serosa connecting two or more folds of the alimentary canal.—*adj.* **omental.**

ommate'um (*Zool.*). A compound eye.

ommatid'ium (*Zool.*). One of the visual elements composing the compound eyes of *Arthropoda.*

om'matoids (*Zool.*). In *Pedipalpi*, two or four white patches on the last somite of the opisthosoma; their nature and function are unknown.

ommat'ophore (*Zool.*). An eye-stalk.

omnibus-bar (*Elec. Eng.*). The original term from which the commonly used expression *bus-bar* (q.v.) is derived.

omnidirectional antenna (*Radio*). An antenna transmitting or receiving equally in all directions in the horizontal plane.

om'nigraph (*Instruments*). A copying instrument used to reproduce drawings on the same or some other scale.

omnim'eter (*Surv.*). A special tacheometric instrument consisting of a transit theodolite having a microscope permanently fixed at right-angles to the line of sight of the telescope, enabling readings to be taken on a horizontal graduated scale. Two such readings are made, corresponding to two pointings of the telescope at marks ten feet apart on a distant vertical staff, and from them horizontal and vertical components of distance are deduced.

omniv'orous (*Bot.*). Said of a parasitic fungus which attacks several or many species of host plant.—(*Zool.*) Including both animal and vegetable tissue in the diet.

omo- (*Zool.*). (Greek *omos*, **shoulder**). A prefix used in the construction of compound terms; e.g. *omohyoid*, pertaining to the shoulder and the hyoid.

omoideum, ō'mo-id'— (*Zool.*). In Birds, the pterygoid.

omoster'num (*Zool.*). An anterior element of the sternum in *Amphibia.*

om'phacite (*Min.*). An aluminous pyroxene, near diopside in composition, occurring in eclogites as pale-green mineral grains; in a thin section colourless, superficially resembling olivine.

omphal-, omphalo- (Greek *omphalos*, **navel**). A prefix used in the construction of compound terms; e g. *omphalomesenteric*, pertaining to the umbilicus and the mesentery.

omphalec'tomy (*Surg.*). Surgical removal of the umbilicus.

omphal'ic (*Zool.*). Pertaining to the umbilicus.

omphali'tis (*Med.*). Inflammation of the umbilicus.

omphal'oid (*Zool.*). Navel-shaped.

om'phalophlebi'tis (*Vet.*). Inflammation of the navel or umbilical cord. See **pyosepticaemia.**

on-costs (*Build.*, *Eng.*, *etc.*). All items of expenditure that cannot be allocated to a definite job, i.e. all expenses other than *prime cost* (q.v.). Also called OVERHEAD EXPENSES, ESTABLISHMENT CHARGES, LOADING, BURDEN.

on-cost men (*Mining*). Those mine workers who receive day wages.

on-setter (*Mining*). See **head hitcher.**

on the line (*Cinema.*). Said of the synchronous motors which drive cameras in a motion-picture studio when they are switched on to the driving mains. *Off the line* denotes the opposite condition.

once-through boiler (*Eng.*). See **Benson boiler, flash boiler.**

on'chocerci'asis (*Med.*). Infestation of the skin and subcutaneous tissues with the nematode worm of the genus *Onchocerca.*

on'chosphere, oncosphere (*Zool.*). In *Cestoda*, a larval form characterised by the possession of three pairs of hooks.

oncogenous, on-koj'— (*Med.*). Inducing, or tending to induce, the formation of tumours.

oncol'ogy (*Med.*). That part of medical science dealing with new-growths (tumours) of body-tissue.

oncom'eter (*Med.*). An apparatus for measuring variations in the size of bodily organs.

ondé, on-dā (*Textiles*). Generally a fourfold yarn with a spiral effect produced by a coarse thread which is incorporated.

on'dograph (*Elec. Eng.*). A recording device for tracing out a.c. wave-forms by a step-by-step method. A condenser is connected to the voltage under investigation at successive points in the cycle, and is made to discharge through a ballistic galvanometer, whose deflection will be proportional to the voltage at that point.

ondule (*Weaving*). A wave effect running the length of a fabric; developed by alternately spacing out and closing up certain warp threads by means of a special reed.

one-at-once wheel (or **engine**) (*Lace*). A small machine which winds a length of yarn on a brass bobbin, uniform tension being maintained.

one-at-once winding (*Lace*). The operation of filling up a brass bobbin with a special kind of yarn.

one-coat work (*Plast.*). Plastering in one coat only—a coat of coarse stuff.

one-hour rating (*Elec. Eng.*). A form of rating commonly used for electrical machinery supplying an intermittent load; e.g. traction motors for suburban service. It indicates that the machine will deliver its specified rating for a period of one hour without exceeding the specified temperature rises.

one-phase (*Elec. Eng.*). See **single-phase.**

one-pipe system (*Plumb.*). A plumbing system in which both soil and waste are carried by a common pipe, the fittings being protected with specially deep seals.

one-sided inheritance (*Gen.*). Inheritance through a chromosome which occurs in one sex only, e.g. a Y-chromosome.

one-to-one transformer (*Elec. Eng.*). A transformer having the same number of turns on the primary as on the secondary; used in circuits when it is desired to insulate one part of a circuit from another.

one-way switch (*Elec. Eng.*). A switch providing only one path for the current. Cf. *double-throw switches* (two-way switches).

onei'ric, oni'ric (*Med.*). Pertaining to dreams.

Oneon'ta Group (*Geol.*). A series of flagstones, red, grey and greenish shales, yielding plant remains, and reaching a thickness of 3000 ft. in eastern New York State. See also **Portage Group.**

onomatoma'nia (*Med.*). An obsessional state of mind in which forgetfulness of certain words is associated with an irresistible impulse to repeat other words, often obscene.

Onondaga Limestone,—daw'ga (*Geol.*). The coral-reef limestone in the Ulsterian of the Middle Devonian, extending from New York to Ohio, Michigan, and Kentucky. Famed for its well-preserved fossils; an important oil-bearing formation in Ontario, Canada, and in the eastern central United States.

ontogeny, ontogen'esis, on-toj'en-i (*Biol.*). The history of the development of an individual; cf. *phylogeny.—adj.* **ontogenetic.**

onych-, onycho-, on-i'ko *or* on'ik-o (Greek *onyx*, gen. *onychos*, a nail or claw). A prefix used in the construction of compound terms; e.g. *onychocryptosis* (q.v.).

ony'chia (*Med.*). Inflammation of the nail-bed.

ony'chium (*Zool.*). In Insects, a pulvillus: in some Spiders, an extension of the tarsus between the paired claws.

onychocrypto'sis (*Med.*). Ingrowing toe-nail.

onychogenic, —jen'ik (*Zool.*). Nail-forming, nail-producing; as a substance similar to eleidin occurring in the superficial cells of the nail-bed.

onychogrypho'sis, onychogrypo'sis (*Med.*). Thickening, twisting, and overgrowth of the nails (usually of the toes) as a result of chronic infection and irritation.

onychomyco'sis (*Bot.*). A disease of the nails due to a fungus.

Onychoph'ora (*Zool.*). See **Prototracheata.**

onyx (*Min.*). A cryptocrystalline variety of silica which consists of layers of different colours, white, black, and red, the bands being straight, not curved (as in agate).

onyx marble (*Min.*). Oriental alabaster (see under **alabaster**).

oö-, ō'o (Greek *oon*, egg). A prefix used in the construction of compound terms; e.g. *oöplasm*, the cell-substance of an egg.

oöblas'tema (*Zool.*). A fertilised egg.

o'öcyst (*Zool.*). In certain *Protozoa*, the cyst formed around two conjugating gametes: in *Sporozoa*, the passive phase into which an oökinete changes in the host.

o'öcyte (*Zool.*). An ovum prior to the formation of the first polar body: a female gametocyte.

oœcium, ō-ē'si-um (*Zool.*). A brood pouch.

o'ögamy (*Biol.*). (1) The union of gametes of dissimilar size, usually of a relatively large non-motile egg and a small active sperm.—(2) In *Protozoa*, anisogamy in which the female gamete is a hologamete.

oögen'esis (*Biol.*). The origin and development of ova.

oögo'nial branch (*Bot.*). A hypha on or in which an oögonium develops.

oögo'nium (*Bot.*). The female sexual organ in algae and fungi. It has a non-cellular wall, and contains one or more oöspheres, which are converted into oöspores at fertilisation and set free before they germinate.—(*Zool.*) An egg-mother-cell or oöcyte.

oöki'nete (*Zool.*). In certain *Protozoa*, an active vermiform stage developed from the zygote.

oölem'ma (*Zool.*). See **vitelline membrane.**

O'olite (*Geol.*). A stratigraphical term referring to the Jurassic oölitic limestones. See **Inferior Oölite Series, Great Oölite Series.**

oölith (*Geol.*). A more or less spherical concretion of calcium carbonate, chamosite, or dolomite, not exceeding 2 mm. in diameter, usually showing a concentric-layered and/or a radiating fibrous structure. Oöliths develop when certain substances pass from the colloidal to the crystalline condition.

oölitic (*Geol.*). A textural term applicable to sedimentary rocks, of several different kinds, which consist largely of oöliths. Cf. *pisolitic.*

oölysis, ō-ol'— (*Bot.*). The conversion of carpels and ovules into leafy structures.

Oomyce'tes (*Bot.*). One of the main subdivisions of the *Phycomycetes*, with some hundreds of species; these have a more or less well-developed mycelium on which oögonia with oöspores are formed.

oöphorec'tomy (*Surg.*). Removal of an ovary by operation.

oöphori'tis (*Med.*). Inflammation of an ovary.

oopho'rosalpingec'tomy (*Surg.*). Removal, by operation, of an ovary and a Fallopian tube.

oöphoros'tomy (*Surg.*). The surgical formation of an opening into an ovarian cyst.

oöphorot'omy (*Surg.*). Surgical incision of an ovary.

o'öphyte (*Bot.*). The gametophyte, in *Bryophyta* and *Pteridophyta.*

o'öplasm (*Bot.*). The central plasma in the oögonium of some *Oomycetes*, representing a more or less undifferentiated egg.

o'ösperm (*Zool.*). See **oöblastema.**

o'osphere (*Biol.*). The unfertilised female gamete or its homologue.

o'öspore (*Bot.*). A thick-walled spore, which normally germinates only after a period of inactivity, formed after the fertilisation of the oösphere in lower plants.

oöspore (*Zool.*). A fertilised ovum: in *Protozoa*, an encysted zygote.

oös'tegite (*Zool.*). In some higher *Crustacea*, a brood pouch formed by plates upon the thoracic limbs.

o'östeg'opod (*Zool.*). In some higher *Crustacea*, one of the thoracic limbs bearing the brood pouch.

o'öthe'ca (*Zool.*). An egg-case, as in the Cockroach.

oöto'coid (*Zool.*). Bringing forth the young in an immature condition and allowing them to complete their early development in a marsupium.

oöto'cous (*Zool.*). Oviparous.

o'ötype (*Zool.*). A section of the oviduct in which the egg-shell is secreted: in *Platyhelminthes*, a chamber, situated at the junction of the oviduct and vitelline ducts, into which the shell-glands open.

ooze (*Geol.*). A fine-grained, soft, deep-sea deposit, composed of shells and fragments of foraminifera, diatoms, and other organisms.

oözo'oid (*Zool.*). An individual which arises directly from an ovum, as opposed to a *blastozooid*, which arises by budding from another individual.

O.P. side. The side of the stage opposite to the *prompt side* (q.v.).

opacifier, ō-pas'— (*Pot.*). A material used in the manufacture of glazes and vitreous enamels to intensify the density of colour or opalescence.

opacity (*Photog.*). The reciprocal of the transmission ratio of an image, i.e. the ratio of the incident light intensity to the transmitted light intensity.

opal (*Min.*). An amorphous variety of silica with a varying amount of water. The transparent coloured varieties, exhibiting opalescence, are highly prized as gemstones. See **fire opal, wood opal.**

opal agate (*Min.*). A variety of opal, of different shades of colour and agate-like in structure.

opal glass (*Glass*). Glass which is opalescent or white; made by the addition of fluorides (e.g. fluorspar, cryolite) to the glass mixture.

opal jasper (*Min.*). Opal containing some yellow iron oxide and other impurities; it has the colour of yellow jasper with the lustre of common opal. Also called JASP OPAL.

opal lamp (*Illum.*). An electric filament lamp having the bulb made of opalescent glassware, so that the filament itself is not directly visible.

opales'cence (*Chem.*). The milky, iridescent appearance of a solution or mineral, due to the reflection of light from very fine, suspended particles.—(*Min.*) The play of colour exhibited by precious opal, due to interference at the surfaces of minutely thin films, the thicknesses of the latter being of the same order of magnitude as the wavelength of light.

o'paline (*Photog.*). A normal photographic print fixed on plate glass by squeegeeing.

O'palite (*Build.*). A composition, obtainable in many colours, which is applied to walls to produce the surface appearance of glazed bricks.

opaque. Totally absorbent of rays of a specified wavelength; e.g. wood is opaque to visible light but slightly transparent to infra-red rays, and completely transparent to X-rays and waves for radio communication.

opaque (*Bot.*). Dull, not shining.

open aestivation (*Bot.*). Aestivation in which the perianth leaves neither overlap nor meet by their edges.

open arc (*Illum.*). A carbon arc to which there is free access of the external atmosphere, any enclosure being for light diffusion or to give protection from draughts.

openband (or **right-hand**) **twine** (*Textiles*). The term used in the woollen trade to denote the direction of twist in a yarn produced by open-spindle bands; synonymous with the term *right-hand twist* used in the worsted industry.

opencast (*Mining*). A large open pit from which ore is extracted.

open channel (*Hyd.*). A channel for the conveyance of liquid, the free surface of which is always within the channel and at atmospheric pressure. Open channels are frequently covered over in practice.

open circuit (*Elec. Eng.*). A break in an electrical circuit along which current can normally pass. A generator or transformer is said to be on *open circuit* when it has a voltage across its terminals but is not delivering any current, owing to there not being a complete circuit between them.

open circuit (*Teleg.*). A circuit which is not completely closed during the spacing signal or the marking signal. See also **open-wire circuit.**

open-circuit characteristic (*Elec. Eng.*). A term commonly used to denote the curve obtained by plotting the e.m.f. generated by an electric generator on open circuit against the field current. Also called NO-LOAD CHARACTERISTIC.

open-circuit impedance (*Elec. Comm.*). The driving point or input impedance of a network or line when the end is open-circuited.

open-circuit loss (*Elec. Eng.*). See **no-load loss.**

open-circuit transition (*Elec. Eng.*). A method used, in the series-parallel control of traction motors, for changing the connexions of the motors from series to parallel; the circuit is broken while the reconnexion is being made. Cf. *bridge transition*, *short-circuit transition.*

open-circuit voltage (*Elec. Eng.*). The voltage appearing across the terminals of an electric generator or transformer when it is delivering no load. The term also refers to the voltage appearing across the electrodes of an arc-welding plant when no current is flowing.

open community (*Bot.*). A plant community which does not occupy the ground completely, so that bare spaces are visible.

open-diaphragm loudspeaker (*Acous.*). A loudspeaker in which the radiating diaphragm is not fitted with a horn but operates directly into the low radiation impedance of the air.

open floor (*Build.*). A floor which is not covered by a ceiling, the joists being therefore on view.

open-frame girder (*Struct.*). A girder consisting of upper and lower booms connected at intervals by (usually) vertical members, and not braced by any diagonal members.

open fuse (*Elec. Eng.*). A fuse in which the mounting is such that the fuse link is fully exposed, except for any external containing case.

open-hearth furnace (*Met.*). A furnace, of reverberatory type, used in steel-making. The charge is contained on a shallow hearth, and the furnace fired with gas on regenerative principle. Capacity 40-250 tons.

open-hearth process (*Met.*). A process for making steel from varying proportions of pig-iron (solid or liquid) and scrap. The metal is melted on a shallow hearth by burning producer gas over it. Oxidation of the impurities (C,Si,Mn.) is produced by the oxidising furnace gas and the addition of iron oxide. This process is used almost universally in Britain and for about 90% of the steel made in America. Also called SIEMENS-MARTIN PROCESS. See **acid process, basic process, steel-making.**

open mortise (*Join.*). A *slot mortise* (q.v.).

open newel stair (*Build.*). A stair having successive flights rising in opposite directions, and arranged about a rectangular well hole.

open pipe (*Acous.*). A pipe which is partially or completely open at the upper end, so that the wavelength of the fundamental resonance is approximately double the length of the air column.

open roof (*Build.*). A roof which is not covered in by a ceiling, the trusses being exposed.

open sand (*Moulding*). (1) A sand of good porosity or permeability, as distinct from a *close* sand.—(2) The process of casting in an open mould when the finish of the top surface is immaterial.

open shed (*Weaving*). A passage between upper and lower lines of warp threads; the individual threads remain stationary until required to move up or down. A thread which is up (or down), and is required in the same position when the next shed is formed, remains stationary: only those threads move which are required to change position.

open shedding (*Weaving*). The best method of separating warp threads during weaving, threads being moved only when required to change position; at other times they remain stationary. Maximum loom speed is obtainable with this type of shed.

open slating (*Build.*). Slating in which gaps of 1-4 in. are left between adjacent slates in any course.

open slot (*Elec. Eng.*). A type of slot, used in the armatures of electric machines, in which the opening is the same width as the rest of the slot. Cf. *semi-closed slot.*

open string (*Carp.*). See **cut string.**

open traverse (*Surv.*). A traverse in which the final line does not link up with the first line.

open-type (*Elec. Eng*). Said of electrical apparatus having no protecting enclosure around live parts; e.g. *open-type boiling plate*, an electric boiling plate in which the heating elements are exposed to the atmosphere.

open vascular bundle (*Bot.*). A bundle including cambium.

open well (*Build.*). A stair enclosing a vertical opening between the outer sides of the flights.

open-wire (or open) circuit (*Elec. Comm*). A circuit supported from insulators on poles and, with others, forming a pole route.

open woodland (*Bot.*). Grassy ground with trees here and there, often forming groups.

openwork or lace fabrics (*Hosiery*). Knitted fabrics with an openwork pattern produced by a transference of certain stitches from a needle or needles to adjacent needles; this process lightens the weight of the fabric. Openwork patterns may also be arranged by a disposal of stitches.

opening (*Cotton Spinning*). The first operation in preparing, for the spinning process, the compressed and matted cotton from a bale.

operating-duty (*Elec. Eng.*). A term applied to a switch or circuit-breaker to denote the series of making and breaking operations used in specifying its performance.

operating factor (*Elec. Eng.*). The ratio which the time during which an intermittently run motor is actually running bears to the length of the duty cycle.

operating room (*Teleph.*). The room in which the operators in a manual or automatic (enquiries, etc.) exchange are located in front of their switchboards.

operating time (*Teleph.*). The time during which a trunk circuit must be held while the operator is establishing the call. See **holding time.**

operator's position (*Teleph.*). The same as *position.*

oper'cular apparatus (*Zool.*). In Fish, the operculum, together with the branchiostegal membrane and rays.

opercular cell (*Bot.*). A lid cell by means of which some antheridia open.

opercular'e (*Zool.*). In Fish, a dorsal membrane bone of the operculum.

oper'culate (*Bot.*). (1) Possessing a lid.—(2) Opening by means of a lid.

oper'culum (*Bot.*). A cover or lid which opens to allow of the escape of spores from a sporangium or other container.

operculum (*Zool.*). In Fish, the gill-cover: in some tubicolous *Polychaeta*, an enlarged branch of a tentacle which tightly closes the mouth of the tube when the animal is retracted: in *Xiphosura*, the united anterior pair of abdominal appendages bearing the genital apertures: in Spiders, a small plate partially covering the opening of a lung book: in some *Cirripedia*, plates of the carapace which can be closed over the retracted thorax: in *Pterobranchia*, a ventral and lateral projection of the collar forming a lower lip.—*adjs.* **opercular, operculate, operculiform, operculigenous.**

ophical'cite (*Geol.*). See **forsterite-marble.**

ophiceph'alous (*Zool.*). Snake-headed: (in *Echinoidea*) said of small pedicellariae having a flexible stalk and short, broad jaws with toothed edges, which lack poison-glands but have a special articulating device.

ophidi'asis, o'phidism (*Med.*). Poisoning by snake venom.

ophi-mottling (*Geol.*). A textural character of certain basic gabbroic rocks in which large pyroxenes enclosing small plagioclase crystals ophitically are embedded in a groundmass essentially feldspathic.

ophioplu'teus (*Zool.*). In *Ophiuroidea*, a pelagic ciliated larval form, in which the posterolateral arms are large and are directed forwards. See also **pluteus.**

ophit'ic texture (*Geol.*). A texture characteristic of dolerites in which relatively large pyroxene crystals completely enclose smaller, lath-shaped plagioclases. See also **poikilitic.**

Ophi'uroi'dea (*Zool.*). A class of *Echinodermata* having a dorsoventrally flattened body of stellate form; the arms are sharply differentiated from the disc; the tube-feet lack ampullae and lie on the lower surface, but not in grooves; there is no anus; the madreporite is aboral, and there is a well-developed skeleton; free-living forms. Brittle Stars.

ophthalm-, ophthalmo- (Greek *ophthalmos*, eye). A prefix used in the construction of compound terms; e.g. *ophthalmoplegia* (q.v.).

ophthalmec'tomy (*Surg.*). Excision of an eye.

ophthal'mia (*Med*). Inflammation of various parts of the eye, especially of the conjunctiva.

ophthal'mic (*Zool*). Pertaining to or situated near the eye; as the *ophthalmic nerve*, which passes along the back of the orbit in lower Vertebrates.

ophthalmol'ogy (*Med.*). That part of medical science which deals with the eye and its diseases —*n.* **ophthalmol'ogist.**

ophthalmople'gia (*Med.*). Paralysis of one or more muscles of the eye.

ophthal'moscope (*Med.*). An instrument for inspecting the interior of the eye by means of light reflected from a mirror.

Opiliones, ō-pil'i-ō-nēz (*Zool.*). An order of *Embolobranchiata* having a uniform prosoma and a segmented opisthosoma; there is no telson; the pedipalpi are slender and tactile, the coxae having gnathobases; respiration is by tracheae; the body is usually globular, and the legs are very long and slender; carnivorous cosmopolitan forms. Harvestmen.

opisom'eter (*Surv.*). See **map measurer.**

opisth-, opistho- (Greek *opisthe*, behind, posterior). A prefix used in the construction of compound terms; e.g. *opisthocoelous* (q.v.).

opis'thial aperture (*Bot.*). The opening between the base of the stomatal pore and the substomatal cavity.

Opis'thobran'chia (*Zool.*). An order of marine *Euthyneura* which breathe by gills and show a tendency to reduction of the shell; the mantle-cavity is widely open or absent. Sea Hares, Sea Slugs, Sea Butterflies, etc.

opis'thocoelous, —sē'lus (*Zool.*). Concave posteriorly and convex anteriorly; said of vertebral centra.

Opisthoco'mifor'mes (*Zool.*). An order of *Coraciomorphae* having a schizognathous (*Opisthocomi*) or desmognathous (*Cuculi* and *Psittaci*) palate; zygodactylous arboreal Birds. Parrots and Cockatoos, Cuckoos, Hoatzin, and Plantain-eaters.

opisthode'tic (*Zool.*). In Bivalves, posterior to the beak.

opisthoglos'sal (*Zool.*). Having the tongue attached anteriorly, free posteriorly, as in *Frogs*.

opis'thomere (*Zool.*). A postoral somite.

Opis'thomi (*Zool.*). An order of *Neopterygii* of small size and eel-like form, with pelvic fins absent, and spiny dorsal fin; fresh-water carnivorous forms of Africa and Southern Asia. Spiny Eels.

opisthoneph'ros (*Zool.*). In Vertebrates, a type of excretory organ corresponding to the mesonephros together with the metanephros.—*adj.* **opisthonephric.**

opisthoso'ma (*Zool.*). In *Acarina*, the segments of the body posterior to the last pair of legs: in *Arachnida*, the abdomen, comprising the mesosoma and metasoma.

opisthot'ic (*Zool.*). A posterior bone of the auditory capsule in the Vertebrate skull.

opisthot'onos (*Med.*). Extreme arching backwards of the spine and the neck as a result of spasm of the muscles in these regions; e.g. in tetanus.

opossum (*Furs*). The dressed skin of the opossum, a marsupial climbing animal of America, and of other marsupials native to Australia; the fur is greyish and is often dyed.

opother'apy (*Med.*). (Literally, treatment by juices.) Treatment by administration of extracts of animal organs, especially of ductless glands.

oppo'nens (*Zool.*). A muscle which, by its contraction, assists the opposition of the digits.

opposed-cylinder engine (*I.C. Engs.*). An engine with cylinders, or banks of cylinders, on opposite sides of the crankcase in the same plane, their connecting-rods working on a common crankshaft placed between them.

opposed-voltage protective system (*Elec. Eng.*). A form of Merz-Price protective system in which the secondary voltages of current transformers situated at each end of the circuit to be protected are balanced against each other, so that there is normally no current on the pilots connecting them.

opposite (*Bot.*). (1) Said of leaves inserted in pairs at each node, with one on each side of the stem.—(2) Said of a stamen which stands opposite to the middle of a petal.

opposition (*Astron.*). The instant when the elongation of the moon or a planet is 180°; that is, when it is in line with the earth and sun, the earth being between the two.

op'sonin (*Zool.*). A substance, present in the blood, which enhances the phagocytic properties of leucocytes.

optics. The study of light. *Physical optics* deals with the nature of light and its wave properties; *geometrical optics* ignores the wave nature of light and treats problems of reflection and refraction from the ray aspect.

optic (*Zool.*). Pertaining to the sense of sight; the second cranial nerve of Vertebrates, running to the eye.

optic atrophy (*Med.*). The condition of the optic disc (where the nerve fibres of the retina pass through the eyeball) resulting from degeneration of the optic nerve, the disc becoming paler and more sharply defined than normal.

optic axial angle (*Min.*). The angle between the two optic axes in biaxial minerals, usually denoted as 2V (when measured in the mineral) or 2E (in air).

optic axis (*Light*). That direction in a doubly refracting crystal along which the ordinary and extraordinary rays pursue the same path with the same velocity. A uniaxial crystal has one and a biaxial crystal two optic axes.

optic lobes (*Zool.*). In Vertebrates, part of the mid-brain, which is concerned with the sense of sight, and from which the optic nerves originate.

optic neuritis (*Med.*). See **papillitis.**

optical activity (*Chem.*, *Phys.*). A property possessed by many substances whereby plane-polarised light, in passing through them, suffers a rotation of its plane of polarisation, the angle of rotation being proportional to the thickness of substance traversed by the light. In the case of molten or dissolved substances it is due to the possession of an asymmetric molecular structure. See **specific rotation.**

optical centre of a lens (*Light*). That point on the principal axis of a lens or lens system through which passes a ray whose incident and emergent directions are parallel.

optical double (*Astron.*). The name given to a pair of stars which appear in close proximity owing to the perspective in which they are seen, but which have no physical connexion.

optical flat (*Photog.*). A surface, generally of glass, which has been lapped by rubbing on an optically flat surface so that deviations from a true plane surface are small in comparison with the wavelength of light.

optical glass (*Glass*). Glass made expressly for its optical qualities. The composition varies widely both as to constituents and amounts, and the requirements as regards freedom from streaks and bubble are very exacting.

optical indicator (*I.C. Engs.*). An engine indicator in which a ray of light is deflected successively by mirrors in directions at right-angles, proportionately first to cylinder pressure, then to piston displacement, being finally focused on a ground-glass screen or photographic plate, on which it traces the *indicator diagram* (q.v.).

optical isomerism (*Chem.*). The existence of isomeric compounds which differ only in their optical activity.

optical-mechanical system (*Television*). Any system of television employing mechanical scanning.

optical printing (*Cinema.*). The process of printing positive frames by optical arrangements which can reduce, enlarge, re-shape, fade, or wipe the image on the negative. Used extensively for trailers and general editing, a duplicate negative being made for release prints.

optical pyrometer (*Heat*). An instrument which measures the temperatures of furnaces by estimating the colour of the radiation, or by matching it with that of a glowing filament.

optical scratch (*Cinema.*). A scratch on the sound-track caused by a particle of dirt which has entered the recording mechanism.

optical sign (*Min.*). Anisotropic minerals are either optically positive or negative, indicated by + or − in technical descriptions. See **negative mineral, positive mineral.**

optical square (*Surv.*). A hand instrument for setting out right-angles in the field. It works on the principle of the *sextant* (q.v.), the two reflecting surfaces being arranged in this case to yield lines of sight at a fixed angle of 90° apart.

op'ticon (*Zool.*). In Insects, the internal medullary mass or inner zone of the optic lobe of the brain.

optimum. Most favourable: the point at which any condition is most favourable or at its height; e.g. *optimum temperature, optimum humidity*, etc.

op'tocoele (*Zool.*). The cavity of one of the optic lobes of the Vertebrate brain.

op'togram (*Zool.*). A retinal image.

ora (*Zool.*). See **os.**

ora serra'ta (*Zool.*). The edge of the retina.

oral (*Zool.*). Pertaining to, or in the region of, the mouth.

orange lead (*Chem.*). Pb_3O_4. Obtained by heating white lead (basic lead carbonate) in air at approximately 450° C. Commercial varieties contain up to approximately 35% PbO_2.

Orase'ma (*Zool.*). A small hymenopterous Insect of which the immature stages are ectoparasitic on certain species of tropical ants. See **phthisaner, phthisergate, phthisogyne.**

orbic'ular (*Bot.*). Flat, with a circular or almost circular outline.

orbicular structure (*Geol.*). A structure exhibited by those igneous rocks which contain spherical orbs up to several inches in diameter, each showing a development of alternating concentric shells of different minerals, so deposited by rhythmic crystallisation. See, for example, **corsite.**

orbicular'es (*Zool.*). Muscles which surround an aperture; as the muscles which close the lips and eyelids in Mammals.

orbit (*Astron.*). The path of a heavenly body moving about another under gravitational attraction. See also **elements of an orbit.**

orbit (*Zool.*). A space lodging an eye: in Vertebrates, the depression in the skull containing the eye: in Arthropods, the hollow which receives the eye or the base of the eye-stalk: in Birds, the skin surrounding the eye.

orbital. *Adj.* from *orbit.*

orbi'to- (Latin *orbita*, orbit). A prefix used in the construction of compound terms; e.g. *orbitonasal*, pertaining to the orbit and the nose.

orbitosphe'noid (*Zool.*). A paired cartilage bone of the Vertebrate skull, forming the side wall of the brain-case in the region of the presphenoid.

Orca'dian Series (*Geol.*). A name sometimes applied to the Middle Old Red Sandstone of Scotland, including as the chief member the Caithness Flagstone Group, overlying barren red sandstones without fossils. The name *Orcadian* is also applied to the basin in which the Old Red Sandstone of Caithness, Moray, the Orkney and Shetland Islands was deposited.

orch-, orchi- (Greek *orchis*, testicle). A prefix used in the construction of compound terms; e.g. *orchi-epididymitis* (q.v.). **orchid-, orchido-** are falsely derived variants.

orchec'tomy (*Surg.*). See **orchidectomy.**

or'chic, orchit'ic (*Zool.*). Pertaining to the testis.

orchid-, orchido-. Prefix. See under **orch-.**

orchidal'gia (*Med.*). Pain in a testis.

orchidec'tomy, orchec'tomy (*Surg.*). Surgical removal of a testis.

or'chidopex'y (*Surg.*). The operation of stitching an undescended testis to the scrotum.

orchi-epididymi'tis (*Med.*). Inflammation of the testis and the epididymis.

orchi'tis (*Med.*). Inflammation of a testis.

or'cinol (*Chem.*). $CH_3{\cdot}C_6H_3(OH)_2$ (1,3,5), *m*-dihydroxy-toluene, a dihydric phenol, colourless crystals, m.p. 107° C., b.p. 288° C.

orcu'liform (*Bot.*). Said of a two-celled spore having a thick septum pierced by a connecting-tube between the two cells.

order (*Bot., Zool.*). A group of closely related plants or animals forming a subdivision of a *class*, and itself further subdivided into *families*. See *The Vegetable Kingdom*, *The Animal Kingdom*, in Appendix.

order form. A special paper form intended for requisitions.

order number (*Eng.*). (Of a torque impulse or a vibration, as the torsional oscillation of an engine crankshaft) the number of impulses or vibrations which occur during one revolution of the shaft.

order of reaction (*Chem.*). A classification of chemical reactions based on the index of the power to which concentration terms are raised in the expression for the instantaneous velocity of the reaction, i.e. on the apparent number of molecules which interact.

order wire circuit (*Teleph.*). A circuit between operators in different exchanges serving for exchange of information in setting up subscribers' calls.

ordinary ray (*Light*). Of the two plane-polarised components into which a ray of light is split in passing through a doubly refracting crystal, the *ordinary ray* is the one which obeys Snell's law and gives a constant refractive index for all angles of incidence.

ordnance (*Artillery*). A generic term embracing all artillery weapons, including guns, howitzers, and mortars.

Ordnance Bench Mark (*Surv.*). A bench mark established with reference to the Ordnance Datum.

Ordnance Datum (*Surv.*). The standard datum for Great Britain; originally the assumed mean sea-level at Liverpool (1844), now the mean sea-level at Newlyn, Cornwall (1921).

Ordovician, —vish'an (*Geol.*). The middle period in the lower Palaeozoic era, which followed the Cambrian period. It was named by Prof. Chas. Lapworth after the Ordovices, an old British tribe of the Welsh Border, in which area rocks of this age are found.

See **Ashgill Series** **Llandeilian Series**
Arenig do. **Llanvirn** do.
Bala do. **Ordovicic** do.
Caradocian do.

Ordovic'ic (*Geol.*). Comparable with *Ordovician.* See **Canadian, Cincinnatian,** and **Mohawkian.**

ore (*Min.*). A term applied to metalliferous minerals which are of economic value and can (or may) be profitably exploited. It is extended to non-metals and also to minerals which are potentially valuable.

ore hearth (*Met.*). See **Scotch hearth.**

Oregon pine (*Timber*). A strong light timber, much used for roofing timbers for public buildings and for floorings. Also called DOUGLAS FIR, BRITISH COLUMBIAN PINE.

Orford process (*Met.*). A process used by the International Nickel Co. for separating the copper and nickel in the matte obtained by bessemerising. The matte, which consists of copper-nickel sulphides, is fused with sodium sulphide, and a separation into two layers, the top rich in nickel and the bottom rich in copper, is obtained.

organ. A musical instrument, comprising ranks of pipes which radiate sound when blown by compressed air, the operation of the pipes being controlled by manuals on key-boards and by a set of pedals operated by the feet. By extension, any musical instrument producing by synthetic means tones similar to those obtained from pipes and operated from keyboards; e.g. the *Electrone* and *Hammond.*

organ pitch (*Acous.*). See **pitch of organ pipe stops.**

organ (*Bot., Zool.*). A part of the body of an animal or a plant adapted and specialised for the performance of a particular function.

or'gandie (*Textiles*). A light, transparent cotton dress material, with a stiff finish; usually plain-weave, but sometimes finished with a crimp stripe or with crammed stripes.

or'ganelle (*Cyt.*). A *cell organ* (q.v.).

organic axis (*Cyt.*). The principal axis of a cell, passing through the centrosome and the nucleus of the resting cell.

organic chemistry (*Chem.*). The study of the compounds of carbon. Owing to the ability of carbon atoms to combine together in long chains, these compounds are far more numerous than those of other elements. They are the basis of living matter.

organic disease. See under **functional disease.**

organised (*Biol.*). Showing the characteristics of an organism: having the tissues and organs formed into a unified whole.

organiser (*Zool.*). An organisation centre in development: a part of the body from which pass out organising influences to other regions of the embryo; as the anterior lip of the blastopore.

organism (*Biol.*). A living animal or plant.

organo-magnesium compounds (*Chem.*). *Grignard reagents* (q.v.), compounds of the type R.Mg.I.

organo-metallic compounds (*Chem.*). Compounds consisting of one or more alkyl radicals attached to the atom of a metal; e.g. $Na(CH_3)$, $Zn(C_2H_5)_2$, $Hg(C_2H_5)_2$, etc.

organogeny, organogen'esis (*Biol.*). The study of the formation and development of organs.

organog'raphy (*Bot.*). A descriptive study of the external form of plants, with relation to function.

or'ganon spira'le (*Zool.*). See **Corti's organ.**

organ'osol (*Chem.*). A colloidal solution in an organic liquid.

or'ganother'apy (*Med.*). Treatment of disease by administration of animal organs or extracts of them, especially of ductless gland extracts. See also **opotherapy.**

or'ganzine, —zēn (*Textiles*). Silk yarn intended to be used as warp; formed from two or more threads, run together, which have a slight twist imparted to them to withstand the strain of weaving.

or'gasm (*Zool.*). Turgescence: immoderate excitement.—*adj.* **orgastic.**

Orgatron (*Acous.*). An electronic musical instrument using the pneumatic action of a reed organ. The electrical current for the operation of radiating loudspeakers is obtained by electrostatic pick-ups operated by the motion of the languids of the air-operated reeds, using adequate amplifiers.

o'riel (*Build.*). A projecting window supported upon corbels or brackets.

Oriental alabaster (*Min.*). See under **alabaster.**

Oriental almandine (*Min.*). A trade name for corundum, of gemstone quality, which is deep-red in colour, resembling true almandine (a garnet) in this, but no other, respect.

Oriental amethyst, etc. (*Min.*). See **false amethyst,** etc.

Oriental cat's eye (*Min.*). See **cymophane.**

Oriental emerald (*Min.*). A trade name for corundum, of gemstone quality, resembling true emerald in colour.

oriental region (*Zool.*). One of the primary faunal regions into which the land surface of the globe is divided. It includes the southern coast of Asia east of the Persian Gulf, India south of the Himalayas, southern China and Malaysia, and the islands of the Malay Archipelago north and west of Wallace's line.

Oriental ruby (*Min.*). See **ruby.**

Oriental topaz (*Min.*). A variety of the mineral corundum in colour resembling topaz and sold as such.

orientation (*Biol.*). The position, or change of position, of a part or organ with relation to the whole: change of position of an organism under stimulus.

orientation (*Chem.*). (1) The determination of the position of substituent atoms and groups in an organic molecule, especially in a benzene nucleus. —(2) The ordering of molecules, particles, or crystals so that they point in a definite direction.

orientation (*Met.*). The position of important sets of planes in a crystal in relation to any fixed system of planes. See **pure metal crystal.**

orientation (*Surv.*). The process of rotating a plan in the horizontal plane until all survey lines on the plan are parallel to the corresponding lines on the ground.

orienting curvature (*Physiol.*). See **tropism.**

orifice (*Hyd.*). A small opening intended for the passage of a fluid.

origin distortion (*Cathode Ray Tubes*). Distortion of the wave-form indicated by a gas-focused cathode ray oscillograph employing electrostatic deflection, due to the non-linear relation between angular deflection and deflecting voltage which exists at low values of the latter. It results in a flattening of the wave-form where it crosses the zero line.

Oris'kany (Oriska'nian) Stage (*Geol.*) The higher of the two groups into which the strata of Lower Devonian age in eastern N. America are divided. It includes an impure detrital shaly limestone (Port Ewen Limestone), succeeded by the Oriskany Sandstone.

Orizab'a Limestones (*Geol.*). Thick limestones in the Comanchean, partly of Fredericksburg, partly of Washita age, occurring in Mexico.

or'leans (*Textiles*). (1) The name given to fabrics constructed from fine cotton warp and Botany worsted weft.—(2) A good type of American cotton, 1⅛ in. staple, shipped from New Orleans.

orlop deck (*Ship Constr.*). The lowermost deck in a ship of several decks. It is simply a platform, and contributes nothing to main longitudinal strength; usually of small extent.

or'molu (*Furn.*). See **mosaic gold.**

ornamental slating (*Build.*). Slating having a patterned or diamond-like arrangement.

ornis (*Zool.*). A Bird fauna.

ornith'ic (*Zool.*). Pertaining to Birds.

or'nithocop'ros (*Zool.*). The excrement of Birds.

ornithol'ogy (*Zool.*). The study of Birds.

or'nithophi'ly (*Bot.*). Pollination by Birds.

ornithop'ter (*Aero.*). Any flying machine that derives its principal support in flight from the air reactions caused by flapping motions of the wings, this motion having been imparted to them from the source of power being carried.

o'ro-. (1) (Latin *os*, gen. *oris*, mouth). A prefix used in the construction of compound terms; e.g. *oronasal* (q.v.).—(2) (Greek *oros*, mountain). A prefix used in the construction of compound terms; e.g. *orogenesis* (q.v.).

oroanal, ō-rō-ā'nal (*Zool.*). Connecting, pertaining to, or serving as, mouth and anus.

orogen'esis (*Geol.*). A phase in the building of mountains during which the accumulated sediments are compressed, giving rise to folds and faults.

orographic rain (*Meteor.*). Rain caused by moisture-laden winds impinging on the rising slopes of hills and mountains. Precipitation is caused by the cooling of the moist air consequent upon its being forced upwards.

orona'sal (*Zool.*). Pertaining to or connecting the mouth and the nose.

orope'sa float (or **sweep**). A fish-shaped float used in marine mine-sweeping to support the sweeping wire, the latter being drawn between two trawlers and kept at the correct depth by *otter boards* (q.v.).

or'piment (*Min.*). Trisulphide of arsenic, which crystallises in the monoclinic system. It is commonly associated with realgar, and is used as a pigment.

or'rery (*Astron.*). A mechanical model of the solar system showing the relative motions of the planets by means of clock-work; much in vogue in the eighteenth century. (Named after Charles Boyle, Earl of Orrery.)

Orsat apparatus (*Chem.*). A portable apparatus used in the analysis of flue, furnace, and exhaust gases. A sample of the gas is successively scrubbed by solutions which selectively absorb the CO_2, CO, and oxygen.

orthite (*Min.*). See **allanite.**

ortho- (Greek *orthos*, straight). A prefix used in the construction of compound terms; e.g. *orthoenteric*, having a straight alimentary canal.

ortho- (*Chem.*). Derived from an acid anhydride by combination with the largest number of water molecules.

ortho- (*Chem.*). (1) Containing a benzene nucleus substituted in the 1.2 positions.—(2) Consisting of diatomic molecules with parallel nuclear spins and an odd rotational quantum number.

ortho (*Photog.*). A term describing the registration of colours with correct grades of luminosities but without hue. Also ORTHOCHROMATIC, ORTHOSKIAGRAPHIC.

ortho film stock (*Cinema.*). Fine-grained positive film stock for printing in black-and-white, i.e. when the registration of the relative luminosities of colours is not in question.

orthoalumin'ic acid (*Chem.*). A term used to emphasise the acidic nature of aluminium hydroxide.

orthochromat'ic (*Photog.*). Said of emulsions which register visual luminosities correctly, apart from colour. Actually such emulsions are sensitive to all colours except red. See also **ortho.**

orthoclad'ous (*Bot.*). Having long, straight branches.

or'thoclase (*Min.*). Silicate of potassium and aluminium, $KAlSi_3O_8$, crystallising in the monoclinic system; it occurs as an essential constituent in granitic and syenitic rocks, and as an accessory in many other rock types. See also **sanidine, microcline.**

orthodi'agraph (*Med.*). An X-ray apparatus for recording exactly the size and form of organs and structures inside the body.

orthodon'tia. See **dentistry.**

orthogen'esis (*Biol.*). A theory of the mechanism of evolution which postulates that variation is determined by the action of the environment on the fixed constitution of the organism, so that the possibilities of variation are limited to certain definite lines.

orthogeotro'pism (*Bot.*). Growth of a stem vertically upwards, or of a root vertically downwards, in relation to gravity.

or'thogneiss, —thō-nis (*Geol.*). Term applied to gneissose rocks which have been derived from rocks of igneous origin. Cf. *paragneiss.*

orthog'onal (*Bot.*). The manner of arrangement of four members of a flower when two are median and two lateral.

orthograph. A view showing an elevation of a building or of part of a building.

orthojector circuit-breaker (*Elec. Eng.*). A form of circuit-breaker, requiring only a small quantity of oil, in which the arc is extinguished by a flow of oil across the contacts, which flow is produced partly by mechanical means and partly by the high pressure set up by the arc itself.

orthokinet'ic (*Chem.*). Migrating in the same direction.

orthopae'dics, orthope'dics. That branch of surgery which deals with deformities arising from injury or disease of bones or of joints.—*adj.* **orthopaedic.**

orthopho'ria (*Med.*). The state of normal adjustment and balance of the muscles of the eye.

orthophosphor'ic acid (*Chem.*). H_3PO_4. Formed when phosphorus pentoxide is dissolved in water and the solution is boiled.

or'thophyre (*Geol.*). A little-used term for a form of microsyenite, consisting essentially of orthoclase. Better used, if at all, as a textural term.

orthophy'ric (*Geol.*). A textural term applied to medium- and fine-grained syenitic rocks consisting of closely packed orthoclase crystals of stouter build than in the typical trachytic texture. The term actually implies the presence of porphyritic orthoclase crystals.

orthopnoea, orthopnea, —pnē'a (*Med.*). Dyspnoea so severe that the patient is unable to lie down; a symptom of heart failure.—*adj.* **orthopnoeic.**

Orthop'tera (*Zool.*). An order of *Exopterygota* in which the first pair of wings is thickened, and the second pair, if present, is membranous; anal cerci always occur, and the mouth-parts are adapted for biting; carnivorous or herbivorous forms, most of which burrow or live among foliage on the surface of the ground; Earwigs, Cockroaches, Praying Mantis, Stick Insects, Locusts, Grasshoppers, and Crickets.

orthop'terous (*Zool.*). Having the posterior pair of wings straight folded.

orthoptic treatment (*Med.*). The non-operative treatment of squint by specially devised stereoscopic exercises.

orthopyrox'ene (*Min.*). A group of pyroxene minerals crystallising in the orthorhombic system; e.g. enstatite, hypersthene.

orthora'dial (*Zool.*). Said of a type of segmentation in which the lines of cleavage are symmetrically arranged with relation to the main axis of the ovum.

orthorhom'bic system (*Crystal.*). The style of crystal architecture which is characterised by three crystal axes, at right-angles to each other and all of different lengths. It includes such minerals as olivine, topaz, and barytes.

orthoselection (*Biol.*). Modification resulting from the elimination of all other lines of variation through the selective struggle.

orthoskiagraph'ic (*Photog.*). See **ortho.**

orthostat'ic (*Med.*). Associated with or caused by the erect posture; e.g. *orthostatic* albuminuria.

orthostich'ous (*Zool.*). Arranged in straight rows; as the fin skeleton in Fish when the peripheral elements are parallel. Cf. *rachiostichous, rhipidostichous.*

or'thostich'y, orthostichies, —stik'ēz (*Bot.*). A vertical rank of leaves on a stem.

or'thostyle (*Arch.*). A colonnade formed of columns arranged in a straight line.

orthotro'pous (*Bot.*). (1) Said of an ovule which is straight, i.e. with the micropyle in a straight line with the funicle.—(2) Said of organs which show a sharp positive or negative tropism in respect to a given stimulus.

Ortmann's coastal regions (*Ocean.*). A series of faunistic regions into which the coastal waters of the world have been divided.

ory'zenin (*Chem.*). A protein of the *glutelin* (q.v.) group found in rice.

O.S. (*Astron., etc.*). Abbrev. for *Old Style* (q.v.).

O.S. (*Build.*). Abbrev. for *one side.*

Os (*Chem.*). The symbol for *osmium.*

os (*Zool.*). An opening, as the *os uteri.* (Latin *os,* gen. *oris,* mouth.)—*pl.* **o'ra.**

os (*Zool.*). A bone, as the *os coccygis.* (Latin *os,* gen. *ossis,* bone.)—*pl.* **ossa.**

os cloacae (*Zool.*) See **hypoischium.**

os coccygis (*Zool.*). See **urostyle.**

os penis (*Zool.*). A bone developed in the middle line of the penis in some Mammals, as Bats, Whales, some Rodents, Carnivores, and Primates.

osar (*Geol.*). See **esker.**

o'sazones (*Chem.*). The diphenylhydrazones of monosaccharoses, obtained by the action of two molecules of phenylhydrazine on one molecule of the monosaccharose. They are sparingly soluble in water, can be purified by recrystallisation, and serve to identify the respective monosaccharoses.

Osborne Beds (*Geol.*). A group of marls and sands, with thin limestones, belonging to the Oligocene System; found in the Isle of Wight.

oscillating current (*Radio*). The same as *alternating current*; the term is usually confined to those currents having frequencies of the order of hundreds of cycles per second, or higher.

oscillating cylinder (*Eng.*). An obsolete type of steam-engine whose cylinder oscillates on trunnions, through which the steam was admitted and exhausted: the same principle used in certain small oil-pumps, etc.

oscillation (*Radio*). The generation of alternating currents in a resonant circuit, usually with the aid of thermionic valves.

oscillation, centre of (*Phys.*). See **centre of oscillation.**

oscillation constant (*Radio*). The square root of the product of the inductance (in henries) and the capacitance (in farads) of a resonant circuit.

oscillation, damped (*Elec. Comm.*). See **damped oscillation.**

oscillation, time of (*Horol.*). The time of oscillation of a pendulum or balance is twice that of the single vibration.

oscillation transformer (*Radio*). Obsolete term for a high-frequency transformer used for coupling an antenna to a closed resonant circuit.

oscillation valve (*Radio, Thermionics*). An early name for a two- or three-electrode thermionic valve used as a detector or oscillator.

oscillator (*Radio*). A combination of thermionic valves and resonant circuits for the production of oscillations.

oscillator drift (*Radio*). The slow change in frequency of a thermionic valve oscillator occasioned by changing supply voltages, ageing, and warming-up of the valve and circuit elements, etc.

os'cillatory circuit (*Radio*). A circuit containing inductance and capacitance in series. Also called RESONANT CIRCUIT.

oscillatory discharge (*Radio*). The discharge of a condenser through an inductance when the resistance of the circuit is sufficiently low and the current persists after the condenser has completely discharged, so that it charges up again in the reverse direction, until the current reverses; the process is repeated until all the initial energy is dissipated in the resistance.

oscillatory scanning (*Television*). A system of scanning in which the scanning spot moves repeatedly to and fro across the image, so that successive lines are scanned in opposite directions.

oscillatron (*Thermionics*). The normal cathode ray tube as used for exhibiting or registering oscillograph wave-forms.

os'cillogram (*Elec. Eng.*). A record of a wave-form obtained from an oscillograph—usually by photographing the wave-form as exhibited by a line of light in the oscillograph.

os'cillograph (*Elec. Eng.*). An instrument for producing a curve representing the wave-form of an alternating quantity.

See **Blondel—**
cathode ray—
Duddell—
electrostatic—
hot-wire—

os'cilloscope (*Elec. Eng.*). A term sometimes employed to denote a low-voltage cathode ray oscillograph.

os'culant, os'culate (*Zool.*). Intermediate in characteristics between two groups, genera, or species.

osculating orbit (*Astron.*). The name given in dynamical astronomy to the orbit a body would have if at a specified instant all the other planets were annihilated and it moved under the sole attraction of the sun.

os'culum (*Zool.*). In *Porifera*, an exhalant aperture by which water escapes from the canal system.—*adjs.* **oscular, osculiferous.**

Osler's disease, Osler-Vaquez disease (*Med.*). See **erythraemia.**

osmete'rium (*Zool.*). In certain *Papilionidae*, a bifurcate sac exhaling a disagreeable odour which can be protruded through a slit-like aperture in the first thoracic segment.

osmic acid (*Chem.*). An erroneous name for osmium tetroxide, OsO_4, yellow crystals which give off an ill-smelling, poisonous vapour. Its aqueous solution is used as a histological stain for fat.

osmirid'ium (*Met.*). A very hard, white, naturally occurring alloy of osmium (17-48%) and iridium (49%) containing smaller amounts of platinum, ruthenium, and rhodium.

osmium (*Chem.*). Symbol, Os. A metallic element in the eighth group of the periodic system, a member of the platinum group. At. no. 76, at. wt. 191·0, m.p. 2500°. Osmium is the heaviest substance known; sp. gr. at 20° C. 22·48. Specific electrical resistivity 9·5 microhms per cm. cub. Finely divided, it is an important catalyst for gas reactions. The metal is not attacked by any acids.

osmom'eter (*Chem.*). An apparatus for the measurement of osmotic pressures.

os'mophore (*Chem.*). See **odoriphore.**

osmo'sis (*Chem.*). The diffusion of a solvent through a semi-permeable membrane into a more concentrated solution in order to equalise the concentrations on both sides of the membrane.

osmotic coefficient (*Chem.*). The quotient of the van't Hoff factor and the number of ions produced by the dissociation of one molecule of the electrolyte.

osmotic pressure (*Chem.*). The pressure exerted by a dissolved substance in virtue of the motion of its molecules. It may be measured by the pressure which must be applied to a solution in order just to prevent osmosis into the solution.

osone (*Chem.*). The oxidation product of an osazone, obtained by the elimination of phenylhydrazine and oxidation by the action of HCl. Osones contain the group $\mathrm{O{:}\overset{|}{C}\text{—}CH{:}O}$. When reduced, the aldehyde group only is converted into a hydroxyl group, and by this method it is possible to convert an *aldose* (q.v.) into a *ketose* (q.v.); e.g. glucose into fructose.

osphrad'ium (*Zool.*). A sense-organ of certain aquatic *Mollusca*, consisting usually of a patch of columnar ciliated epithelium, richly innervated from the visceral commissure; formerly believed to be of olfactory function, but now suspected of being concerned in the assessment of suspended silt in the water entering the mantle chamber.—*adj.* **osphradial.**

ossa (*Zool.*). See **os.**

ossein, os'e-in (*Chem.*). A collagen forming the chief organic constituent of bone, from which, by hydrolysis, glucosamine can be obtained.

os'seoalbu'minoid (*Chem.*). A collagen found in bone.

osseomu'coid (*Chem.*). A collagen found in bone.

os'seous (*Zool.*). Bony: resembling bone.

os'sicle (*Zool.*). A small bone: in *Echinodermata*, one of the skeletal plates: in *Crustacea*, one of the calcified toothed plates of the gastric mill.

ossifica'tion (*Zool.*). The formation of bone: transformation of cartilage or mesenchymatous tissue into bone.—*v.* **ossify.**

Osta'riophy'si (*Zool.*). A large order of *Neopterygii* having cycloid scales, abdominal pelvic fins, and soft-rayed median fins; the anterior vertebrae are co-ossified and associated with a chain of small bones (Weberian ossicles) connecting the air-bladder with the internal ear; cosmopolitan fresh-water forms. Cannibal Fish, Carps, Loaches, and Cat-fishes.

oste-, osteo- (Greek *osteon*, bone). A prefix used in the construction of compound terms; e.g. *osteogenetic*, pertaining to the production of bone.

ostei'tis (*Med.*). Inflammation of a bone.

osteitis defor'mans (*Med.*). See **Paget's disease.**

osteitis fibro'sa (*Med.*). See **fibrocystic disease.**

osteo-arthritis, ostearthritis (*Med.*). Arthritis deformans. A form of chronic arthritis in which the cartilages of the joint and the bone adjacent to them are gradually worn away.

osteo-arthrop'athy (*Med.*). Strictly, any disease affecting both bones and joints. Specifically, symmetrical enlargement of the bones of the hands and the feet with thickening of the fingers and toes, associated especially with chronic diseases of the lungs or of the heart.

os'teoblast (*Zool.*). A bone-forming cell.

osteochondri'tis (*Med.*). Inflammation of both bone and cartilage. See also **Perthe's disease.**

osteochondro'ma (*Med.*). A tumour composed of bony and of cartilaginous elements.

osteocla'sis (*Med*). (1) The surgical fracture of a bone for the correction of deformity.—(2) The absorption and destruction of bone tissue by osteoclasts.

os'teoclast (*Zool*). A bone-destroying cell, especially one which breaks down any preceding matrix, chondrified or calcified, during bone-formation.

osteocra'nium (*Zool*). The bony brain-case which replaces the chondrocranium in higher Vertebrates.

osteoder'mis (*Zool*). An ossified or partially ossified dermis. membrane bones formed by ossification of the dermis.—*adj.* **osteodermal.**

osteogen'esis (*Zool.*). See **ossification.**

osteogenesis imperfec'ta (*Med.*). See **fragilitas ossium.**

osteol'ogy (*Zool.*). The study of bones.

osteo'ma (*Med.*). A tumour composed of bone.

osteomala'cia (*Med.*). Mollities ossium. A condition in which softening of the bones, as a result of absorption of calcium salts from them, occurs, especially in pregnant women; thought to be causally related to deficiency in Vitamin D in the diet.

osteomyeli'tis (*Med.*). Inflammation of the bone-marrow and of the bone.

osteop'athy. A method of healing, based on the fact that abnormalities in the human framework (bones, muscles, ligaments, etc.) ultimately cause disease by interfering with the blood and nerve supply to the body, thereby allowing other factors in ill-health to exert their influence unduly. These abnormalities are often the direct single cause of much suffering and they can be removed by skilled manual adjustment.

osteopathyro'sis (*Med.*). See **fragilitas ossium.**

osteopetro'sis (*Med.*). Albers-Schönberg disease; congenital osteosclerotic anaemia; marble bones. A rare condition in which the bones become solid as a result of obliteration of the bone-marrow by bone, associated with enlargement of the liver and of the spleen, and with anaemia.

osteopha'gia (*Vet.*). A depraved appetite for bones and dead animals, exhibited by herbivorous animals suffering from a deficiency of phosphorus and calcium salts in the diet.

os'teophyte (*Med.*). A bony excrescence or outgrowth from the margin of osteo-arthritic joints or from diseased bone.

osteoporo'sis (*Zool.*). Development of a porous structure by absorption of bone.

osteosarco'ma (*Med.*). A malignant tumour derived from osteoblasts, composed of bone and sarcoma cells.

osteosclereide, —skler'ēd (*Bot.*). A thick-walled idioblast which is shaped something like a thigh-bone.

osteosclero'sis (*Med.*). Abnormal thickening of bone. See also **osteopetrosis.**

os'teoscute (*Zool.*). In *Vertebrata*, a flat dermal ossification.

osteot'omy (*Surg.*). The surgical cutting of a bone.

os'tiolate (*Bot.*). Having an opening.

os'tiole (*Bot.*). (1) The opening by means of which spores, etc. escape from a conceptacle or a perithecium.—(2) A general term for a pore.

os'tium (*Zool.*). A mouth-like aperture: in *Porifera*, an inhalant opening on the surface: in *Arthropoda*, an aperture in the wall of the heart by which blood enters the heart from the pericardial cavity: in *Mammalia*, the internal aperture of a Fallopian tube.—*adj.* **ostiate.**

Ostrac'oda (*Zool.*). A subclass of *Crustacea* of minute size, occurring in both fresh and salt water; there is a bivalve shell without growth lines enclosing the head, and a large mandibular palp; normally there are seven pairs of appendages; parthenogenesis commonly occurs, the males of some species being unknown.

Ostwald colour atlas (*Photog.*). A system of colour relations arranged according to hue, luminosity, and saturation.

Ostwald's dilution law (*Chem.*). The application of the law of mass action to the ionisation of a weak electrolyte, yielding the expression $\frac{\alpha^2}{(1-\alpha)V}=K$, where α is the degree of ionisation, V the *dilution* (2, q.v.), and K the ionisation constant, for the case in which two ions are formed.

Ostwald's theory of indicators (*Chem.*). The assumption that all *indicators* (1, q.v.) are either weak acids or weak bases, in which the colour of the ionised form differs markedly from that of the undissociated form.

O.S. & W. (*Build.*). Abbrev. for *oak, sunk, and weathered.*

ot-, oto- (Greek *ous*, gen. *otis*, ear). A prefix used in the construction of compound terms; e.g. *otalgia* (q.v.).

otal'gia (*Med.*). Earache.

o'tic (*Zool.*). Pertaining to the ear or to the auditory capsule. one of the cartilage bones of the auditory capsule.

otid'ium (*Zool.*). A statocyst of *Mollusca*.

oti'tis (*Med.*). Inflammation of the ear.—OTITIS EXTERNA, a term for various inflammatory conditions of the external ear.—OTITIS MEDIA, inflammation of the middle ear.

otoco'nia (*Zool.*). Numerous small concretions which, in some *Mollusca* (e.g. most *Euthyneura*), replace the single large concretion or otolith in the otocyst.

o'tocyst (*Zool.*). In many aquatic Invertebrates, a sac lined by sensory hairlets, filled with fluid, and containing a calcareous concretion (*otolith*) which subserves the equilibristic sense, and was formerly believed also to serve the sense of hearing: in Vertebrates, part of the internal ear which is similarly constructed (as the utriculus).

o'tolith (*Zool.*). The calcareous concretion which occurs in an otocyst.

otol'ogy (*Med.*). That part of surgical science dealing with the organ of hearing and its diseases. —*n.* **otol'ogist.**

otorhi'nolaryngol'ogy. That part of surgical science which deals with diseases of the ear, nose, and throat.

otorrhoe'a, otorrhe'a (*Med.*). A discharge, especially of pus, from the ear.

otosclero'sis (*Med.*). The formation of spongy bone in the capsule of the labyrinth of the ear, associated with progressive deafness.

o'toscope (*Med.*). An instrument for inspecting the external canal of the ear and the ear-drum.

otter (*Furs*). The dressed skin of the otter, a fish-eating animal living in streams and lakes; the fur is of a rich-brown colour, even and thick.

otter boards (*Ocean.*). Oblong boards, bound with iron, attached to the sides of a trawl net and eccentrically to the towing warps; they serve to keep the mouth of the net open. Also used in marine mine-sweeping (see **oropesa sweep**).

Otto cycle (*I.C. Engs.*). The working cycle of a 4-stroke engine, consisting of suction, compression, explosion at constant volume, expansion, and exhaust, occupying two revolutions of the crankshaft.

ottoman rib cloths (*Textiles*). Dress fabrics made from Botany quality yarns, generally hard twisted, with a warp rib; in two of the varieties, *ottoman* and *soleil*, the ribs are of equal size, but in *ottoman cord* they are of two different sizes.

ot'trelite (*Min.*). A manganese-bearing chloritoid mineral, a product of the metamorphism of certain argillaceous sedimentary rocks, named from Ottrez in the Ardennes (Belgium).

ottrelite-slate (*Geol.*). A metamorphic argillaceous rock characterised by abundant crystals of ottrelite.

out-and-in bond (*Masonry*). The mode of laying ashlar quoins, so that they shall be headers and stretchers alternately.

out-of-balance (*Eng*). Said of a reciprocating engine in which the reciprocating parts are imperfectly balanced.

out-of-phase (*Elec. Eng.*). Said of alternating quantities, having the same frequency, which reach their maximum values at different instants of time.

out of register (*Print.*). See **register.**

out of wind (*Carp., etc*). A term applied to a flat surface. a surface which is not twisted.

out-to-out (*Join., etc.*). A term applied to an overall measurement across a piece of framing.

out-band (*Masonry*). A jamb stone laid as a stretcher and recessed to take a frame.

outbreeding. See **exogamy.**

outburst bank (*Hyd. Eng.*). The middle part of the slope of a sea embankment, above the footing and below the swash-bank.

outcrop (*Geol.*). An occurrence of a rock at the surface of the ground.—Also *v.*

outdoor substation (*Elec. Eng.*). A substation in which the transformers, switchgear, etc. are mounted entirely in the open air, having been suitably weatherproofed for the purpose.

outer (*Elec. Eng.*). Either of the two conductors of a 3-wire distribution system which are respectively at a voltage above and below earth. Cf. the *neutral* (or *middle*) *conductor*, which is at approximately earth potential.

outer conductor (*Elec. Eng.*). See **external conductor.**

outer cover (*Aero.*). The external covering of the hull structure of a rigid airship; it serves for the protection of the gas-bags and structure, and to preserve the aerodynamic form of the hull.

outer dead-centre (*Eng.*). The position of the crank of a reciprocating engine or pump when the piston is at the end of its outstroke, i.e. when the piston is nearest the crankshaft.

outer forme (*Typog.*). The forme of type from which the outside of a sheet is printed, viz. pages 1; 4, 5; 8, 9, etc.

outer string (*Join.*). The *string* (q.v.) farthest from the wall.

outer tympan (*Typog.*). The larger tympan of a press, into which the smaller one fits.

outfall (*San. Eng.*). The discharge point of a sewer.

outfall sewer (*San. Eng.*). The main sewer carrying away sewage material from a town to the place where it is to be purified or discharged.

out-gate (*Foundry*). See **riser.**

outgoing (*Teleph.*). Indication of the direction of a call with respect to a position, exchange, or selector. Cf. *incoming.*

outgoing feeder (*Elec. Eng.*). A feeder along which power is supplied from a substation or generating station.

outgoing jack (*Teleph.*). A jack which is directly connected to a junction to another exchange, or with a trunk line.

outlet (*Auto. Teleph.*). One of a number of possible outgoing circuits from a switch to the next free switch which is to be operated in establishing a connexion.

outlet (*Build.*). An opening serving to direct the discharge of a liquid.

out'lier, —li-er (*Geol.*). A remnant of a younger rock which is surrounded by older strata. It normally forms a hill, often capped by a durable rock, and occurs in front of an escarpment. Cf. *inlier.*

output coefficient (*Elec. Eng.*). See **specific torque coefficient.**

output transformer (*Elec. Comm.*). A transformer which couples the last stage in a valve amplifier with the load, e.g. a loudspeaker or line.

output valve (*Radio, Thermionics*). A valve designed to be capable of delivering a relatively large amount of alternating-current power, instead of being purely a voltage amplifier. The final valve in a multi-stage amplifying circuit. Also called POWER VALVE.

outrigger (*Build.*). A projecting beam carrying a suspended scaffold.

outside broadcasting (*Radio*). The broadcasting of programme material which originates outside the precincts of the studio. Abbrev. **O.B.**

outside crank (*Eng.*). An overhung, or single-web crank attached to a crankshaft outside the main bearings.

outside cylinders (*Eng.*). The steam cylinders carried outside the frame of a locomotive, working on to crank-pins in the driving wheels.

outside gouge (*Carp., etc.*). A firmer gouge having the bevel ground upon the convex side of the cutting edge.

outside lap (*Eng.*). The amount by which the slide-valve of a steam-engine overlaps the edge of the steam ports when in mid-position. Also called the STEAM LAP.

outside lines (*Cinema.*). Sight lines which are outside the angle of view of the lens of a camera.

outside lining (*Join.*). The external member of a cased frame.

outside reams (*Print.*). Reams of paper made up of defective sheets (*outsides*, q.v.).

outsides (*Paper*). See under **insides.**

outwash fan (*Geol.*). A sheet of gravel and sand, lying beyond the margins of a sheet of boulder clay, deposited by melt-waters from an ice-sheet or glacier.

ova (*Bot., Zool.*). *Pl.* of *ovum.*

oval (*Bot.*). Flat, rounded at each end, with curved sides, and about twice as long as broad, widest in the middle.

oval pistons (*I.C. Engs.*). (1) Pistons, originally round, worn oval through friction at the thrust faces.—(2) Pistons purposely turned slightly oval, to compensate for the unequal diametral expansion due to the gudgeon-pin bosses.

ova'rian (*Anat.*). Pertaining to or connected with the ovary.

ova'riole (*Zool.*). In Insects, one of the egg-tubes of which the ovary is composed.

ova'riotes'tis (*Zool.*). See **ovotestis.**

ovari'tis (*Med.*). Inflammation of an ovary.

o'vary (*Anat., Zool.*). A female gonad: a reproductive gland producing ova.—*adj.* **ova'rian.**

ovary (*Bot.*). (1) The basal enlarged part of a carpel or of a syncarpous gynaeceum, containing the ovules.—(2) Loosely used as meaning the *pistil.*

ovate (*Bot.*). Flat and thin, shaped like the longitudinal section of an egg, widest below the middle.

overall efficiency (*Elec. Eng.*). When power is passed through a number of items of plant in succession, e.g. a steam turbine and a generator, or a transformer and a synchronous convertor, the *overall efficiency* is the ratio of the output from the final item of plant to the input to the first.

overall grade of service (*Auto. Teleph.*). The grade of service of an exchange as a whole, as distinct from the grade adopted in specified groups of circuits. See **grading.**

overbridge (*Civ. Eng.*). A bridge carrying one road over another which is in cutting.

overburden (*Build.*). The encallow, or overlying stratum of soil, in brickfields.

overcast (*Meteor.*). Said of the sky when more than eight-tenths of it is covered by cloud.

overcasting (*Bind.*). The method of sewing used to make separate leaves into sections for binding Also called WHIPPING, WHIPSTITCHING.

overcheck (*Textiles*). The name applied to a prominent check effect in a check fabric, to distinguish it from the more subdued pattern with which it is combined.

overcloak (*Plumb.*). When the overlapping edge in a roll extends over to the flat surface beyond the roll, it is called an *overcloak*.

overcoil (*Horol.*). The last coil of a balance spring, which is raised above the plane of the spring and then bent to form a terminal curve.

over-compounded generator (*Elec. Eng.*). A compound-wound d.c. generator in which the series winding is so designed that the voltage rises as the load increases.

over-compounded motor (*Elec. Eng.*). A compound-wound d.c. motor in which the series winding is so designed that the speed rises with an increase in load.

over-current (or **overload) relay** (*Elec. Eng.*). A relay which operates as soon as the current exceeds a certain predetermined value.

over-current release (*Elec. Eng.*). A device for tripping an electric circuit when the current in it exceeds a certain predetermined value. Also called OVERLOAD RELEASE.

overcutting (*Acous.*). The use of too great amplitude of radial motion in cutting the original gramophone record on the wax blank, so that one track cuts into the adjacent track.

overdoor (*Build.*). (1) An ornamental door-head.—(2) A pediment.

over-exposure (*Photog.*). Excess of exposure of any sensitive surface, above that required for the proper gradation of light and shade. Over-exposure is indicated by lack of detail and prevalence of fog after development.

overfeed stoker (*Eng.*). A *mechanical stoker* (q.v.) consisting of a hopper from which the fuel is continuously fed on to the bars of an inclined stepped grate, mechanically oscillated or rocked to cause the burning fuel to descend towards an ash table.

overflow (*Plumb.*). A means of escape provided for excess water supplied to cisterns, sinks, water-tanks, etc.

overflow meter (*Auto. Teleph.*). A meter which counts the number of calls which fail to get through any system of trunking in an automatic switching exchange because of lack of trunks or outlets.

overfold (*Geol.*). A fold with both limbs dipping in the same direction, but one more steeply inclined than the other. Cf. *isoclinal fold.*

overgraining (*Paint.*). A coat of graining colour (usually mixed with beer to act as a drier) applied over grained work so as to produce shades across the work.

overgrowth (*Crystal.*). See **crystalline overgrowth.**

overhang (*Aero.*). (1) In multiplanes, the distance by which the tip of one of the planes projects beyond the tip of another.—(2) In a wing structure, the distance from the outermost supporting point to the extremity of the wing tip.

overhang (*Elec. Eng.*). See **armature end connexions.**

overhead camshaft (*I.C. Engs.*). A *camshaft* (q.v.) running across the top of the cylinder-heads of an engine, usually driven by a bevel-shaft from the crankshaft, the cams operating on rockers or directly on the valve-stems.

overhead-contact system (*Elec. Eng.*). The method of supplying current to the vehicles of an electric traction system whereby the current is collected from a contact wire suspended above the track, by means of current-collectors mounted on the roof of the vehicle. The term may also refer to the actual contact wire and its supporting structure.

overhead crossing (*Elec. Eng.*). A device used on the overhead-contact wire system of an electric railway or tramway, to allow the crossing of two contact wires and permit the passage of a current-collector along either wire.

overhead expenses. See **on-costs.**

overhead railway (*Civ Eng*). An elevated railway carried above ground-level on arches or viaducts.

overhead transmission-line (*Elec. Eng.*). A transmission line in which the conductors are supported on poles, towers, or other similar structures at a considerable height above the earth.

overhead travelling-crane (*Eng.*). A workshop crane consisting of a girder along which a wheeled crab can be traversed. The girder is mounted on wheels running on rails fixed along the length of the shop, near the roof. Travelling, traversing, and lifting are done by hand or power. Also called SHOP TRAVELLER.

overhead valves (*I.C. Engs.*). In a vertical petrol- or oil-engine, inlet and exhaust valves working in the surface of the head opposite the piston, either in a vertical position or inclined.

overhearing (*Teleph.*). The *cross-talk* (q.v.) between a phantom and a side circuit.

overheated (*Met.*). Said of metal which has been heated in preparation for hot-working, or during a heat-treating operation, to a temperature at which rapid grain growth occurs and large grains are produced. The structure and properties can be restored by treatment, and in this respect it differs from burning (see **burnt metal**).

overlap (*Geol.*). The relationship between conformable strata laid down during an extension of the basin of sedimentation (for example, on the margins of a slowly sinking landmass), so that each successive stratum extends beyond the boundaries of the one lying immediately beneath. Cf. *off-lap* and *overstep.*

overlap span (*Elec. Eng.*). See **section gap.**

overlap test (*Elec. Eng.*). A test used for locating a fault in a cable; the resistance between the cable and earth is measured, first with the far end of the cable earthed, and again with it free.

overlay (*Typog.*). To adjust the impression surface of a machine by cutting and patching, in order to increase the pressure on dark tones and decrease it on light tones.

overload. A load on a machine, etc. greater than that which it is designed to withstand continuously.

overload capacity (*Elec. Eng.*). The amount of overload which an electrical machine can withstand for a specified length of time without excessive heating, commutation, or other adverse effect.

overload protective system (*Elec. Eng.*). A system of protecting an electric power network by means of over-current relays. To provide discrimination, the relays have time lags, graded so that the relays more remote from the supply point have shorter lags.

overload relay (*Elec. Eng.*). See **over-current relay.**

overload release (*Elec. Eng.*). See **over-current release.**

overman (*Mining*). (1) An underground manager of one or more ventilating districts in a coal-mine.—(2) An umpire appointed to an arbitration board in a mine dispute.

overmantel (*Build.*). The upper part of the ornamental front to a fireplace.

overmodulation (*Radio*). Modulation to a depth exceeding 100%, i.e. to such a degree that the amplitude falls to zero for an appreciable fraction of the modulating cycle.

overpick (*Weaving*). The condition when the *picking* (q.v.) arm of a loom is above the shuttle box.

overpoled copper (*Met.*). See **poling.**

overproof (*Spirits*). See **proof*.**

overreach (*Vet.*). An error of gait in the horse, in which the toe of the hind foot strikes the heel of the fore foot.

over-rigid (*Struct.*). See **redundant.**

overrun (*Typog.*). To carry words from the end of one line of type to the beginning of the next, and so on until the matter fits. Insertions or deletions frequently necessitate overrunning.

oversailing courses (*Build.*) Brick or stone courses projecting from a wall for the sake of appearance only, as distinct from corbels, which are load-carrying.

overshooting (*Cinema.*). The application of too high transmission level to the film recorder, so that the modulation exceeds the available maximum amplitude in variable-area recording and the latitude of the emulsion in variable-density recording.

overshot wheel (*Eng.*). A water-wheel in which the discharge flume or head-race is at the top, the water flowing tangentially into the buckets.

oversite concrete (*Build.*). A concrete layer covering a building site within the external walls, serving to keep out ground air and moisture, and also providing a foundation for the floor.

overspeed protection (*Elec. Eng.*). Protection, usually by means of a centrifugally operated device, against excessive speed of an electric machine; used on inverted rotary convertors and also on d.c. motors in certain cases.

overstep (*Geol.*). The structural relationship between an unconformable stratum and the outcrops of the underlying rocks, across which the former transgresses. Cf. *overlap.*

overstrain (*Eng.*). The result of stressing an elastic material beyond its *yield point* (q.v.); a new and higher yield point results, but the elastic limit is reduced.

overthrust fault (*Geol.*). A fault of low hade along which one slice or block of rock has been pushed bodily over another, during intense compressional earth-movements. The horizontal displacement along the thrust plane may amount to several miles. See **thrust plane.**

overtone (*Acous.*). In a complex tone, any of the components above the fundamental frequency.

overvoltage (*Chem.*). The difference between the potential at which a gas, especially hydrogen, is evolved from a solution and the potential of a reversible electrode of the same gas in the same solution. It is largely characteristic of the material at which the gas is evolved.

overvoltage protective device (*Elec. Eng.*). A device giving protection to electrical apparatus against the possibility of damage caused by an excess voltage, i.e. a voltage above normal.

overvoltage release (*Elec. Eng.*). A device arranged to trip an electrical circuit when the voltage in it exceeds a certain predetermined value.

ovi- (Latin *ovum*, egg). A prefix used in the construction of compound terms; e.g. *oviform.*

o'vicell (*Zool.*). In *Polyzoa*, a modified zooecium which acts as a brood-pouch.

o'viduct (*Zool.*). The tube which leads from the ovary to the exterior and by which the ova are discharged.—*adj.* **ovidu'cal.**

ovif'erous, ovig'erous (*Zool.*). Used to carry eggs, as the *ovigerous* legs of *Pycnogonida.*

ovip'arous (*Zool.*). Egg-laying; cf. *viviparous.*—*n.* **ovipar'ity.**

oviposition (*Zool.*). The act of depositing eggs.—*v.* **ovipos'it.**

ovipos'itor (*Zool.*). In some Fish (as the Bitterling), a flexible tube formed by the extension of the edges of the genital aperture in the female: in female Insects, the egg-laying organ formed by the three pairs of gonapophyses.

o'visac (*Zool.*). A brood-pouch: an egg receptacle.

o'void (*Bot.*). Solid, like an egg in form, and attached by the broader end.

o'volo (*Arch.*). A quarter-round convex moulding.

o'votes'tis (*Zool.*). A genital gland which produces both ova and spermatozoa, as the gonad of the Snail.

o'vovivip'arous (*Zool.*). Producing eggs which hatch out within the uterus of the mother.

ovula'tion (*Zool.*). The formation of ova: in Mammals, the process of escape of the ovum from the ovary.

ov'ule (*Bot*). (1) The nucellus containing the embryo sac and enclosed by one or two integuments, which, after fertilisation, and subsequent development, becomes the seed.—(2) A young seed in course of development.

ovulif'erous scale (*Bot.*). One of the scales of a fertile cone in *Coniferae*; it bears the ovules, and later, the seeds, and the sum total of all the ovuliferous scales present makes up the greater part of the mature cone.

o'vum (*Bot., Zool.*). A non-motile, female gamete.—*pl.* **ova.**

Owen bridge (*Elec. Eng.*). An a.c. bridge in which an inductance is measured in terms of a standard capacitance and two resistances.

Owen's organ (*Zool.*). In female *Nautiloidea*, an oval structure with numerous closely set ridges lying between the groups of tentacles.

ox-eye (*Build*). A dormer window oval in shape.

oxalates (*Chem.*). The salts and esters of oxalic acid.

oxal'ic acid (*Chem.*). $HOOC{\cdot}COOH,2H_2O$, a dibasic acid which crystallises with two molecules of water in monoclinic prisms, m.p. 101° C., m.p. (anhydrous) 190° C.; it sublimes readily, occurs in many plants, is obtainable by the oxidation of many organic substances and is prepared technically by the fusion of sawdust with caustic soda or potash at about 220° C. Permanganate of potash oxidises it to CO_2, which reaction is used in volumetric analysis.

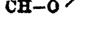
oxalu'ria (*Med.*). The presence of crystals of oxalates in the urine.

ox'alyl (*Chem.*). The bivalent acid radical $O{:}\overset{|}{C}{\cdot}\overset{|}{C}{\cdot}O$.

oxam'ic acid (*Chem.*). $H_2N{\cdot}CO{\cdot}COOH$, a crystalline powder, m.p. 210° C. (with decomposition).

oxam'ide (*Chem.*). $H_2N{\cdot}CO{\cdot}CO{\cdot}NH_2$, the normal amide of oxalic acid, a crystalline powder which sublimes when heated.

oxazoles (*Chem.*). Derivatives of oxazole,



ox'eote (*Zool.*). Rod-shaped.—*n.* **ox'ea.**

Oxford Clay, Oxfordian Stage (*Geol.*). A thick bed of blue marine clay which is shaly in part and belongs to the Upper Jurassic rocks. It is important for brick-making, e.g. at Peterborough (Fletton), and has yielded the remains of many extinct reptiles (*Ichthyosaurus, Plesiosaurus, Dinosauria*, etc.) and ammonites.

Oxford shirting (*Textiles*). A plain-weave cotton fabric, generally striped, used for shirting; a plain shirting of this type is known as a *plain Oxford.*

ox'idase (*Bot., Zool.*). One of a group of enzymes occurring in plant and animal cells and promoting oxidation.

oxidation (*Chem.*). The addition of oxygen to a compound. More generally, any reaction which involves the loss of electrons from an atom.

oxidation-reduction indicators (*Chem.*). Substances which exist in oxidised and reduced forms having different colours, used to give approximate values of oxidation-reduction potentials.

oxidation-reduction potential (*Chem.*). See **standard oxidation-reduction potential.**

oxides (*Chem.*). Compounds of oxygen with another element. Oxides are formed by the combination of oxygen with most other elements, particularly at elevated temperatures, but not with those of group O in the periodic system, the inert gases, helium, argon, neon, etc.

oxide-coated cathode (*Thermionics*). A cathode coated with oxides of the alkali and alkaline-earth metals, to produce thermionic emission at relatively low temperatures.

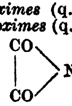
oxide-coated filament (*Thermionics*). An incandescent filament, coated with oxides of the alkali metals, which acts as an oxide-coated cathode.

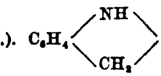
oxide-film arrester (*Elec. Eng.*). A lightning arrester depending for its action on the fact that a layer of lead peroxide, which is a good conductor, changes to red lead, which is a good insulator, when heated by the passing of a current.

oxidising agent (*Chem.*). A substance which is capable of bringing about the chemical change known as oxidation.

oxidising flame (*Chem.*). The outer cone of a non-luminous Bunsen flame.

ox'imes (*Chem.*). Compounds obtained by the action of hydroxylamine on aldehydes or ketones, containing the bivalent oximino group :N·OH attached to the carbon. The oximes of aldehydes are termed *aldoximes* (q.v.) and those obtained from ketones *ketoximes* (q.v.).

oxim'ide (*Chem.*).  $\begin{matrix}CO\\ |\\ CO\end{matrix}\!\!>\!NH$, colourless prisms. It is prepared by the action of P_2O_5 upon oxamic acid.

oxin'dole (*Chem.*).  $C_6H_4\!<\!\begin{matrix}NH\\ CH_2\end{matrix}\!>\!CO$, the lactam of *o*-aminophenyl-acetic acid, colourless needles, m.p. 120° C. Oxindole is amphoteric, dissolving both in alkalis and in acids. The imino-hydrogen is exchangeable for other groups; e.g. ethyl, acetyl, etc.

oxo'nium salts (*Chem.*). Derivatives of a hypothetical oxonium hydroxide, $H_3O{\cdot}OH$, a base with a tetravalent oxygen atom. Such substances are readily produced from several heterocyclic compounds containing oxygen, e.g. dimethylpyrone, which forms salts with hydrochloric acid, etc. by direct addition to the oxygen atom.

oxter piece (*Carp.*). A piece of timber used in ashlering.

oxy- (Greek *oxys*, sharp). A prefix used to construct compound terms; e.g. *oxygnathous*, having sharp jaws.

oxyacan'thine (*Chem.*). $C_{19}H_{21}O_3N$, an alkaloid of the *iso*quinoline group, obtained from the root barks of the *Berberis* species. It crystallises in needles, m.p. 208°-214° C.

oxy-acetylene welding (*Eng.*). Welding with a flame resulting from the combustion of oxygen and acetylene.

oxycelluloses (*Chem.*). Products formed by the action of oxidising agents on cellulose. They dissolve in dilute alkaline solution and have strong reducing properties. When boiled with hydrochloric acid they yield furfuraldehyde quantitatively. This reaction serves for the analytical estimation of oxycelluloses.

oxyceph'aly (*Med.*). Steeple-head. A deformity of the skull characterised by a high forehead and a pointed vertex, associated with exophthalmos and impairment of vision.

oxychloride cement (*Build.*). A strong, extremely hard-setting cement used in making composition floors; composed of an oxide and a chloride of magnesia chemically combined.

ox'ychlor'ocru'orin (*Zool.*). The compound formed by oxidation of *chlorocruorin* (q.v.).

oxychro'matin (*Cyt.*). A form of chromatin which stains comparatively lightly, and contains little nucleic acid. Cf. *basichromatin.*

oxydac'tylous (*Zool.*). Having narrow-pointed digits.

oxygen (*Chem.*). Symbol, O. A non-metallic element in the sixth group of the periodic system. At. no. 8, at. wt. 16·0000, valency 2. It is a colourless, odourless gas which supports combustion and is essential for the respiration of most forms of life. M.p. −218·4° C., b.p. −183° C., density 1·42904 gms. per litre at N.T.P., formula O_2. An unstable form is ozone, O_3. Oxygen is the most abundant element, forming 21% by volume of the atmosphere, eight-ninths by weight of water, and nearly one-half by weight of the rocks of the earth's crust. It is manufactured from liquid air, for use in hot welding flames, in medical practice, and in anaesthesia; liquid oxygen mixed with charcoal, sawdust, etc. forms a powerful explosive.

oxygen-free high-conductivity copper (*Met.*). Copper made by a special treatment after electrolytic refining. Distinguished from tough-pitch by the absence of oxygen, and from deoxidised by the absence of deoxidisers.

oxyge'notax'is or **oxytax'is** (*Biol.*). Response or reaction of an organism to the stimulus of oxygen. —*adjs.* **oxygenotac'tic, oxytac'tic.**

oxygenotro'pism or **oxytro'pism** (*Biol.*). Synonym for *oxygenotaxis.*

oxyhae'mocy'anin (*Zool.*). The compound formed by oxidation of haemocyanin.

oxyhaemoglo'bin (*Chem., Zool.*). The product obtained by the action of oxygen upon haemoglobin. The oxygen is readily given up when the oxygen-tension is low in the surrounding medium.

oxy-hydrogen welding (*Eng.*). A method of welding in which the heat is produced by the combustion of a mixture of oxygen and hydrogen.

oxymuriatic acid (*Chem.*). The name given by Lavoisier to *chlorine.*

oxyn'tic (*Zool.*). Acid-secreting.

oxyproline (*Chem.*). 4-Hydroxypyrrolidine-2-carboxylic acid, obtained by the cleavage of gelatine.

oxytax'is (*Biol.*). See **oxygenotaxis.**

oxytocic, —tŏ'sik (*Zool.*). Stimulating uterine contraction.

oxytro'pism (*Biol.*). See **oxygenotaxis.**

oyster-fitting (*Illum.*). A bulkhead fitting designed to emit light on both sides of the bulkhead or other partition upon which it is mounted.

ozae'na, oze'na (*Med.*). Chronic atrophic rhinitis. Chronic inflammation of the nasal mucous membrane, which atrophies, with the formation of crusts in the nose and a foul smell.—(*Vet.*) Catarrh of the frontal and maxillary sinuses of the horse.

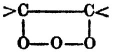
Ozar'kian (*Geol.*). The name applied by Ulrich to the equivalents, in N. America (Ozark, Missouri), of the Tremadocian of Great Britain; deposited during a period of transition between the Cambrian and Ordovician periods.

o'zobrome (*Photog*). A process for the production of large carbon prints from bromide prints.

ozo'kerite (*Min.*). A mineral paraffin wax, of dark yellow, brown, or black colour, m p. 55°-110° C., sp. gr. 0 85-0·95, soluble in petrol, benzene, turpentine; it is found in Galicia and near the Caspian Sea. When bleached, it forms *ceresine* (q.v.).

ozone (*Chem.*). O_3. Produced by the action of ultra-violet rays and radium emanation on oxygen, and when air or oxygen is exposed to a silent discharge of electricity. Powerful oxidising agent. Used in the conditioning of air and in ventilation.

o'zonides (*Chem.*). Explosive organic compounds formed by the addition of an ozone molecule to a double bond. They thus contain the characteristic grouping:



ozoniser (*Chem.*). An apparatus in which oxygen is converted into ozone by being subjected to an electric brush discharge.

o'zotype (*Photog.*). A process in which a carbon tissue is pressed on to an exposed bichromated print before development.

p (*Build., Hyd.*). Abbrev. for *prime, pitch,* and *pressure intensity.*

***p*-** (*Chem.*). An abbrev. for: (1) *para-*, i.e. containing a benzene nucleus substituted in the 1.4 positions; (2) *primary*, i.e. containing the functional group attached to a $-CH_2$ group.

p_H, *p*H, P_H (*Chem.*). See ***p*H-value.**

P (*Biol.*). Symbol for *parental generation.*—P_1, the first parental generation.—P_2, the grandparental generation.

P (*Chem.*). The symbol for *phosphorus.*

[*P*] (*Chem.*). The symbol for *parachor.*

P. and C. (*Build.*). Abbrev. for *parge and core.*

P. and S. (*Carp.*). Abbrev. for *planking and strutting.*

P side. See **prompt side.**

P-trap (*San. Eng.*). A type of trap shaped like the letter P, and having a nearly horizontal outlet; used in sanitary pipes.

P-wire (*Auto. Teleph.*). The third, guard, or private wire of the three which constitute a channel through an exchange; it holds the circuit when established, and, by retaining an earth, guards the circuit at every point from an extraneous connexion.

π- (*Chem.*). A symbol for *peri-*, i.e. containing a condensed double aromatic nucleus substituted in the 1.8 positions.

π-network (*Elec. Comm.*). An electrical network consisting of a shunt arm, a series arm, and another shunt arm equal to the first shunt arm.

Π (*Chem.*). A symbol for *pressure*, especially *osmotic pressure.*

Pa (*Chem.*). The symbol for *protoactinium.*

P.A. (*Elec. Comm.*). Abbrev. for (1) *public-address*; (2) *power amplifier.*

P.A.B.X. (*Teleph.*). Abbrev. for *private automatic branch exchange.*

Pacchionian glands, pak-i-ō'—(*Zool.*). Villous processes of the arachnoid which penetrate into the veins and venous sinuses of the dura mater and beyond to become embedded in the skull; they serve to drain the cerebrospinal fluid into the venous system.

pace (*Build.*). An area of floor which is raised above the general level of the surrounding floor.

pachy-, pak'i- (Greek *pachys*, thick). Prefix used in the construction of compound terms; e.g. *pachycarpous.*

pachycar'pous (*Bot.*). Having a thick pericarp.

pachyder'matocele (*Med.*). A soft flabby tumour, composed of fibrous and nervous tissue, which hangs over the face or the ears.

pachyder'matous (*Zool.*). Thick-skinned.

pachyder'mia, pachyderma (*Med.*). Abnormal thickness of the skin.

pachydermia laryngis (*Med.*). A rare variety of chronic laryngitis in which there is hyperplasia and thickening of the mucous membrane of the vocal cords.

pachymeningi'tis (*Med.*). Inflammation of the dura mater (the outer membrane covering the brain and spinal cord).

pachyne'ma (*Cyt.*). A stage in reduction division; *pachytene* (q.v.).

pachyphyl'lous (*Bot.*). Having thick leaves.

pach'ytene (*Cyt.*). The third stage (*bouquet stage*) of meiotic prophase, intervening between zygotene and diplotene, in which condensation of chromosomes commences.

Pacific Ocean. An ocean lying between the west coast of the American continent and the east coast of Asia and Australia. It extends from the Arctic Circle to the Antarctic Circle. See **ocean depths, ocean temperatures.**

Pacific Province (*Geol.*). The name applied to those regions bordering the Pacific Ocean within which rocks of Cambrian age occur; characterised by a different faunal assemblage from that occurring in rocks of the same age in the Atlantic Province.

Pacin'ian corpuscles (*Zool.*). In Vertebrates, sensory nerve-endings in which the nerve ends in a club-shaped expansion surrounded by many concentric layers of connective tissue.

pack (*Textiles*). The weight-measure by which wool or wool tops are sold, viz. 240 lb.

pack amplifier (*Elec. Comm.*). See **power amplifier, power pack.**

pack-hardening (*Met.*). Case-carburising, using a solid carburising medium, followed by a hardening treatment.

package (*Textiles*). A general term for a cop, cheese, cone, etc. of yarn, indicating that the yarn is in a convenient form for transport or for further processing.

packer (*Mining*). A man employed in a coal-mine, to build pack walls along roadways, etc., to support the roof.

packing (*Eng.*). Material inserted in *stuffing boxes* (q.v.) to make engine and pump rods pressure-tight; it may consist either of compressible material such as hemp, or of metal rings. See **metallic packing.**

packing (*Masonry*). The operation of filling in a double or hollow wall.

packing fraction (*Phys.*). The divergence from a whole number of the mass number of an atom (obtained from its mass spectrum), divided by the mass number and expressed in parts per 10,000, *oxygen* = 16 being taken as standard. See **isotopes.**

paco (*Textiles*). A synonym for *alpaca.*

Pacputan' (*Textiles*). A wool of coarse quality, from the N.W. Frontier of India.

pad (*Elec. Comm.*). See **attenuator pad.**

pad saw (*Carp.*). A type of hand-saw having a very narrow tapering blade, used for curved work.

pad stone (*Build.*). A stone *template* (q.v.).

padder (*Elec. Comm.*). A small adjustable condenser for fine adjustment of capacity, as in a filter or a series of tuned circuits.

paddle hole (*Hyd. Eng.*). The opening in a lock-gate through which water flows from the high-level pond to the lock-chamber, or from the lock-chamber to the low-level pond.

paddle wheels (*Ship Constr.*). Wheels arranged at the sides or stern, dipping into the water and fitted with blades parallel with the shaft, which may be fixed or feathered. When revolved, the wheels propel the vessel.

paddle-wheel fan (*Eng.*). See **centrifugal fan.**

paddling (*Tanning*). A process in tanning light skins by which the skins and the liquor are kept in movement by a revolving paddle.

padlock (*Build.*). A form of movable lock for securing doors and gates from the outside only, for which purpose it is used in conjunction with a hasp and staple.

paediat'ric, pediat'ric (*Med.*). Pertaining to *paediatrics* (*pediatrics*), i.e. that branch of medical science which deals with the study of childhood and the diseases of children. (Greek *pais*, gen. *paidos*, a boy.)

paediatric'ian, pediatric'ian, paediat'rist (*Med.*).

A medical man who specialises in the study of childhood and the diseases of children.

paedog'amy (*Zool*). A variety of autogamy in which both nucleus and cytoplasm divide and reunite.

paedogen'esis (*Bot.*). Markedly precocious flowering.—(*Zool.*) Reproduction by larval or immature forms.

Page effect (*Elec. Eng.*). An audible click heard when a bar of iron is magnetised or demagnetised.

Paget's disease of bone (*Med.*). Osteitis deformans. A chronic disease characterised by progressive enlargement and softening of bones, especially of the skull and of the lower limbs.

Paget's disease of the nipple (*Med.*). A condition in which chronic eczema of the nipple is associated with the subsequent development of cancer of the breast.

pagi'na (*Bot*). A synonym for *lamina.*

pag'odite (*Min.*). This is like ordinary massive *pinite* (q.v.) in its amorphous compact texture and other physical characters, but contains more silica. The Chinese carve the soft stone into miniature pagodas and images. Also called AGALMATOLITE.

Pahoehoe lava, pa-hō'e-hō-e (*Geol.*). A Hawaiian term for viscous lava which consists of wrinkled and hummocky flows, free from large scoriaceous masses.

paint. A pigment in the form of a cake, powder, liquid, or paste, or ready mixed with oil or water.

Painted Desert Beds (*Geol.*). A series of orange-coloured clayey sandstones followed by irregularly bedded, brightly coloured variegated sandstones, belonging to the Triassic System in Arizona. This lower group is followed by the Upper Painted Desert Beds, probably of Jurassic age.

painter's putty (*Paint.*). The same mixture as *glazier's putty* (q.v.).

painter's torch (*Paint.*). A blowlamp with a vaporising burner, used to soften oil paint prior to scraping it off with a flexible knife, in cases where an old coat of paint is to be removed.

pair (*Build., etc.*). To match two similar objects on opposite hands.

pa'lae-, palaeo- (Greek *palaios*, ancient) A prefix used in the construction of compound terms; e.g. *palaeobotany* (q.v.).

Palaearc'tic region (*Zool*). One of the subrealms into which the Holarctic region is divided; it includes Europe and northern Asia, together with Africa north of the Sahara.

palaeobot'any. The study of fossil plants.

Pal'aeogene System (*Geol.*). The name given to the older part of the Tertiary System, which includes the rocks of Eocene and Oligocene age.

Palaeog'nathae (*Zool.*). A division of *Neornithes* possessing a dromaeognathous palate.

Palaeolith'ic Period (*Geol*). The older stone age, characterised by successive 'cultures' of stone implements, made by extinct types of men. Cf. *Neolithic Period.*

palaeonis'coid scale (*Zool.*). In Fish, a type of scale consisting of an outer layer of ganoin, a middle layer of cosmin, and an inner layer of isopedin.

palaeontol'ogy (*Geol.*). That branch of geological science which is essentially the study of animal life in past geological periods. It deals with the successive faunas which have peopled the earth since earliest times; with the structure, relationships, evolution, and environment of the individual creatures.

Palaeopterygii, —op'ter-ij'i-i (*Zool.*). A subclass of very primitive *Pisces* in which the skull consists of a persistent cartilaginous cranium with an investment of membrane bone; caudal fin diphycercal or heterocercal; integument usually with unarticulated ganoid scales with branched canals for blood-vessels; infraclavicles occur in the shoulder-girdle. Bichirs, Sturgeons, and Spoonbills.

Palaeozo'ic (*Geol.*). A major division of geological time comprising the Cambrian, Ordovician, Silurian, Devonian, Carboniferous, and Permian Periods. Some geologists place the Permian in the succeeding geological epoch, the Mesozoic.

palag'onite (*Geol.*). A term applied to altered basaltic glass. It occurs as infillings in rocks, and is a soft-brown or greenish-black cryptocrystalline substance. Named from Palagonia, Sicily.

pal'ama (*Zool.*). The webbing of the feet in Birds of aquatic habit.

palat-, palato- (Latin *palatum*, palate). A prefix used in the construction of compound terms; e g. *palatopharyngeal.*

palate (*Bot*). The prominent part of the lower lip of a ringent corolla which closes the opening of the corolla.

palate (*Zool.*). In Vertebrates, the roof of the mouth: in Insects the epipharynx.—*adjs.* **pal'atal, pal'atine.**

pal'atine (*Zool*) Pertaining to the palate: a paired membrane bone of the Vertebrate skull which forms part of the roof of the mouth.

palatople'gia (*Med.*). Paralysis of the palate.

pale-, paleo-. Prefix. See **palae-, palaeo-.**

pale, palea (*pl.* **paleae**), **palet** (*Bot*). (1) The inner bracteole, thin and membranous, which, with the flowering glume, encloses a grass flower.—(2) A general name for the glumes associated with the grass flower.—(3) The scales which form the ramentum in ferns.

pale (*Build.*). A *paling* (q.v.).

pale ale (*Brew.*). Ale of a light colour and with a distinct flavour of hops; usually bottled. See **beer.**

pale leaf gold (*Dec.*). An alloy of gold and silver beaten out into extremely thin sheets so that it may be applied to surfaces which it is required to gild.

palea'ceous (*Bot.*). Chaffy in texture.

paleo'la (*Bot*). See **lodicule.**

palet (*Bot.*). See **pale.**

pa'liform (*Bot*). Having the form of a stake.

paling (*Build.*). One of the upright boards in a fence.

palingen'esis (*Geol*). The rebirth of granitic or allied magma by pure melting, or by the action of intensely penetrating granitic liquid charged with magmatic vapours.

palingenesis (*Zool.*). The reproduction of truly ancestral characters during ontogeny.—*adj.* **palingenet'ic.**

palisade (*Build.*). Fencing formed of pointed wooden poles or iron railings.

palisade cell (*Bot.*). (1) One cell of the palisade layer of a leaf.—(2) One of the terminal cells of the hyphae forming the cortex in a lichen thallus.

palisade layer (*Bot.*). A layer of elongated cells, set at right-angles to the surface of a leaf, underlying the upper epidermis, containing numerous chloroplasts, and concerned with photosynthesis.

palisade stereide (*Bot.*). A rod-shaped, thick-walled cell, elongated at right-angles to the surface of the seed, and occurring in the testa.

palisade tissue (*Bot.*). One or more layers of palisade cells beneath the epidermis of a leaf.

Palisades sill (*Geol.*). A massive intrusive sheet of dolerite (diabase) intruded during the Triassic period of vulcanicity in the Hudson region.

palladinised asbestos (*Chem.*). Asbestos fibres saturated with a solution of a palladium compound, which is subsequently decomposed to give finely divided palladium dispersed throughout the asbestos.

palladious iodide (*Chem.*). PdI_2. Precipitated when potassium iodide is added to solutions of palladious chloride. As the other halogen salts of palladium are soluble, this reaction is used to distinguish iodine from the other halogens.

palla'dium (*Met*). Symbol, Pd. A metallic element in the eighth group of the periodic system. At. no. 46, at. wt. 106 7. The metal is white, m p. 1550°, b.p. 2500°, sp. gr. 11·4. Used as a catalyst in hydrogenation. Native palladium is mostly in grains and is frequently alloyed with platinum and iridium.

pallaesthe'sia (*Med.*). Sensibility of bone to vibratory stimuli.

pal'lasite (*Min.*). A group name for stony meteorites which contain fractured or rounded crystals of olivine in a network of nickel-iron.

palles'cent (*Bot.*). Becoming lighter in colour with age.

pallesthe'sia (*Med*) See **pallaesthesia.**

pallet (*Acous.*). The flap of wood, faced with felt or leather, which is raised to permit the flow of air to wind-chests, etc., in the mechanism of an organ.

pallet (*Build.*). A thin strip of wood built into the mortar joint of a wall, to provide a substance to which joinery may be nailed.

pallet (*Horol*). The surface or part upon which the teeth of the escape wheel act to give impulse to the pendulum or balance. The first pallet acted upon by a tooth of the escape wheel is known as the *entering pallet*, and the other pallet as the *exit pallet*.—CIRCULAR PALLETS, pallets which are equidistant from the pallet-staff axis — EQUIDISTANT LOCKING PALLETS, pallets in which the locking corners of the entering and exit pallets are equidistant from the pallet-staff axis.—EXPOSED PALLETS, usually refers to a clock movement in which the pallets are in front of the dial.

pallet brick (*Build.*). A purpose-made brick with a groove in one edge to receive a fixing strip.

pallet jewel (or **stone**) (*Horol.*). The jewel in the pallets upon which the escape-wheel teeth act.

pallet staff (*Horol.*). The pivoted axis upon which the pallets are mounted.

palli-, pallio- (Latin *pallium*, mantle). A prefix used in the construction of compound terms; e.g. *palliopedal.*

pal'lial groove (*Zool.*). The groove between the mantle and the body in Bivalves.

pallial line (*Zool.*). The line of attachment of the mantle to the shell in Bivalves.

pal'liative (*Med.*). Affording temporary relief from pain or discomfort: a medicinal remedy which does this.

pal'lium (*Zool.*). The mantle in *Brachiopoda* or *Mollusca*, a fold of integument which secretes the shell: in the Vertebrate brain, that part of the wall of the cerebral hemispheres excluding the corpus striatum and rhinencephalon.—*adjs.* **pallial, palliate.**

Palm Beach (*Textiles*). A light fabric of plain weave made from cotton warp and lustre worsted weft, or entirely of cotton; the warp yarn provides a colour effect.

palm oil (*Chem.*). A reddish-yellow fatty mass from the fruit of *Elaeis guineensis*, m.p. 27°-43° C., sp. gr. 0·90-0·95, saponification value 196-205, iodine value 51-57, acid value 24-200.

palm-kernel oil (*Chem.*). A yellowish oil from the nuts of *Elaeis guineensis*, m.p. 26°-30° C., sp. gr. 0·95, saponification value 247, iodine value 13·5, acid value 8·4.

pal'mar (*Zool.*). See **thenal.**

pal'mate (*Bot.*). Having several (often 5-7) lobes, segments, or leaflets spreading from the same point, like the fingers from the palm; applied particularly to leaves.

palmate (*Zool.*). Having webbed feet.

palmat'ifid (*Bot.*). Having the leaf blade cut about half-way in, to form a number of diverging lobes.

pal'matine (*Chem.*). An alkaloid of the *iso*quinoline group, obtained from calumba root, *Jateorhiza columba*. It has not been isolated in the free state. Salts, however, are known, e.g. the iodide, $C_{21}H_{23}O_4NI \cdot 2H_2O$, which crystallises in yellow needles, m.p. 240° C.

palmat'isect (*Bot.*). Having the leaf blade cut nearly to the base, so forming a number of diverging lobes.

palmel'la stage (*Zool.*). In some holophytic *Mastigophora*, a pseudo-colonial stage simulating the lower *Algae*, produced by division taking place when the flagella are withdrawn and the organism is in a resting phase.

palmit'ic acid (*Chem.*). $C_{15}H_{31} \cdot COOH$, a normal fatty acid, m p. 63° C., b.p. 269° C. It occurs as glycerides in vegetable oils and fats.

pal'mitins (*Chem*). The glycerine esters of palmitic acid.

palmu'la (*Zool.*). In *Insecta*, the terminal process or lobe of the tarsus between the claws.

palp (*Zool*). See **palpus.**

pal'pacle (*Zool.*). In *Siphonophora*, the tentacle of a dactylozooid.

palpe'bra (*Anat., Zool.*). An eyelid.

palpebral fissure (*Anat.*). The space between the upper and lower eyelids.

pal'pifer (*Zool*) In Insects, a lateral sclerite of the stipes which bears the maxillary palp. Also PALPIGER.

Palpigra'di (*Zool.*). An order of small *Embolobranchiata* having a prosoma with the last two segments free, and a segmented opisthosoma; the telson is a long jointed flagellum; the pedipalps are leg-like and tactile; there are no eyes; respiration is cutaneous or by three pairs of lung-books; occur under stones. Micro-Whip-Scorpions.

palpimac'ula (*Zool*) In Insects, a sensory spot on the labial palps.

palpitation (*Med.*). Awareness on the part of a person that his heart is beating against the chest wall, usually associated with increase in the frequency of the heart beat: loosely, increased frequency of the beat of the heart.

pal'pocil (*Zool.*). In *Coelenterata*, a sense hairlet attached to a sense cell.

palpon (*Zool.*). See **dactylozooid.**

palpus (*Zool.*). In *Crustacea* and *Insecta*, a jointed sensory appendage associated with the mouth-parts and representing the exopodite of the gnathobase to which it is attached: in *Polychaeta*, a sensory appendage of the prostomium.—*adj.* **palpal.**

palsy (*Med.*). See **paralysis.**

paludic'olous (*Ecol.*). Living in ponds, streams, and marshes.

pal'udism (*Med.*). See **malaria.**

pal'udose (*Bot.*). Inhabiting wet places.

pampero, pam-pā'rō (*Meteor.*). A line-squall (Argentina and Uruguay).

pam'pinody (*Bot.*). The change of parts of a leaf, or of leaves, into tendrils.

Pamun'key formation (*Geol.*). The local representative of the Eocene Series in the coastal region of Virginia and Maryland.

pan (*Bot.*). (1) A compact layer of soil particles, lying some distance beneath the surface, cemented together by organic material, or by iron and other compounds, and relatively impermeable to water.—(2) A depression in the surface of a salt marsh, in which salt water stands for lengthy periods.

pan (*Build.*). A panel of brickwork, or lath and plaster, in half-timbered work.

pan breeze (*Build.*). A mixture of coke breeze and clinker collected in the pan below a furnace consuming coke breeze. It is used as a coarse aggregate in the manufacture of concrete.

pancake coil (*Elec. Eng., Radio*). An inductance coil in which the windings are arranged spirally, in the form of a flat disc.

pancaking (*Aero.*): The landing of a heavier-than-air craft at a relatively steep angle, with low forward speed.

pan film stock (*Cinema.*). The normal negative stock used in cinematograph motion-picture cameras; it implies a panchromatic emulsion, this being requisite for speed and uniformity of registration of luminosities over the visible spectrum.

pan shot (*Cinema.*). See **panning shot.**

panache, pan-ash' (*Civ. Eng.*). A *pendentive* (q.v.).

pana'ris, bovine (*Vet*). An acute inflammation beneath the horny covering of the claw of cattle.

pancardi'tis (*Med.*). Concurrent inflammation of the three main structures of the heart—the pericardium, the myocardium, and the endocardium.

panchromatic emulsions (*Photog.*). Emulsions which are reasonably sensitive photographically to all visible colours, particularly towards the red-end of the spectrum.

pan'creas, —krē-as (*Zool.*). In Vertebrates, a large compound digestive gland the duct of which opens into the duodenum and which also contains islands of endocrine gland tissue.—*adj.* **pancreat'ic.**

pancreatec'tomy (*Surg.*). Surgical removal of the pancreas.

pancreat'ic enzymes (*Chem.*). The enzymes of the pancreatic juice are trypsin, steapsin, amylopsin, maltase, a lactase, pancreatic erepsin, rennin, and possibly invertase.

pancreati'tis (*Med.*). Inflammation of the pancreas.

pancreat'olith (*Med.*). A calculus in the pancreas.

pancreat'omy (*Surg.*). Incision of the pancreas.

pandem'ic (*Med.*). (Of an epidemic) occurring over a wide area such as a country or a continent: an epidemic so widespread.

pandiculation (*Med.*). The combined action of stretching the body and the limbs and yawning.

pan'durate, pandu'riform (*Bot.*). Shaped like the body of a fiddle.

pane (*Build.*). (1) A panel.—(2) A sheet of glass cut to size for use as a window light.

pane, pean, peen (*Tools*). The end of a hammer-head opposite to that carrying the hammering face; made to various shapes for particular operations such as riveting, etc. See **ball-pane hammer, cross-pane hammer, straight-pane hammer.**

panel (*Elec. Eng.*). A sheet of slate, marble, or other material upon which instruments, switches, relays, etc., are mounted. Also called SWITCHBOARD PANEL, CONTROL PANEL. See also **Board of Trade panel.**

panel (*Join.*). The thin flat wooden piece surrounded by the framing of a door, and having its surface sunken in relation to the general surface of the framing members.

panels (*Eng.*). In a truss or open-web girder, the framed units of which the truss is composed; the divisions separated by the vertical members.

panel heating (*Build.*). A system of heating a building in which heating units or coils of pipes are concealed in special panels, or built in wall or ceiling plaster. Also called CONCEALED HEATING.

panel mould (*Plast.*). A mould used for running panels.

panel mounting (*Elec. Comm.*). The normal method of accommodating a collection of non-portable apparatus. Each piece or unit is constructed separately on its standard panel, which is mounted with others on a standard vertical rack, the different panels being provided with terminal blocks so that the units can be wired together after assembly.

panel saw (*Join.*). A hand-saw used for panelling, having seven teeth to the inch.

panel-switch (*Elec. Eng.*). See **flush-switch.**

panelled framing (*Join.*). Doors and frames formed of stiles, rails, and muntins framed together with mortise-and-tenon joints, and having panels fitted into the spaces.

panelling (*Build., etc.*). A general name for panelled surfaces.

Paneth's cells (*Zool.*). Conspicuous cells, containing oxyphil granules, occurring at the base of the crypts of Lieberkuhn.

pangam'ic (*Zool.*). Of indiscriminate mating.

panhysterec'tomy (*Surg.*). Complete surgical removal of the uterus.

panic bolt (*Build.*). A special form of door-bolt which is released by pressure at the middle of the door; commonly used on exit-doors in public buildings.

panicle (*Bot.*). (1) Strictly, a branched raceme with each branch bearing a raceme of flowers.—(2) Loosely, any branched inflorescence of some degree of complexity.

panic'ulate (*Bot*). (1) Having the form of a panicle.—(2) Branched (said of an inflorescence).

panidiomor'phic (*Geol.*). A term applied to igneous rocks which have almost all their constituents of perfect crystalline shape.

Panizza's foramen, pa-nĕt'sa (*Zool.*). In *Loricata*, a small foramen allowing interchange of blood between the right and left systemic arches.

panmix'ia (*Zool.*). Cessation of natural selection, as in the case of an organ which through change of habits or environment of a species is no longer useful.

panne velvet (*Textiles*). A warp pile fabric with silk pile; used for dresses and furnishings.

panniculi'tis (*Med.*). Inflammation of the subcutaneous fat in any part of the body.

pannic'ulus carno'sus (*Zool.*). In some Mammals, an extensive system of dermal musculature covering the trunk and part of the limbs, by means of which the animal can shake itself.

pannier (*Civ. Eng.*) A kind of gabion.

panniform (*Bot.*). Looking like felt.

panning shot (*Cinema.*). A shot obtained in motion-picture production by swinging the camera sideways, so that the view appears to pass across the screen, like a panorama. It is accomplished either with a fixed focus, or with a pulled focus if the objects to be taken are at varying distances. See **vertical panning.**

pannose (*Bot.*). Felted.

pannus (*Med.*). The appearance of a curtain of blood-vessels round the margin of the cornea; e.g. in trachoma, or in phlyctenular keratitis.

panoistic, —ō-is'tik (*Zool.*). In *Insecta*, said of ovarioles in which nutritive cells are wanting.

panophthalmi'tis, panophthal'mia (*Med.*). Inflammation of all the structures of the eye.

panorama head (*Cinema.*). A swivel device fitted to the head of a camera tripod to permit the sideways swinging motion of the camera when taking panning shots.

panoramic camera (*Photog.*). A camera intended to take very wide angle views, generally by rotation about an axis and by exposing a roll of film through a vertical slit.

pan'otrope (*Acous.*). A purely electrical reproducer of disc gramophone records, using a pick-up, valve amplifier, and one or more loudspeakers. Cf. *acoustic gramophone.*

panphotomet'ric (*Bot.*). Said of a narrow leaf which stands nearly or quite erect.

pansinusi'tis (*Med.*). Inflammation of all the air-containing sinuses which communicate with the nasal cavity.

panspor'oblast (*Zool.*). In *Neosporidia*, a cell-complex producing both sporoblasts and spores.

pantas (*Vet.*). Diarrhoea of herbivorous animals.

panther (*Furs*). See **leopard.**

pan'tile (*Build.*). A roofing tile, usually 13¼ × 9½ in., which is shaped with a double curve or ogee.

pan'tograph (*Elec. Eng.*). A sliding type of current-collector for use on traction systems employing an overhead contact wire. The contact-strip of the collector is mounted on a hinged diamond-shaped structure, so that it can move vertically to follow variations in the contact wire height.

pantograph (*Instruments*). A mechanism by which a point is constrained to copy, to any required scale, the path traced by another point. It is based on the geometry of a parallelogram; used in engraving machines, etc.

pantograph (*Textiles*). The part of an embroidery frame by means of which is determined the position of the ground net in relation to the needles.

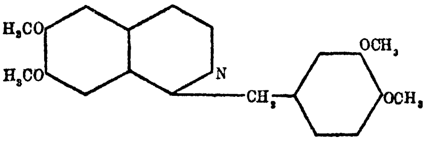
pantoph'agous (*Zool.*). Omnivorous.

Pantop'oda (*Zool.*). See **Pycnogonida.**

pap (*Build.*). An outlet nozzle fitted to an eaves gutter.

pa'pain (*Chem.*). A protein-digesting enzyme present in the juice from the fruits and leaves of the papaw tree (*Carica Papaya*); it can soften meat that has been wrapped for a time in the leaves.

papav'erine (*Chem.*). An alkaloid occurring in opium, colourless prisms, m.p. 147° C., optically inactive. It is 3,4-dimethoxybenzyl-4',5'-dimethoxy-*iso*quinoline and has the formula:



paper. Consists of continuous webs of suitable vegetable fibres, freed from non-cellulose constituents and deposited from an aqueous suspension. Wood-pulp, esparto, and rags are the chief raw materials, though other substances are used. During the process of manufacture, the fibres are reduced to the requisite length, and their physical properties are modified by mechanical or chemical treatment. See **cellulose.**—(*Diel.*) Cable papers have a breaking strength of 7000 lb. per square inch longitudinally and 3500 transversely. Elongation before breaking is 2 and 4% respectively.

paper cable (*Elec. Comm.*). See **dry-core cable.**

paper condenser (*Elec. Comm.*). A condenser which has thin paper as the dielectric separating aluminium foil electrodes, these being wound together and waxed. See **Mansbridge condenser.**

paper-hanging (*Build., Dec.*). The operation of pasting wall-paper to interior wall surfaces as a decorative covering.

paper negatives (*Photog.*). Negatives made with emulsions on paper supports, instead of the more usual film or glass. They have the advantages of lightness, cheapness, ease of retouching, and possibility of large dimensions.

paper surface record (*Acous.*). In this type of gramophone record a coarse core material is used for the interior of the disc, the fine surface material being carried on a disc of thin paper until united, one on each side of the core, in the press in the final stage of manufacture.

papier-mâché, pă'pyer mash'ā *or* pap'yā mah'shā (*Paper*). A material consisting either of paper-pulp mixed with glue or some other hardening substance or of sheets of paper pasted together. It can be made to resemble hardened wood or plaster. See **flong.**

papiliona'ceous (*Bot.*). Having some likeness in form to a butterfly; said of flowers like those of the pea.

papil'la (*Zool.*). A small conical projection of soft tissue, especially on the skin or lining of the alimentary canal: the conical mass of soft tissue or pulp projecting into the base of a developing feather or tooth.—*adjs.* **papillary, papillate.**

papillae folia'tae (*Zool.*). In some Mammals, two small oval areas at the back of the tongue, marked by a series of alternating transverse ridges and richly provided with taste-buds.

papilli'tis (*Med.*). Optic neuritis. Inflammation of the disc or head of the optic nerve within the globe of the eye.

papilloedema, papilledema, —e-dē'ma (*Med.*). Choked disc. Swelling and congestion of the disc or head of the optic nerve within the globe of the eye, as a result of increase of pressure within the skull.

papillo'ma (*Med.*) A tumour (usually innocent) resulting from the new growth of the cells of the skin or of the mucous membrane.

pap'illose (*Bot.*) Covered with papillae.

papoon (*Textiles*). A cotton fabric of plain weave, generally with a self-coloured warp shot with a different colour of weft Sometimes has a 2-and-2 stripe of different warp colours. Shipped to Eastern markets for native dresses.

pappose, pappous (*Bot.*). Having a pappus.

pappus (*Bot*) A ring of hairs or of scales, or a flat radiating group of hairs at the upper end of a stalk, attached to the top of a fruit and serving in wind dispersal. Dandelion 'clocks' are a familiar example

pap'ulae (*Zool.*). The dermal gills of *Echinodermata*, small finger-shaped, thin-walled respiratory projections of the body-wall.

papule (*Med.*). A small, circumscribed, solid elevation above the skin; as in chicken-pox.—*adj.* **papular.**

papulopus'tular (*Med.*). Of papules and pustules.

papyra'ceous (*Bot*). Papery in texture.

papy'rotypes (*Photog.*). Photographic processes in which paper supports are used in transfer work.

para- (*Chem.*). (1) Derived from an acid anhydride by combination with an unusually large number of water molecules.—(2) A polymer of . . . —(3) A compound related to . . . —. See also ***p-***.

para- (*Chem.*). (1) Containing a benzene nucleus substituted in the 1.4 positions.—(2) Consisting of diatomic molecules with anti-parallel nuclear spins and an even rotational quantum number.

para- (Greek *para*, beside). A prefix used in the construction of compound terms; e.g. *para-mastoid*, beside the mastoid.

para reds (*Paint.*). Pigments obtained from paranitraniline.

paraba'sal apparatus (*Zool.*). A peculiar striated body surrounding the ring of blepharoplasts in certain *Mastigophora* with a tuft of flagella.

parabasal body (*Zool.*). In certain parasitic *Mastigophora*, a body of unknown function associated with the base of the flagella.

parabio'sis (*Embryol.*). The union of similar embryos between which a functional connexion exists; e.g. Siamese Twins.—*adj.* **parabiot'ic.**

parablast'ic (*Zool.*). Said of (1) certain large nuclei occurring in the proximal nutritive syncytial layer of tissue which lies on the yolk in the early stages of development of certain Fish; (2) certain similar nuclei of yolk-laden cells in the development of some Mammals.

parab'ola (*Maths.*). (1) The section of a right circular cone by a plane parallel to a generator of the cone. —(2) The locus of a point equi-distant from a fixed point (*focus*) and a fixed line (*directrix*). The eccentricity is unity and the curve is of the form $y^2 = 4px$.

parabolas, positive ray (*Phys.*). Parabolic traces on the photographic plate obtained by Sir J. J. Thomson's original method of positive-ray analysis, which consisted in subjecting a narrow beam of the rays to the action of mutually perpendicular magnetic and electrostatic fields. See **positive rays, mass spectrograph.**

parabol'ic (*Bot.*). Having a broad base and gradually narrowing by curved sides to a blunt apex.

parabolic arch (*Civ. Eng.*). An arch having the outline of a parabola.

parabolic mirror, parabolic reflector (*Light*). A mirror or reflector whose surface is a paraboloid of revolution. Such a mirror gives a point focus, free from aberration, for incident rays parallel to its axis. For this reason the main mirror of a reflecting telescope is given a paraboloidal form. Such mirrors are also used in searchlights and automobile headlamps.

parabolic (or **German**) **nozzle** (*Eng.*). A nozzle of parabolic section with a high coefficient of discharge, placed in a pipe to measure the flow of a gas. The pressure drop is measured by a manometer.

parab'oloid of revolution (*Maths.*). A solid figure formed by the revolution of a parabola about its axis.

parabron'chi (*Zool.*). In Birds, the branches into which the secondary bronchi divide; the air-pipes.

paraca'sein (*Chem.*). A term for the coagulated casein or insoluble curd of milk.

paracente'sis (*Surg.*). Tapping The puncture of body cavities with a hollow needle, for the removal of inflammatory fluids.

par'achor (*Chem.*). A quantity which may be regarded as the molecular volume of a substance when its surface tension is unity; in most cases it is practically independent of temperature. Its value is given by the expression $[P] = \frac{M\gamma^{\frac{1}{4}}}{\rho_L - \rho_V}$, where M is the molecular weight, γ the surface tension, ρ_L and ρ_V are the densities of the liquid and vapour respectively.

parachor'dals (*Zool.*). In the developing cranium, a pair of flat curved plates of cartilage lying on either side of the notochord.

parachute (*Aero.*). A collapsible umbrella-like flotation device, whose function is to retard the rate of descent of a falling body.—FREE PARACHUTE, a parachute to be released or opened by the falling person.—AUTOMATIC PARACHUTE, a parachute which opens automatically.—AUXILIARY PARACHUTE, a small parachute which aids the release of the main one.

parachute disseminule (*Bot.*). A fruit or seed provided with a pappus, or a tuft of hairs, or any other device which facilitates dispersal by the wind.

parachute flare (*Aero.*). A pyrotechnic flare, attached to a parachute released from an aircraft in order to illuminate a region. Used for emergency landing, military observation, bombing, etc.

parac'me (*Zool.*). The period in the history of an individual or a race when vigour is decreasing: the senescent period in the life-history of an individual: the phylogerontic period in the history of a race. Cf. *epacme*.

paracoele, —sēl (*Zool.*). The cavity of one of the cerebral hemispheres of the Vertebrate brain.

par'acone (*Zool.*). In Mammals, the antero-external cusp of an upper molar tooth.

paracon'id (*Zool.*). In Mammals, the antero-external cusp of a lower molar tooth.

paracorol'la (*Bot.*). See **corona.**

Paractinopoda (*Zool.*). See **Synaptida.**

paracym'bium (*Zool.*). The smaller of two parts into which the pedipalpal tarsus of some male Spiders is divided.

parades'mose (*Bot.*, *Zool.*). A very slender thread of stainable material which connects for some time the two halves of a dividing blepharoplast.

paradoxical bone (*Zool.*). See **prevomer.**

paraeiopod, par-ī'o-pod (*Zool.*). In *Crustacea*, a walking leg.

paraesthe'sia (*Med.*). An abnormal sensation, such as tingling, tickling, and formication.

parafeed coupling (*Elec. Comm.*). The combination of resistance-capacity with intervalve-transformer coupling so that the anode-feed through a resistance is diverted from the transformer, which can then be designed with reduced dimensions and cost.

paraffins (*Chem.*). A term for the whole series of saturated aliphatic hydrocarbons of the general formula C_nH_{2n+2}. The term PARAFFIN HYDROCARBONS is also used. They are very indifferent to oxidising agents, and not reactive, hence the name *paraffin* (Latin *parum affinis*, little allied).

paraffin, liquid. A liquid form of *petrolatum* (q v.), odourless and tasteless, used as a mild laxative.

paraffin oil (*Fuels, etc.*). See **kerosene.**

paraffin wax (*Chem.*). Higher homologues of paraffins, wax-like substances obtained as a residue from the distillation of petroleum; m p 45°-65° C., sp. gr. 0 9, resistivity 10^{16} ohms per cub. cm, dielectric constant 2-2·3.

parafib'ula (*Zool.*). A bony element external to the proximal end of the fibula in some *Lacertilia* and young *Metatheria*.

paraformal'dehyde (*Chem.*). $(H\,CHO)_2$, a condensation product of formaldehyde obtained by the evaporation of an aqueous solution of formaldehyde. It is a white crystalline mass, soluble in water.

par'afrons (*Zool.*). In certain Insects, the area between the frontal suture and the eyes.

paragan'glia (*Zool.*). In higher Vertebrates, small glandular bodies, occurring in the posterior part of the abdomen, which show a chromaphil reaction and are believed to secrete adrenaline.

paraganglio'ma (*Med.*). Chromaffinoma; phaeochromacytoma. A tumour composed of chromaffin cells, especially those of the adrenal medulla; usually associated with high blood-pressure.

paragas'ter (*Zool.*). The internal cavity of a Sponge, lined by choanocytes.

paragastric canals (*Zool.*). In *Porifera*, the canal-system: in *Ctenophora*, the paired blind canals running from the infundibulum to the oral cone.

paragas'trula (*Zool.*). A stage in the development of *Porifera* in which the flagellate cells of the amphiblastula are invaginated.

paraglos'sa (*Zool.*). In Insects, the outer pair of lobes arising from the margin of the prementum.

paragna'tha (*Zool.*). In some *Crustacea*, a pair of lobes formed by subdivision of the metastoma.

paragna'thous (*Zool.*). Having jaws of equal length; as Birds, which have upper and lower beak of equal length.

paragneiss, par'-a-nīs (*Geol.*). A term given to gneissose rocks which have been derived from detrital sedimentary rocks. Cf. *orthogneiss*.

paragonimi'asis (*Med.*). Invasion of the lungs by the lung fluke *Paragonimus westermanii*; the condition is endemic in the Far East, and infection results from eating fresh-water crustaceans.

parag'onite (*Min.*). A silicate of sodium, aluminium, and hydrogen. It is a sodium mica, has a yellowish or greenish colour, and is usually associated with metamorphic rocks.

paragraph'ia (*Med.*). Faulty spelling, misplacement of letters and words, and use of wrong words in writing, as a result of a lesion in the brain.

paragu'la (*Zool.*). A region of the Insect head, beside the gula.

paragutta (*Cables*). A substance containing deproteinised rubber and wax, used for insulating submarine telephone cables.

paragy'nous (*Bot.*). Said of an antheridium applied to the side of an oögonium.

parahor'mone (*Zool.*). A substance which, like a hormone, has a controlling effect on distant parts of the body, but which is an ordinary by-product of metabolic activity, not produced for a specific purpose.

parahypoph'ysis (*Zool.*). In Vertebrates, a vestigial structure in the region of the pituitary body.

parakerato'sis (*Med.*). Faulty formation of the horny layer of the skin, with scaling of the skin

para-lavas (*Geol.*). The name applied by L. L Fermor to certain argillaceous sedimentary rocks which, following fusion at the surface of the ground, developed the characters of lava flows.

paral'dehyde (*Chem.*). $(CH_3{\cdot}CHO)_3$, a condensation product of acetaldehyde, obtained by the action of concentrated sulphuric acid upon acetaldehyde It is a colourless liquid, b.p. 124° C., and can be converted again into acetaldehyde by distillation with dilute sulphuric acid. A common hypnotic

paralex'ia (*Med*). A defect in the power of seeing and interpreting written language, with meaningless transposition of words and syllables, due to a lesion in the brain.

parallactic angle (*Astron.*). The name given to that angle in a spherical triangle on the celestial sphere which is made at the heavenly body itself by the arcs of great circles drawn to it from the celestial pole and the zenith respectively.

parallactic ellipse (*Astron.*). The small ellipse on the celestial sphere apparently described by every star in a year about its mean position owing to the earth's orbital motion; the semi-major axis of the ellipse is the star's *parallax*, namely the angle subtended by the earth's mean distance from the sun at the star's distance.

parallactic inequality (*Astron.*). A periodic term in the mathematical expression of the moon's motion, so called because it is due to the finite distance of the sun and therefore depends on the solar parallax; it amounts to about 2 ft. 7 in. at a maximum, and has for period the synodic month.

par'allax. Generally, the apparent change in the position of an object seen against a more distant background when the viewpoint is changed. Absence of parallax is often used to adjust two objects, or two images, at equal distances from the observer.—(*Astron.*) The apparent displacement of a heavenly body on the celestial sphere due to a change of position of the observer. According to the nature of such a change, three parallaxes are distinguished, viz. (1) *diurnal* or *geocentric*; (2) *annual* or *heliocentric*; (3) *secular*. (See these articles.)—(*Surv.*) A condition set up when the image formed by the object-glass of a surveying telescope is not in the same plane as the cross-hairs, so that on moving his eye from side to side or up and down the observer can see relative movement between them.

parallax stereogram (*Photog.*). The use of a line screen in front of a positive transparency of alternate strips of two views of an object, made by exposing an emulsion in a similar arrangement with a large lens and two apertures representing the two eyes.

parallel (*Geog.*, *Surv.*). A *parallel of latitude* is an imaginary line around the earth's surface connecting points of equal terrestrial latitude.

parallel (*Elec. Eng.*, *etc.*). Two circuits are said to be *in parallel* when they are connected so that any current flowing divides between the two. Two machines, transformers, or batteries are said to be *in parallel* when the terminals of the same polarity are connected together.

parallel body (*Ship Constr.*). That portion of a ship's form wherein the fullest transverse shape is maintained constant.

parallel descent (*Bot.*). The manner of derivation of structures which are similar but occur on plants not descended from an obvious common ancestor.

parallel feed (*Radio*). A method of connecting the anode of a thermionic valve to the high-tension supply through a high resistance or inductance, whilst the a.c. circuits are connected through a condenser. The d.c. and a c. components of the anode current are thereby separated. Also called SHUNT FEED.

parallel feeder (*Elec. Eng.*). A feeder connected in parallel with an existing feeder in order to carry additional load.

parallel-feeder protection (*Elec. Eng.*). A type of balanced protective equipment relying for its action on the fact that the current in two parallel feeders will normally be equal, this balance being upset if a fault occurs on one of the feeders.

parallel folding (*Bind.*). The method of folding a sheet so that all folds are parallel.

parallel gutter (*Build*). A rectangular roof-gutter, e.g. one bounded at the sides by a parapet wall and a pole plate.

parallel motion (*Eng.*). A system of links by which the reciprocating motion of one point is copied to an enlarged scale by another—a modified pantograph mechanism. Used on piston-type engine indicators, etc.

parallel ruler (*Instruments*). A drawing instrument consisting of two straightedges so linked together by connecting pieces that their edges are always parallel, although the distance between them may be varied.

parallel slot (*Elec. Eng.*). The most usual shape of slot for the armature windings of electric machines, the slot having parallel sides. Cf. *taper slots*.

parallel-veined (*Bot.*). Having the main veins running side by side for some distance in the leaf.

par'allelism (*Bot.*). Evolution along similar lines in unrelated groups of plants.

parallelodro'mous (*Bot.*). Having parallel veins.

parallelogram of forces (*Mech.*). A rule for the composition of two forces which states that if two forces, acting at a point, are represented in magnitude and direction by two adjacent sides of a parallelogram, the resultant of the two forces is similarly represented by the diagonal of the parallelogram passing through the common point.

parallelotrop'ic (*Bot.*). Said of a plant member set along the direction of stimulus.

paraly'ser (*Bot.*). A substance which destroys an enzyme or prevents it from acting.—(*Chem.*) A *catalytic poison* (q.v.).

paral'ysis (*Med.*). 'Palsy.' The loss in any part of the body of the power of movement, or of the capacity to respond to sensory stimuli.

paralysis agitans (*Med.*). Parkinson's disease; 'shaking palsy.' A progressive disease due to degeneration of certain nerve cells at the base of the brain; characterised by rigidity of muscles (the body being fixed in a posture of slight flexion), mask-like expression of the face, and a coarse tremor, especially of the hands. See retropulsion.

paralysis, fowl (*Vet.*). See neurolymphomatosis.

paralysis, guinea-pig (*Vet.*). A filterable-virus infection of cavies characterised by a diffuse meningo-myelo-encephalitis.

paralysis, infantile (*Med.*). See under **poliomyelitis.**

paralytic ileus (*Med.*). See **ileus (paralytic).**

paramagnetic (*Magn.*). A substance is said to be *paramagnetic* when it has a permeability greater than that of a vacuum, i.e. greater than unity.

paramas'tigote (*Zool.*). Having one long principal flagellum and a short accessory flagellum.

paramatta (*Textiles*). The name applied to twilled fabrics with a Botany worsted or cotton warp and a worsted weft; made into waterproof garments.

par'amere (*Zool.*). Half of a bilaterally symmetrical structure: one of the inner pair of gonapophyses in a male Insect.

param'eter (*Maths.*). Generally, a line or figure that serves to determine a point, line, figure, or quantity in a class of such things.—(*Elec. Comm.*) A derived constant of a transmission circuit or network, which is more convenient for expressing performance or for use in calculations.—(*Crystal.*) The *parameters* of a plane consist of a series of numbers which express the relative intercepts of that plane upon the crystallographic axes. Given in terms of the established unit lengths of those axes.

parametric equations (*Maths.*). Of a curve or surface: equations in which co-ordinates of points on the curve or surface are given in terms of one or more variables (*parameters*) of the curve or surface.

parametri'tis (*Med.*). Pelvic cellulitis. Inflammation of the pelvic cellular connective tissue in the region of the uterus, e.g. in the puerperium.

parame'trium (*Med.*). The subperitoneal connective tissue surrounding the uterus, especially that in the region of the cervix.

paramito'sis (*Zool.*). A form of mitosis occurring in *Protozoa*, in which the longitudinal halves of the chromosomes remain attached at one end after division so that they appear to divide transversely.

par'amorph (*Min.*). The name given to a mineral species which can change its molecular constitution without any change of chemical substance. See **pseudomorph.**

Paramount (*Build.*). A building-board made of a fireproof gypsum.

paramphistomi'asis (*Med.*). Invasion of the human intestine with trematode parasites of the family *Paramphistomidae*.

paramudras (*Geol.*). Flint nodules of exceptionally large size and doubtful significance occurring in the Chalk exposed on the east coast of England.

paramy'osin'ogen (*Chem.*). One of the chief proteins contained in living muscle.

parane'ma (*Bot.*). A sterile hair.—*pl.* **parane'mata.**

paraneph'ric (*Zool.*). Situated beside the kidney.

paraneph'ros (*Zool.*). See **suprarenal body.**

paranoi'a (*Psychiatry*). A psychosis characterised by the insidious development of a permanent and unshakeable delusional system, resulting from internal causes, and accompanied by the preservation of clear and orderly thought, action, and will. Hallucination is not usually present. Attributed by Freudians to unconscious homosexuality.—*adj.* and *n.* **paranoi'ac.**

par'anoid schizophrenia (*Psychiatry*). A type of schizophrenia showing certain symptoms of paranoia, including delusions of persecution and jealousy, but with less systematisation of thought and with much disintegration of the personality.

paranoid state (*Psychiatry*). A state in which a person shows certain characteristics of paranoia, but in a lesser degree and without disintegration of the personality.

parano'tum (*Zool.*). In Insects, a lateral expansion of a thoracic tergum.—*adj.* **parano'tal.**

paranu'cleus (*Zool.*). A term which has been loosely used to indicate any structure lying beside the nucleus; as a micronucleus of *Ciliophora*, or a mass of mitochondria.

para-o'phoron (*Zool.*) A rudimentary structure in the ovary of Vertebrates homologous with the paradidymis of the male.

parapet (*Build., Civ. Eng.*). A low wall built along the edge of a bridge, quay, or roof.

parapet gutter (*Build.*). A gutter constructed behind a parapet wall.

paraphase amplifier (*Elec. Comm.*). A push-pull amplifier incorporating one or more stages of paraphase coupling.

paraphase coupling (*Elec. Comm.*). An amplifier with a push-pull stage, or series of stages, in which the reversed phase is obtained by taking a fraction of the output voltage of the first valve of the amplifier and applying it to a similar balancing first valve, which operates succeeding stages as in normal push-pull, the number of transformers being minimised thereby.

parapha'sia (*Med.*). A defect of speech in which words are misplaced and wrong words substituted for right ones; due to a lesion in the brain.

paraphimo'sis (*Med.*). Persistent retraction of the inner lining of the prepuce behind the glans penis in a case of phimosis.

paraphototrop'ic (*Bot.*). See **diaphototropic.**

paraphrax'ia (*Med.*) The performance by a person of an act different from the one required of him; due to a lesion in the brain.

paraphre'nia (*Psychiatry*). A type of schizophrenia characterised by the extremely insidious development of ideas of persecution and, later, of exultation, without disintegration of personality. Gradually ideas of grandeur and of the patient's own importance may replace ideas of persecution, and auditory and other hallucinations may develop.

par'aphyll (*Bot.*) A very small leaf-like, or much branched, structure found among the leaves of mosses.

paraph'ysis, *or* **—fi'zis** (*Bot.*). A sterile hair, which may be simple or branched and may consist of one or more cells, occurring among reproductive structures in many lower plants.

paraphysis (*Zool.*). A thin-walled sac developed as an outgrowth from the non-nervous roof of the telencephalon.—*pl.* **paraphyses.**—*adj.* **paraphysate.**

paraphy'soid (*Bot.*). A plate of cells occurring between the asci in some *Ascomycetes*.

parapi'neal body (*Zool.*). In *Cyclostomata*, some Fish, and most Lizards, an epiphysial outgrowth of the roof of the thalamencephalon just anterior to the pineal body; in some forms developed as a third eye with a lens.

par'aplasm (*Cyt.*). The inactive, vegetative portion of the cytoplasm.

paraplec'tenchy'ma (*Bot.*). Pseudoparenchyma.

paraple'gia (*Med.*). Paralysis of the lower part of the body and of the legs.

parapo'dium (*Zool.*). In *Mollusca*, the epipodia: in *Polychaeta*, a paired fleshy projection of the body-wall of each somite used in locomotion.—*adj.* **parapo'dial.**

parapoph'yses (*Zool.*). A pair of ventrolateral processes of a vertebra arising from the sides of the centrum.

parap'sid (*Zool.*). (Of a skull) possessing a single postorbital fossa.

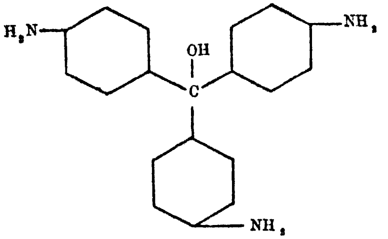
parap'teron (*Zool.*). See **tegula.**

parap'terum (*Zool.*). In Birds, a group of small feathers attached to the humerus.

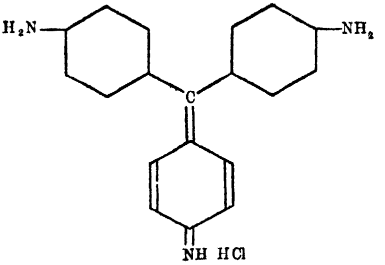
paraquad'rate (*Zool.*). See **squamosal.**

***para*-quinones** (*Chem.*). Quinones in which the two quinone oxygen atoms are in the *para* position.

pararosan'iline (*Chem.*) A triamino-triphenylcarbinol of the formula:



It is obtained by the oxidation of a mixture of *p*-toluidine (1 mol.) and aniline (2 mols.). As oxidising agents, arsenic acid or nitrobenzene are used. Acids effect the elimination of water and the formation of a dyestuff with a quinonoid structure, e.g. the hydrochloride of pararosaniline or parafuchsine has the formula:



pararosol'ic acid (*Chem.*). See **aurine.**

paraseie'nae (*Meteor.*). See **mock moons.**

parasite (*Bot., Zool.*). An organism which lives in or on another organism and derives subsistence from it without rendering it any service in return. See **parasitism.**

parasit'ic bronchitis (*Vet.*). See **husk.**

parasitic castration (*Bot.*). The condition when a plant is unable to fruit owing to damage to the reproductive organs by a parasite.—(*Zool.*) Castration brought about by the presence of a parasite, as in the case of a Crab parasitised by *Sacculina.*

parasitic drag (*Aero.*). The drag of all aircraft parts other than the induced and profile drag associated with the production of lift.

parasitic loss (*Elec. Eng.*). A term sometimes used to denote loss in electric machines due to eddy-currents occurring in any part of the machine, i.e. in the conductors themselves or in parts of the metal framework. The term does not include losses due to the main flux in the magnetic circuit, which come under the heading of *iron loss* (q.v.).

parasitic male (*Zool.*). A dwarf male in which all but the sexual organs are reduced, and which is entirely dependent on the female for nourishment; as in some deep-sea Angler-fish (Ceratioids).

parasitic oscillation (*Radio, etc.*). Unwanted oscillation of an amplifier, or oscillation of an oscillator at some frequency other than that of the main resonant circuits. It is generally of high frequency, and may occur during a portion of each cycle of the main oscillation.

par'asitism (*Biol.*). A close, internal, or external partnership between two organisms which is detrimental to one partner (the *host*) and beneficial to the other partner (the *parasite*); the latter obtains its nourishment at the expense of the nutritive fluids of the host.

par'asitoid' (*Zool.*). An animal which is parasitic in one stage of the life-history and subsequently free-living in the adult stage, as the parasitic *Hymenoptera.*

parasol (*Aero.*). An aeroplane, usually a monoplane, in which the main plane is carried as a separate structure above the body or fuselage.

parasphen'oid (*Zool.*). In some of the lower Vertebrates, a membrane bone of the skull, which forms part of the cranial floor.

paras'tas (*Build.*). A *pilaster* (q.v.).

paraster'num (*Zool.*). The gastralia of certain Reptiles.

parastichy, —stik'i (*Bot.*). A spiral line passing once round a stem through the bases of successive leaves.—*pl.* **parastich'ies.**

parasti'pes (*Zool.*). See **subgalea.**

parasymbio'sis (*Biol.*). The condition when two organisms grow together but neither assist one another nor harm one another.

parasympathet'ic nervous system (*Zool.*). In Vertebrates, a system of motor nerve-fibres supplying the smooth muscles and glands of the body and originating in the head from the brain and in the sacral region from the spinal cord; *cf. sympathetic nervous system.*—*adj.* **parasympathetic.**

parasynap'sis, parasynde'sis (*Cyt.*). Side-by-side union of the elements of a pair of chromosomes; cf. *telosynapsis.*—*adjs.* **parasynap'tic, parasyndet'ic.** See also **synapsis.**

parathe'cium (*Bot.*). A layer of hyphae around the apothecium of a lichen.

parathy'roid (*Zool.*). A ductless gland of Vertebrates arising from the gill-pouches, the function of which is believed to be associated with calcium metabolism and the control of the discharge of nervous energy.

parathyroidec'tomy (*Surg.*). Surgical removal of one or more of the parathyroid glands.—*v.* **parathyroidectomise.**

parat'omy (*Zool.*). In *Annelida*, a form of reproduction by fission in which regeneration takes place before separation.

paraton'ic movements (*Bot.*) Plant movements in relation to an external stimulus.

paratra'cheal (*Bot.*). Said of xylem parenchyma occurring at the edge of the annual ring and round the vessels, but nowhere else.

paratuberculo'sis (*Vet.*). See **Johne's disease.**

paraty'phoid (*Med.*). An infectious disease due to infection by *Bacterium paratyphosum A, B,* or *C*; similar to, but more mild than, typhoid fever; characterised by enteritis, enlargement of the spleen, raised temperature, and a rash of rose-coloured spots.

paratyphoid, avian (*Vet.*). A contagious disease of birds due to infection by *B. aertrycke.*

paratyphoid, swine (*Vet.*). A contagious disease of swine due to infection by bacteria of the *Salmonella* group, particularly *B. suipestifer.*

paravane (*Armaments*). A kite-shaped device used in mine-sweeping. By means of it a sharp wire is kept at an angle from a mine-sweeper, so that mines may be cut from their moorings and float up to view, to be sunk by puncture or detonation.

parax'ial (*Photog.*). The path of a ray which is parallel to the axis of an optical system.

Parazo'a (*Zool.*). A subkingdom of the animal kingdom comprising multicellular animals having two tissue layers only (of which one is composed of choanocytes), and lacking a nervous system and enteric cavity, and showing little co-ordination between the different cells composing the body. Cf. *Protozoa, Metazoa.*

Par. C. (*Build.*). Abbrev. for *Parian cement.*

parcel plating (*Elec. Eng.*). The electrodeposition of a metal over a selected area of an article, the remainder being covered with a non-conductor in order to prevent deposition.

parchmentising (*Paper*). The process of passing paper through sulphuric acid, which causes the fibres to swell and the paper to become transparent. Paper so prepared is used principally for food-wrapping.

parenceph'alon (*Zool.*). A cerebral hemisphere.

paren'chyma, *or* —en-ki'ma (*Bot.*). A tissue composed of blunt-ended cells, having thin walls consisting of cellulose, and often forming a general packing among conducting and mechanical tissues. —(*Zool.*) Soft spongy tissue of indeterminate form, consisting usually of cells separated by spaces filled with fluid or by a gelatinous matrix, and generally of mesodermal origin.—*adj.* **parenchymatous.**

parenchym'ula (*Zool.*). In *Porifera*, a flagellate larval form the internal cavity of which is occluded by a form of parenchyma.

parent metal (*Elec. Eng.*). A term used in welding to denote the metal of the parts which are to be welded.

paren'teral (*Med.*). Said of the administration of therapeutic agents by any way other than through the alimentary tract.

paren'theses (*Typog.*). A mark of punctuation ( ) used to enclose a definition, explanation, reference, etc., or interpolations and remarks made by the writer of the text himself. Cf. *bracket.*

pare'sis (*Med.*). (1) Slight or incomplete paralysis. —(2) General paresis; the same as *general paralysis of the insane* (q v.).

paresthesia (*Med.*). See **paraesthesia.**

par'gasite (*Min.*). A monoclinic amphibole closely similar to hornblende but containing a peculiar molecule with fluorine, aluminium, and sodium as its chief constituents. Named from Pargas, Finland.

parge-work (*Build.*). An ancient form of external plastering with a mixture similar to that used in *pargetting* (q.v.) chimneys. Also called PARGING.

par'getting (*Build.*). The operation of rendering the interior of a flue with a lime and hair mortar liberally mixed with cow-dung.

parging (*Build.*). See **parge-work.**

parhe'lia (*Meteor.*). *Sing.* **parhelion.** See **mock suns.**

Pa'rian (*Pot.*). A feldspathic, yellowish, semi-transparent body, resembling Carrara marble; usually cast.

Parian cement (*Plast.*). A hard plaster made from an intimate mixture of gypsum and borax which has been calcined and then ground to powder.

parich'nos (*Bot.*). In certain lower vascular plants, a pair of scars, one on each side of the leaf base; each scar marks the end of a strand of parenchyma passing into the stem.

pariet-, parieto- (Latin *paries*, gen. *parietis*, wall). A prefix used in the construction of compound terms; e.g. *parieto-occipital*, pertaining to the parietal and occipital lobes of the cerebrum.

pari'etal (*Bot.*). Attached to, or lying near to and more or less parallel with, a wall. Applied particularly to the placenta when this arises from the peripheral wall of a carpel, and to chloroplasts of *Algae* lying not far inside the cell wall.

parietal (*Zool.*). A paired dorsal membrane bone of the Vertebrate skull, situated between the auditory capsules: pertaining to, or forming part of, the wall of a structure: (in Insects) said of the part of the epicranium between the vertex and the frons.

parietal cells (*Zool.*). The oxyntic cells of a gastric gland in *Vertebrata.*

pari'etes (*Anat., Zool.*). The walls of an organ or a cavity.—*sing.* **paries,** pār'i-ēz.

paring chisel (*Carp., Join.*). A long chisel with a thinner blade than a firmer tool, used for finishing off work by hand. It is not intended to be struck with a mallet.

paring gouge (*Carp. etc.*). A gouge having the bevel ground upon the inside or concave face of the cutting edge.

paripin'nate (*Bot.*). Said of a compound pinnate leaf which has no terminal leaflet.

Paris green (*Chem.*). A double salt of copper acetate and copper meta-arsenite. Also known as SCHWEINFURT GREEN.

parison (*Glass*). The intermediate shape produced in the manufacture of a glass article in more than one stage. In the automatic and semi-automatic methods, the parison is formed in one mould, being then transferred to another for the final forming operation.

parity (*Med.*). The condition or fact of having borne children.

Parke's process (*Met.*). A process used for desilverising lead. It depends on the fact that when zinc is added to molten lead it combines with silver and gold to form compounds that have a very slight solubility in lead. Furthermore, in cooling the lead, the zinc added is eliminated and only about 0·6% requires to be removed in a later operation.

Parker's cement (*Build., Civ. Eng.*) See **Roman cement.**

parkerising (*Met.*). The process for producing a protective coating on iron and steel by boiling in a solution of manganese dihydrogen phosphate.

Parkinson's disease (*Med.*). See **paralysis agitans.**

parkinsonism (*Med.*). The gradual development, as a sequel to encephalitis lethargica, of a state closely similar to that found in *paralysis agitans* (q.v.).

parliament hinge (*Join.*). See **H-hinge.**

parliamentary candle (*Illum.*). See **standard candle.**

parlour (*Build.*). A sitting-room in a small dwelling-house.

paroccipital, par-ok-sip'— (*Zool.*). A ventrally directed process of the exoccipital in Mammals.

paroi'cous (*Bot.*) Said of those *Bryophyta* in which the antheridia and archegonia occur on the same branches but are not mixed, the antheridia being borne lower on the stems than the archegonia.

parony'chia (*Med.*). A felon or whitlow. Purulent inflammation of the tissues in the immediate region of the finger nail.

paronychia (*Zool.*). In Insects, bristles on the pulvillus of the foot.

parot'ic process (*Zool.*). In some Vertebrates, a bony process formed by the fusion of the opisthotic with the exoccipital.

parot'id gland (*Zool.*). In some *Anura*, an aggregation of poison-producing skin glands on the neck: in *Mammalia*, a salivary gland situated at the angle of the lower jaw.

paroti'tis (*Med.*). Inflammation of the parotid gland. EPIDEMIC PAROTITIS and INFECTIOUS PAROTITIS are synonyms for *mumps.*

parova'rial (*Zool.*). Beside the ovary.

parova'rium (*Zool.*). In some female Mammals, a small collection of tubules, near the anterior end of the ovary, which represents the mesonephros.

parpoint work (*Masonry*). Stone-wall construction in which the squared stones are laid as stretchers, with occasional courses of headers.

parquet, par'kā (*Build.*). A floor-covering of hardwood blocks glued and pinned to the ordinary floor boarding and finally wax-polished.

par'quetry (*Furn.*). A type of marquetry, as wood inlay, consisting of geometrical designs.

parrot disease (*Med., Vet.*). See **psittacosis.**

pars (*Zool.*). A part of an organ.—*pl.* **partes.**

pars anterior (*Zool.*). In higher Vertebrates, part of the anterior lobe of the pituitary body, developed from the hypophysis.

pars intermedia (*Zool.*). In higher Vertebrates, part of the posterior lobe of the pituitary body, which is derived from the hypophysis at first but tends to become spread over the surface of the *pars nervosa* (q.v.) as development proceeds.

pars nervosa (*Zool.*). In higher Vertebrates, part of the posterior lobe of the pituitary body, developed from the infundibulum.

pars tubera'lis (*Zool.*). In higher Vertebrates, part of the anterior lobe of the pituitary body, derived from the hypophysis.

parsec (*Astron.*). The chief unit used in measuring stellar distances, being the distance at which the semi-major axis of the earth's orbit would subtend one second of arc; hence, a star's distance in *parsecs* is the reciprocal of its annual parallax in seconds of arc, one parsec is equal to 206265 astronomical units or $19{\cdot}16 \times 10^{12}$ miles.

Parson's steam turbine (*Eng.*). A *reaction turbine* (q.v.) in which rings of moving blades of increasing size are arranged along the periphery of a drum of increasing diameter. Fixed blades in the casing alternate with the blade rings. Steam expands gradually through the blading, from inlet pressure at the smallest section to condenser pressure at the end.

part (*Arch.*). The one-thirtieth portion of a module.

parted (*Bot.*). Cleft nearly to the base.

parthen-, partheno- (Greek *parthenos*, virgin). A prefix used in the construction of compound terms; e.g. *parthenogenetic* (q.v.).

parthenap'ogamy (*Bot.*). A fusion of vegetative nuclei.

par'thenocar'py (*Bot.*). The production of a fruit without a preliminary act of fertilisation, and without any development of seeds within the fruit.

par'thenogam'y (*Bot*). The union of two female gametes or of structures equivalent to them.

parthenogenet'ic (*Bot., Zool*). Reproducing by the production of ova capable of development without fertilisation by male elements.—**parthenogenesis.**

parthenogonid'ia (*Zool.*). In some *Mastigophora*, agamonts which multiply by fission to form daughter-colonies.

par'thenospore (*Bot.*). A spore formed without a previous sexual act.

par'thenote (*Bot., Zool.*). An individual developed from an egg containing only one nucleus, which is haploid.

partial (*Acous.*). Any one of the single-frequency components of a complex tone; in most musical complex tones the partials have harmonic frequencies with respect to a fundamental.

partial (*Bot.*). Secondary; subsidiary; not general.

partial common (*Auto. Teleph.*). A trunk which is common to some of the groups in a grading unit.

partial earth (*Elec. Eng.*). An earth fault having an appreciable resistance.

partial habitat (*Bot.*). The habitat occupied by a plant during one stage in its life-history.

partial larva (*Zool.*). A parthenogenetic larval Amphibian produced by artificial stimulation of the ovum without the agency of a spermatozoon.

partial parasite (*Bot.*). A plant which has at least some power of photosynthesis, but obtains some material, mainly mineral salts and carbohydrates, from a host.

partial pressures (*Chem.*). See **Dalton's law of partial pressures.**

partial pyritic smelting (*Met.*). Blast-furnace smelting of copper ores in which some of the heat is provided by oxidation of iron sulphide and some by combustion of coke. See **pyritic smelting.**

partial roasting (*Met.*). Roasting carried out in order to eliminate some but not all of the sulphur in an ore. In copper smelting, the sulphur left after roasting combines with copper and some iron to form a matte.

partial umbel (*Bot.*). One of the smaller groups of flowers which altogether make up a compound umbel.

partial valencies (*Chem.*). The residual affinity which, according to Thiele's theory, still prevails in double bonds. The formation of additive compounds and the selective addition in the 1,4-position of conjugated *double bonds* (q.v.) is explained by the presence of partial valencies, although numerous exceptions cannot be accounted for by this theory.

partial veil (*Bot*). A hyphal weft or membrane joining the edge of the pileus to the stipe, and on rupture leaving an annulus.

particle (*Acous.*). A volume of air or fluid which has dimensions very small in comparison with the wavelength of a propagating sound-wave but large in comparison with molecular dimensions.

particle velocity (*Acous.*). In a progressive or stationary sound-wave, the longitudinal alternating velocity of the air or fluid particles, taken either as the maximum velocity or as the r m.s. velocity.

particulate inheritance (*Gen.*). Inheritance, in one individual, of distinctive characteristics of both parents.

parting (*Met.*) The process of removing silver from gold-silver bullion. The composition is adjusted so that the silver content is three times the gold content, the silver being then dissolved out with sulphuric acid.

parting bead (*Join.*). A bead fixed to the cased frame of a double-hung window in order to separate the inner and outer sashes.

parting sand (*Build*). A layer of dry sand separating two layers of damp sand, which are thereby prevented from adhering to one another.—(*Foundry*) Dry sand sprinkled on the parting face of a mould in order to prevent adhesion of the two surfaces at the joint when the cope is rammed.

parting slip (*Join.*). A thin lath of wood or zinc which keeps the sash-weights apart within the cased frame of a double-hung window. Also called MID-FEATHER, WAGTAIL.

parting strip (*Civ. Eng.*). A narrow strip of land, usually bounded by a kerb, separating the carriageways of a double-carriageway road.

partite (*Zool.*). Split almost to the base.

partition (*Bot.*). See **dissepiment** (1).

partition (*Build.*). A dividing wall between rooms.

partition coefficient (*Chem.*). The ratio of the equilibrium concentrations of a substance dissolved in two immiscible solvents. If no chemical interaction occurs, it is independent of the actual values of the concentrations.

partition plate (*Carp.*). The upper horizontal member of a wooden partition, capping the studding and providing a support for joists, etc.

partridge disease (*Vet.*). A popular term for infection of the bowels of partridges by the nematode worm *Trichostrongylus tenuis.*

partu'rient (*Med.*). Of or pertaining to parturition: about to give, or in the process of giving, birth.

parturient apoplexy, parturient fever, parturient paralysis (*Vet.*). See **milk fever.**

parturition (*Zool.*). In viviparous animals, the act of bringing forth young.

party (*Teleph.*). A former name for *subscriber.*

party colours (*Paint.*). A term used in description of a surface painted in more than one colour.

party fence (or **wall**) (*Build.*). A fence or wall separating adjoining properties and owned equally by the two proprietors.

party line (*Teleph.*). An exchange line which is used by a number of subscribers, who are called by selective harmonic ringing.

parvifo'liate (*Bot.*). Having leaves which are small in relation to the size of the stem.

Paschen series (*Phys.*). One of the hydrogen spectral series in the infra-red region. It is represented by the formula $\nu = N\left(\frac{1}{3^2} - \frac{1}{m^2}\right)$, where m takes integral values 4, 5, 6 . . . etc. See **Balmer series, Lyman series.**

pas'cual (*Bot.*). Inhabiting pastures.

pass-key (*Build.*). A special key capable of operating a number of locks in a building.

pass-over offset (*Plumb.*) The local bend which is given to a pipe so that the latter may pass over another pipe in cases where the axes of the pipes are in the same plane.

passage beds (*Geol.*). The general name given to strata laid down during a period of transition from one set of geographical conditions to another; e.g. the Downtonian Stage consists of strata intermediate in character (and in position) between the marine Silurian rocks below and the continental Old Red Sandstone above.

passage cell (*Bot.*). A thin-walled non-suberised cell in an endodermis or an exodermis, through which solutions can diffuse in a transverse direction.

Passerifor'mes (*Zool.*). An order of *Coraciomorphae* having an aegithognathous palate; the front of the shank is covered by a few large scales and the hallux is large and backwardly directed; the right carotid artery is lacking; the young are altrices; an enormous group containing nearly half the known species of Birds—Perching Birds, Song Birds, Swallows, Lyre Birds, etc.

passing hollow (*Horol.*). See **crescent.**

passing-off (*Furs*). The operations of beating, cleaning, and brushing fur to freshen it up.

passing place (*Civ. Eng.*). A railway siding.

passings (*Plumb.*). The overlap of one sheet of lead past another in flashings, etc.

passive electrode (*Elec. Eng.*). The earthed electrode of an electrical precipitation apparatus, being that upon which the particles are deposited. Also called COLLECTING ELECTRODE.

passive metals (*Met.*). Metals on which an oxide film that prevents further attack on the metal is readily formed. When metals other than noble metals have a high resistance to corrosion it is because of passivity. Examples are chromium, nickel, aluminium and tin, and various alloys. See **passivity.**

passive network (*Elec. Comm.*). A network of electrical elements in which there is no source of electromotive force or other source of gain.

passive transducer (*Elec. Comm.*). Any transducer in which the output power is obtained entirely from the applied power, as in a network. See **active transducer.**

passivity (*Met.*). The phenomena associated with the conversion of certain metals (*passive metals*, q.v.) into an extremely unreactive form, as the result of either anodic polarisation, or immersion in certain solutions (e.g. concentrated nitric acid), or exposure to air. It is ascribed to the formation of a very thin, often invisible, surface film of an insoluble compound of the metal, generally an oxide.

paste (*Jewel.*). Strass and other special glass used to imitate precious stones, particularly diamonds.

paste (*Pot.*). Material of which porcelain body is formed. *Hard-paste* (*pâte dure*), composed of china stone and china clay, is true porcelain. *Soft-paste* (*pâte tendre*), composed of glass or frit with white, is artificial porcelain.

pasteboards (*Paper*). See **cardboards.**

paste-mould blowing machines (*Glass*). A machine for blowing light-walled hollow-ware. As a good finish is needed, the moulds are coated with 'paste' and are wetted before each blowing operation.

paste-mould process (*Glass*). See **paste-mould blowing machines.**

pasted filament (*Illum.*). An electric-lamp filament prepared by squirting through a die a paste formed of powdered metal, usually tungsten, together with a binding material, the latter being subsequently removed by heat treatment.

pasted plate (*Elec. Eng.*). A plate in which the active material of the plate is applied in the form of a paste; used for lead-acid accumulators.

pasteurello'sis (*Vet.*). Contagious infection of animals and birds by bacteria of the germs *Pasteurella*. Also HAEMORRHAGIC SEPTICAEMIA.

pasteurisation (*Med.*). Reduction of the number of micro-organisms in milk by maintaining it in a holder at a temperature of from 62·8°-65·5° C. for thirty minutes.

pastillage, pas-tē-yazh' (*Pot.*). Dot and line designs made with coloured slip, which is dribbled from a container with a flexible base and a spout.

pata'gium (*Zool.*). A lobe-like structure at the side of the pronotum in some *Lepidoptera*: in Bats and some other flying Mammals, a stretch of webbing between the fore limb and the hind limb: in Birds, a membranous expansion of the wing.—*adj.* **patagial.**

pat'and (*Build.*). A sill resting on the ground as a support for a post.

Patap'sco formation (*Geol.*). The highest division of the Comanchean of the eastern U.S.A., consisting of brightly coloured, often sandy, clays with fossil plants.

patch (*Elec. Comm.*). To join together units of apparatus, such as amplifiers, equalisers, etc., by flexible cords terminated on plugs, which are inserted into break-jacks bridged across the terminations of each unit.

patch bay (*Elec. Comm.*). The section of rack-mounted equipment which includes all the break-jacks which terminate the units of equipment.

patch, blooping (*Cinema.*). See **blooping patch.**

patch cord (*Elec. Comm.*). The flexible cord, generally shielded and containing a pair of tinsel conductors, which is terminated in plugs for patching between units of rack-mounted equipment.

patch in and **patch out** (*Elec. Comm.*). The temporary connexion (*patching in*) of spare apparatus in a circuit with patch cords, defective apparatus being thereby *patched out*.

pâte dure, pâte tendre, paht dür, tahn^{g}dr (*Pot.*). See **paste.**

patella (*Bot.*). A sessile apothecium, saucer-like, and with a distinct margin.

patella (*Zool.*). In higher Vertebrates, a sesamoid bone of the knee-joint or elbow-joint.

patel'late, patel'liform (*Bot.*). Shaped like a saucer or dish.

patent (*Bot.*). Said of leaves and branches which spread out widely from the stem.

patent board (*Build.*). A general name for any proprietary building-board.

patent glazing (*Build.*). The name applied to various marketed devices for securing together glass sheets (for roof coverings, etc.) without using putty in sashes, the connexion being made usually with special metal sections or flashings.

patent leather (*Leather*). An enamelled leather produced by spraying the leather with a cellulose lacquer.

patent log (*Ships*). See **log (nautical).**

patent plate (*Glass*). Plate glass that has been ground and polished on each side.

patent satin or **mitcheline** (*Textiles*). A fabric of compound structure, with an embossed pattern. Used as a bed-covering.

patent stone (*Civ. Eng.*). *Reconstructed stone* (q.v.).

pat'era (*Plast.*). A circular ornament in relief on friezes.—*pl.* **paterae.**

pathetic muscle (*Zool.*). The superior oblique muscle of the Vertebrate eye

pathetic nerve (*Zool.*). See **trochlear nerve.**

path'ogen (*Med.*). Any disease-producing micro-organism or substance.

pathogen'esis (*Med.*). The development or production of a disease-process —*adj.* **pathogen'ic.**

path'ognomon'ic (*Med.*). Specially indicating a particular disease.

pathological. Concerning pathology: morbid, diseased.

pathol'ogy. That part of medical science which deals with the causes and nature of disease, and with the bodily changes wrought by disease.

pat'in (*Build.*). A *patand* (q.v).

pat'ina (*Chem.*). The thin, often multi-coloured, film of oxide formed on the surface of a metal

patroclin'ic, patrocli'nous (*Bot., Zool.*). Exhibiting the characteristics of the male parent more prominently than those of the female parent. Cf. *matroclinous.*

patromor'phic (*Bot.*). Resembling the father.

patten (*Masonry*). The base of a column or pillar.

patter (*Build*) A kind of float, made of thick wood, used to consolidate and level cement surfaces.

pattern (*Foundry*) A wood, metal, or plaster copy, in one piece or in sections, of an object to be made by casting. Made slightly larger than the finished casting, in order to allow for contraction; and suitably tapered to facilitate withdrawal from the mould. See **contraction rule, double contraction, metal pattern, plate moulding.**

pattern (*Photog., Print.*). A regular texture effect formed by superimposing two or more sets of lines or dots of different pitch or at certain angles; a defect to be avoided, especially in half-tone reproduction of steel-engravings and in half-tone four-colour work.

pattern weaver (*Textiles*). A hand-loom weaver engaged in the work of producing section ranges for new-season styles.

Pattinson's process (*Met.*). The process used for the separation of small quantities of silver from lead by partially solidifying a molten bath of the two metals and separating the remaining liquid. This process is repeated several times and the silver is concentrated in the liquid.

Pattinson's white lead (*Chem.*). A pigment of a lead oxychloride type.

pat'ulous (*Bot.*). Spreading rather widely.

pat'uron (*Zool.*). The first or basal segment of the chelicerae in *Arachnida.*

Patux'ent Beds (*Geol.*). The lowest group of Comanchean beds lying unconformably on older strata in the eastern U.S.A. They consist of arkosic sands with clays, and contain plant remains.

paunch (*Zool.*). See **rumen.**

paur'ometabol'ic (*Zool.*). Showing incomplete metamorphosis, the young resembling the adults both in form and in mode of life; as in *Collembola.* Cf. *hemimetabolic.*

Paurop'oda (*Zool.*). An order of very small *Myriapoda* having twelve trunk somites, nine pairs of legs, and triflagellate antennae.

pavement (*Civ. Eng.*). (1) The side-walk provided for pedestrian traffic only, alongside a road.—(2) The hard surfacing of a road or side-walk.

See **block—** **sheet—**

pavement epithelium (*Zool.*). A variety of epithelium consisting of a layer of flattened cells.

pavement light (*Build.*). A panel formed of glass blocks framed in iron or steel, built into a pavement surface over an opening to the basement of a building, into which it admits light.

pavilion (*Build.*). An ornamental, detached structure which has a roof but is usually not entirely enclosed by walls. Used on sports fields, or as a place for entertainments.

pavilion (*Jewel.*). The base of a faceted stone, between the girdle and the culet.

pavilion roof (*Build.*). A roof which in plan forms a figure of more than four straight sides.

pavings (*Build*). Very hard purpose-made bricks, usually of the dark-blue Staffordshire variety, having a surface chequered by grooves to make it less slippery.

paving flags (*Civ. Eng.*). Thin flat stones used for surfacing pavements. They may be of natural or artificial stone, and should be not less than 2 ft. wide or 6 sq. ft. in area, or less than 3 in. thick.

pavior (*Build.*). (1) A specially hard brick used in the construction of pavement surfaces.—(2) A worker who lays bricks or setts to form pavement surfaces.

Pavit (*Civ. Eng.*). A trade-name for a type of bitumen used for forming pavement or road surfaces.

Pavy's solution (*Chem.*). A modified Fehling's solution containing sufficient ammonium hydroxide to redissolve the cuprous oxide.

pawl (*Eng*). A pivoted catch, usually spring-controlled, engaging with a ratchet wheel or rack to prevent reverse motion, or to convert its own reciprocating motion into an intermittent rotary or linear motion.

Pawlov'sky's glands, pav— (*Zool*). In *Anoplura*, a pair of glands opening into the stylet sac; believed to secrete a lubricating fluid.

P.A.X. (*Teleph*). Abbrev. for *private automatic exchange.*

Paxboard or **Paxfelt** (*Build.*). Trade-name for an insulating material.

paxil'la (*Zool.*). An upright spine bearing two or three circles of horizontal spinelets, occurring in some *Asteroidea.*—*pl.* **paxillae.**—*adjs.* **paxillar, paxilliform.**

Paxillo'sa (*Zool.*) An order of *Asteroidea* in which the dorsal surface is closely set with tufts of spines known as *paxillae* (q.v.); the tube-feet are mostly devoid of suckers, and pedicellariae, if present, are few in number and never forcipulate.

pay load (*Aero.*). That part of an aeroplane's load for which revenue is obtained.

pay station (*Teleph.*). The same as *public call office.*

Pb (*Chem*). The symbol for *lead.*

P.B.X. (*Teleph.*). Abbrev. for *private branch exchange.*

P.B.X. final selector (*Auto. Teleph.*). A final selector arranged so that when it switches to the first of a group of lines going to a P.B.X., it automatically hunts over these until a free line is found.

P.C. (*Civ. Eng.*). A common abbrev. for (1) *prime cost*; (2) *Portland cement.*

Pd (*Chem.*). The symbol for *palladium.*

p.d. (*Elec. Eng.*). Abbrev. for *potential difference.*

Pea Grit (*Geol*). A bed of pisolitic limestone, containing shell fragments, found in the Lower Jurassic rocks of Gloucestershire. It is not a true grit.

peacock ore (*Min.*). The name given to *bornite* (q.v.) because it rapidly becomes iridescent from tarnish.

peak arch (*Arch.*). A pointed arch, such as a Gothic arch.

peak factor (*Elec. Eng.*). The ratio of the peak value of an alternating or pulsating wave to its root-mean-square value. Also called AMPLITUDE FACTOR, CREST FACTOR.

peak joint (*Build.*). The joint between the members of a roof truss at its ridge.

peak load (*Elec. Eng.*). The maximum load on a generating station or power distribution system.

peak value (*Elec. Eng.*). The maximum positive or negative value of an alternating quantity. Also called AMPLITUDE, CREST VALUE, MAXIMUM VALUE.

peak voltmeter (*Elec. Eng.*). A voltmeter for measuring the peak value of an alternating voltage. Also called CREST VOLTMETER.

pean (*Tools*). See **pane.**

pear oil (*Chem.*). See under **amyl acetate.**

pear-push (*Elec. Eng.*). See **pendant push.**

pear-switch (*Elec. Eng.*). See **pendant switch.**

pearl. An abnormal concretion of nacre formed inside a mollusc shell round a foreign body such as a sand particle or a parasite.

pearl (*Typog.*). The old name for a type size, about 5-point.

pearl disease (*Vet.*). Bovine *tuberculosis* (q.v.).

pearl fabrics (*Hosiery*). See **purl fabrics.**

pearl lamp (*Elec. Eng.*). See **inside-frosted lamp.**

pearl spar (*Min.*). See **dolomite.**

pearl white (*Chem.*). See **bismuth trichloride.**

pearlite (*Met.*). A microconstituent of steel and cast-iron. It is produced at the eutectoid point by the simultaneous formation of ferrite and cementite from austenite, and normally consists of alternate plates of these constituents (see, however, **globular pearlite**). A carbon steel containing 0.9% of carbon consists entirely of pearlite. See **eutectoid steel, hypo-eutectoid steel, hyper-eutectoid steel.**

pearlite iron, Perlite Iron (*Met.*). In general, *pearlite iron* is grey cast-iron consisting of graphite in a matrix of pearlite, i.e. without free ferrite. In particular, *Perlite Iron* is a German proprietary name denoting an iron of low silicon content, which is caused to solidify grey by the use of heated moulds.

peat (*Geol.*). The name given to the layers of dead vegetation, in varying degrees of alteration, resulting from the accumulation of the remains of marsh vegetation in swampy hollows in cold and temperate regions. Geologically, peat may be regarded as the youngest member of the series of coals of different rank, including brown coal, lignite, and bituminous coal, which link peat with anthracite. Peat is very widely used as a fuel, after being air-dried, in districts where other fuels are scarce—in Russia on a very large scale for steam-raising. It is low in ash, but contains a high percentage of moisture, and is bulky; calorific value per pound about 7000 B.Th.U.

pebble (*Jewel.*). Semi-precious stones, chiefly agates and quartz.

pebble-dashing (*Plast.*). A rough finish given to a wall by coating it with plaster, on to which, while it is still soft, small stones and liquid lime are thrown.

Pebid'ian (*Geol.*). The name given to a series of igneous rocks, of Pre-Cambrian age, found in Pembrokeshire.

P.E.C., pec (*Cinema.*). Contraction for *photo-electric cell.*

P.E.C. amplifier (*Cinema.*). Abbrev. for *photo-electric cell amplifier.*

pecker (*Teleg.*). The small cylindrical pin which rises and falls in scanning the holes punched in a slip corresponding to the coding of the message. The passage of the pecker through the slip actuates the mechanical part of the transmitter (e.g. a Wheatstone high-speed morse or a Siemens), which sends the electrical signals to line.

peckings (*Build.*). Under-burnt, badly shaped bricks, used only for temporary work or for the inside of walls.

pecky (*Timber*). Showing signs of decay.

pecten (*Zool.*). Any comb-like structure: in some Vertebrates (Reptiles and Birds), a process of the inner surface of the retina of unknown function: in *Arachnida*, a stridulating organ.—*pl.* **pecti'nes** (q.v.).—*adjs.* **pecti'nal, pec'tinate.**

pec'tinate (*Bot., Zool.*). Comb-like; said especially of a pinnatifid leaf having many narrow lateral lobes.

pectine'al (*Zool.*). Comb-like; said (1) of a process of the pubis in Birds, (2) of a ridge on the femur to which is attached the *pectineus muscle*, one of the protractors of the hind limb.

pectinel'lae (*Zool.*). In some *Mastigophora*, transversely planted comb-like membranellae representing the adoral spiral of cilia.

pectines, —ti'nēz (*Zool.*). Comb-like chitinous structures of tactile function attached to the ventral surface of the second somite of the mesosoma in *Scorpionida.*

Pec'tinibran'chia (*Zool.*). An order of *Streptoneura*, having a concentrated nervous system and a single auricle; the central radula tooth is single or absent; there is a monopectinate ctenidium attached to the mantle throughout its length; terrestrial, fresh-water, and marine forms. Periwinkles, Cowries, River Snails, Apple Snails, Slipper Limpets, Worm Shells, and Whelks.

pectins (*Bot.*). A mixture of non-crystalline carbohydrates of high molecular weight occurring in the cell walls of fruits and vegetables, especially in the middle lamella. The mixture is soluble in water and is precipitated from aqueous solution by excess of alcohol. Pectins can form jellies with fruit juices when suitable concentrations of acid and sugar are present, and play an important part in the setting of jam.

pectisation (*Chem.*) The formation of a jelly.

pec'tolite (*Min.*). A silicate of calcium and sodium, with a variable amount of water, which crystallises in the monoclinic system. It occurs in aggregations like the zeolites in the cavities of basic eruptive rocks.

pec'toral fins (*Zool.*). In Fish, the anterior pair of fins.

pectoral girdle (*Zool.*). In Vertebrates, the skeletal framework with which the anterior pair of locomotor appendages articulate.

pectora'les (*Zool.*). In Vertebrates, muscles connecting the upper part of the fore limb with the ventral part of the pectoral girdle.—*sing.* **pectora'lis.**

pectoril'oquy (*Med.*). Conduction, to the chest wall, of the sound of words spoken or whispered by the patient and clearly heard through the stethoscope; indicative of consolidation or cavitation of the lung.

pectus (*Zool.*). A thoracic sclerite of *Insecta*, formed by the fusion of the pleuron with the sternum; in *Vertebrata*, the breast region.—*adj.* **pec'toral.**

peculiar (*Typog.*). A term describing any unusual type character, such as certain accents.

peculiar motion (*Astron.*). A term, more often found in its Latin form, *motus peculiares*, meaning that part of a star's observed motion which remains after allowing for the three motions of the observer, viz., the rotational, orbital, and solar motions, which all contribute to the star's apparent motion.

pedal. Pertaining to the foot or feet.

pedal (*Acous.*). In a piano, the foot-operated lever which raises all the dampers from the wires: the foot-operated key in an organ console. See **balanced pedal.**

pedal feed motion (*Textiles*). A motion for controlling the speed at which sheets of raw cotton are fed to the beater; the speed is varied according to the thickness of the sheets.

ped'ate leaf (*Bot.*). A palmately divided compound leaf having three main divisions, and having the two outer divisions forked one or more times.

peda'tifid (*Bot*). Having the lamina deeply cut in pedate fashion.

pedes, ped'ēz (*Zool.*). See **pes.**

pedestal (*Build.*). A base for the support of a statue, column, or other object.

pedestal (*Furn.*). (1) A panelled stand.—(2) A tall, slender chest, as a pedestal (or night) table: the isolated blocks of a pedestal sideboard or writing table.

pediatric, etc. (*Med.*). See **paediatric,** etc.

ped'icel (*Bot.*). The stalk which bears a single flower or a single fruit.

pedicel (*Zool.*). The second joint of the antennae in Insects: more generally, the stalk of a sedentary organism: the stalk of a free organ, as the *optic pedicel* in some *Crustacea.*

pedicella'ria (*Zool.*). In *Echinodermata*, a small pincer-like calcareous structure, consisting of a basal plate with which are articulated two or three jaws provided with special muscles and capable of executing snapping movements; it may be stalked or sessile.

ped'icel'late, *or* ped-is'— (*Bot.*). Said of a flower or a fruit which has a stalk.—(*Zool.*) Provided with a pedicel.

ped'icle (*Zool.*). In some *Arachnida*, a narrow stalk uniting the prosoma and opisthosoma.

Pedicula'ti (*Zool.*). An order of *Neopterygii* in which the first dorsal fin-ray is moved forward on to the top of the head and provided with a terminal lappet which acts as a bait; pelvic fins jugular or absent; gill-opening reduced, posterior to base of pectoral fin; mainly bottom-living forms of tropical and abyssal waters. Angler-fishes, Bat-fishes, Frog-fishes.

pediculo'sis (*Med.*). Infestation of the body with lice.

pediment (*Build.*). A triangular or segmental part surmounting the portico in the front of a building.

pe'dion (*Crystal.*). A crystal form consisting of a single plane; well shown by some crystals of tourmaline which may be terminated by a pedion, with or without pyramid faces in addition.

Pedipal'pi (*Zool.*). An order of *Embolobranchiata* in which the prosoma is joined to the segmented opisthosoma by a narrow waist; there is usually a narrow segmented telson; the powerful pedipalps are large and chelate or clawed; the first pair of legs are used as feelers; respiration is by lung books; predaceous tropical forms. Whip Scorpions.

ped'ipalps (*Zool.*). In *Arachnida*, the appendages, borne by the first post-oral somite, of which the gnathobases function as jaws; they may be tactile organs or chelate weapons.

pedom'eter (*Surv.*). An instrument for counting the number of paces a walker makes; it is capable of being set so as to record distances travelled.

ped'uncle (*Bot.*). The main stalk or stalks of an inflorescence.

peduncle (*Zool.*). In *Brachiopoda* and *Cirripedia*, the stalk by which the body of the animal is attached to the substratum: in some *Arthropoda*, the narrow portion joining the thorax and abdomen or the prosoma and opisthosoma: in *Vertebrata*, a tract of white fibres in the brain.

pedun'culate (*Bot., Zool.*). Having, or borne on, a peduncle.

peeling (*Print.*). The operation of preparing *overlays* (q.v.) by thinning the hard edges of an illustration.

peen (*Tools*). See **pane.**

peg (*Bot.*). An outgrowth from the hypocotyl of seedlings of cucumbers and related plants. It plays some part in assisting the seedling to emerge from the testa.

peg-and-cup dowels (*Eng.*). Metal pegs and sleeves inserted in the halves of a split pattern, in order to hold them in register while ramming the mould.

peg count meter (*Teleph.*). The manually operated meter at an operator's position.

peg plan (*Weaving*). The plan indicating the order in which the healds are to be lifted during weaving. Also called LIFTING PLAN.

pegwood (*Horol.*). Sticks of close-grained wood used for cleaning out the pivot holes of clocks and watches.

pegged-sole shoes (*Boots and Shoes*). A type of footwear in which the outer sole is attached to the inner sole and the upper by two or more rows of pegs; used for sea boots.

peggies (*Build.*). Slates 10-14 in. long.

peg'matite (*Geol.*). A term originally applied to granitic rocks characterised by intergrowths of feldspar and quartz, as in graphic granite; now applied to igneous rocks of any composition but of particularly coarse grain, occurring as offshoots from, or veins in, larger intrusive rock bodies, representing a flux-rich residuum of the original magma.

pegmatite phase (*Geol.*). That chapter in the cooling history of a body of magma dealing with the production of liquid residua in which fluxes are concentrated, giving a high degree of liquidity to this late fraction of the magma, and hence great penetrative power and, through free molecular movement, abnormally large crystals.

pel'age (*Zool.*). *Fur* (q.v.).

pela'gic (*Geol.*). A term applied to any accumulation of sediments under deep-water conditions.—(*Zool.*) Living in the middle depths and surface waters of the sea Cf. *benthic.*

Pel'agothu'rida (*Zool.*). An order of *Holothuroidea* having shield-shaped buccal tube-feet with enormous ampullae but no retractor muscles, and no tube-feet on the trunk; respiratory trees are lacking; the madreporite is external; pelagic free-swimming forms.

Pelargomor'phae (*Zool.*). A legion of *Neognathae* characterised by the possession of a desmognathous palate; includes Swans, Geese, Ducks, Herons, Storks, and Birds of Prey.

Pelecypo'da (*Zool.*). A class of bilaterally symmetrical *Mollusca* in which the foot is keel-shaped, the mantle is divided into two folds, and the shell consists of two valves which are alike externally, the one being the mirror image of the other. Unlike *Brachiopoda*, the valves of the shell are inequilateral and are hinged together in some cases by a resilient ligament and a more or less complicated series of teeth fitting into sockets in both valves. Sedentary, or slow-moving forms, of exclusively aquatic habit. They are ciliary feeders, a radula being lacking. Cockles, Oysters, Mussels, Scallops, Clams, and Shipworms.

Pélé's hair, pā-lā (*Min.*). Long threads of volcanic glass, which result from jets of lava being blown aside by the wind in the volcano of Kilauea, Hawaii.

pelio'sis rheumatica (*Med.*). Purpura rheumatica; Schönlein's disease. A disease characterised by swelling of the joints and the appearance of purpuric spots and of wheals (urticaria) in the skin.

pelit'ic gneiss (*Geol.*). A gneissose rock derived from the metamorphism of argillaceous sediments.

pelitic schist (*Geol.*). A schist of sedimentary origin, formed by the dynamothermal metamorphism of argillaceous sediments such as clay rocks.

pella'gra (*Med.*). Maidismus. A chronic disease occurring in those who eat maize; thought to be due to deficiency of nicotinic acid (part of vitamin B_2); it is characterised by gastro-intestinal disturbances, a symmetrical erythema of the skin, mental depression, and paralysis.

pellet (*Build*). A term applied to a moulding characterised by a series of spherical protuberances.

pellet (*Plastics*). A small tablet of moulding composition, made to a stock size and weight so that the number required to make up the weight necessary to form a charge for the moulding press may be counted.

Pellet's process (*Photog*). The same as *positive cyanotype*, or reversed blue-printing.

pellicle (*Bot*). The outer layer of the upper surface of a pileous, when it can be stripped off as a delicate membrane.

pellicle (*Photog*). A thin film, particularly of an emulsion when dried.

pellicle (*Zool*). A thin cuticular investment, as in some *Protozoa.*—*adj.* **pellic'ulate.**

pellu'cid (*Bot., Zool.*). Transparent.

pelma (*Zool.*). See **planta.**

Pelmatozo'a (*Zool.*). A subphylum of *Echinodermata* comprising stalked forms of sessile habit; the *Crinoidea* are the only living representatives of the group. Cf *Eleutherozoa.*

pelmet (*Build.*) A head, whether built in or not, to the interior of a window, which conceals the fittings from which the curtains hang.

pel'ophile (*Bot.*). A plant which occurs on clayey soils.

pelo'ria, pel'ory (*Bot*). An abnormal condition in which the flowers of a species normally producing irregular flowers are regular.

pelt (*Mining*). See under **pelter.**

pelt (*Skins*). (1) A general term for the skin of a mammal with the hair on; a raw hide.—(2) The name given specifically to a hide after unhairing.

pelt wool (*Textiles*) Wool which has been removed by the fellmonger from the pelts of slaughtered sheep.

peltate (*Bot*). Said of any plant member which is more or less flattened, and has its stalk attached to the middle of the lower surface.

pelter (*Mining*). A man employed in a coal-mine to take down *pelt* (shaly stone) from the roof of a narrow seam, in order to make height for a coal-cutting machine.

Peltier coefficient (*Elec. Eng.*). The amount of energy absorbed or given out per second, due to the Peltier effect, when unit current is passed through a junction of two dissimilar metals.

Peltier effect (*Elec. Eng.*). The phenomenon whereby heat is liberated or absorbed at a junction where an electric current passes from one metal to another.

Pelton wheel (*Eng.*). An impulse water-turbine in which specially shaped buckets attached to the periphery of a wheel are struck by a jet of water, the nozzle being either deflected or valve-controlled by a governor.

pelvic fins (*Zool.*). In Fish, the posterior pair of fins.

pelvic girdle (*Zool.*). In Vertebrates, the skeletal framework with which the posterior pair of locomotor appendages articulate.

pelvim'eter (*Med.*). A specially designed calliper for measuring distances between various bony points of the female pelvis.

pelvim'etry (*Med.*). Estimation, by the use of pelvimeters or of X-rays, of the size and shape of the female pelvis.

pelvis (*Zool.*). The pelvic girdle or posterior limb girdle of Vertebrates, a skeletal frame with which the hind limbs or fins articulate: in Mammals, a cavity, just inside the hilum of the kidney, into which the uriniferous tubules discharge and which is drained by the ureter.—*adj.* **pelvic.**

pemph'igus (*Med.*). An inflammatory condition of the skin characterised by the eruption of crops of blisters, the mucous membranes at times also being involved.

pen (*Zool.*). In *Cephalopoda*, the shell or cuttle-bone.

pencat'ite (*Geol*). A crystalline limestone which contains brucite and calcite in approximately equal molecular proportions. Formed by contact metamorphism from magnesian limestones. See also **predazzite.**

pencil (*Light*). A narrow beam of light, having a small angle of convergence or divergence.

pencil (*Photog.*).
See **abrasive—** **bromide—**

pencil stone (*Min.*). The name given to the compact variety of pyrophyllite, used for slate-pencils.

pencilling (*Build.*). The operation of painting the mortar joints of a brick wall with white paint so as to accentuate the contrast of colours.

pendant (*Build.*) Ornamentation suspended below an object or surface to be decorated, as from a ceiling.

pendant (*Horol.*). The neck of a watchband, to which the bow is attached.

pendant (*Illum*). A lighting fitting suspended by means of a flexible support.

pendant push (*Elec. Eng.*). A pushbutton arranged for attachment to a flexible cord. Also called PEAR-PUSH, SUSPENSION-PUSH.

pendant socket-outlet (*Elec. Eng.*). A socket-outlet arranged for attachment to a flexible cord.

pendant switch (*Elec. Eng.*). A switch arranged for attachment to a flexible cord. Also called PRESSEL-SWITCH, PEAR-SWITCH, SUSPENSION-SWITCH.

penden'tive (*Civ. Eng.*). A spherical triangle formed by a dome springing from a square base.

pendentive dome (*Civ. Eng.*). A dome covering a square area to which it is linked at the corners by pendentives.

Pendleside Series (*Geol.*). A series of dark shales and limestones found in North Lancashire; they belong to the uppermost Lower Carboniferous Series; well seen in Pendle Hill.

pendulous (*Bot.*). Said of an ovule which is suspended from a point at or near the top of the ovary.

pendulum. The simple pendulum consists of a small, heavy bob suspended from a fixed point by a thread of negligible weight. Such a pendulum, when swinging freely with small amplitude, has a periodic time given by $T=2\pi\sqrt{\frac{l}{g}}$, where l is the length of the thread and g is the acceleration due to gravity.—COMPOUND PENDULUM, any body capable of rotation about a fixed horizontal axis and in stable equilibrium under the action of gravity. If the centre of gravity is at a distance h from the axis of rotation, and k is the radius of gyration about a horizontal axis through the centre of gravity, the period of small oscillations is:

$$T=2\pi\sqrt{\frac{h+\frac{k^2}{h}}{g}}.$$

See **centre of oscillation.**

pendulum (*Horol.*). The time-controlling element of a pendulum clock. The theoretical length of a pendulum, in inches, is given by $L=39\ 14\times t^2$, where t is the time of swing in seconds and 39·14 is the length of a pendulum beating seconds in London. For household clocks the pendulum beats ½-seconds or less. For long-case clocks and regulators, a seconds pendulum is used; for tower clocks it may be up to 2 seconds.

pendulum bob (*Horol.*). The weighted mass at the end of a pendulum.

pendulum damper (*Aero.*). A short heavy pendulum, in the form of pivoted balance weights, attached to the crank of a radial aero-engine in order to neutralise the fundamental torque impulses and so eliminate the associated critical speed.

pendulum governor (*Eng.*). An engine governor the many forms of which involve the principle of the conical pendulum. Heavy balls swing outwards under centrifugal force, so lifting a weighted sleeve and progressively closing the engine throttle valve. See **Porter governor, Proell governor, Watt governor.**

pendulum rod (*Horol.*). The rod of a pendulum which supports the bob.

pendulum spring (*Horol.*). The thin ribbon of spring steel used for suspending the pendulum.

pen'eplain (*Geol.*). A gently rolling lowland, produced after long-continued denudation.

penetration (*Chem.*). A term used in testing bituminous material. Penetration is expressed as the distance that a standard needle vertically penetrates a sample of the material under known conditions of loading, time, and temperature.

penetration (*Radio*). See **depth of penetration.**

penetration twins (*Min.*). Two (or more) crystals united in a regular manner according to a twin law, the one having the appearance of having grown through the other. Cf. *juxtaposition twins.*

pe'nial setae (*Zool.*). See **copulatory spicules.**

pen'icillate, penicil'liform (*Bot.*). Tufted, like a camel-hair brush.

penicil'li (*Zool.*). See **Ruysch's penicilli.**

penis (*Zool.*). The male copulatory organ in Mammals and most *Sauropsida*: a form of male copulatory organ in various *Invertebrata*, as *Platyhelminthes, Gastropoda.*—*adj.* **pe'nial.**

Penmorfa Beds (*Geol.*) A series of flaggy mudstones of Upper Cambrian age, found in North Wales.

pennae (*Zool.*). *Plumae* (q.v.).

Pennant Series (*Geol.*). A series of coarse sandstones and grits found in the Coal Measures of South Wales and in the Bristol Coalfield, between two series of productive measures.

pennate (*Bot.*). Said of diatoms which have an elongated cell which is isobilateral, zygomorphic, or dorsiventral in structure.

pen'ninite (*Min.*). A silicate of magnesium with chemically combined water. It crystallises in the monoclinic system, but is rhombohedral in habit. It is a member of the chlorite group of minerals.

Pennsylvanian System (*Geol.*). A great continental formation, including strata deposited under alluvial fan, flood plain, and delta swamp conditions; the coal-bearing strata of N. America, equivalent to the Coal Measures of Britain. Represented in the Cordilleran trough by marine strata, chiefly limestones, well exposed in the Wasatch Mts.

Penrhiw Series, pen-roo' (*Geol.*). A series of red and green volcanic tuffs and halleflintas which form the basal member of the Pre-Cambrian rocks in Pembrokeshire.

pent-, penta- (Greek *pente*, five). A prefix used in the construction of compound terms; e.g. *pentactinal*, five-rayed.—(*Chem.*) Containing five atoms, groups, etc.

penthouse (*Carp.*). A projecting surface above a door, window, etc., shielding the latter from rain.

pent roof (*Build.*). A roof having only a single slope, often built against another building.

pentacri'noid (*Zool.*). A larval form of some *Crinoidea*, which resembles *Pentacrinus*.

pentacy'clic (*Bot.*). Having the parts arranged in five whorls.

pentad. The period of five days; being an exact fraction of a normal year, it is useful for meteorological records.

pentadac'tyl (*Zool.*). Having five digits.

pentadactyl limb (*Zool.*). The characteristic free appendage of *Tetrapoda* with five digits.

pentag'onal (*Bot.*). Having five angles with convex surfaces between them.

pentagonal dodecahedron (*Crystal.*). A form of the cubic system comprising twelve identical pentagonal faces. Pyrite frequently crystallises in this form, hence the synonym *pyritohedron.*

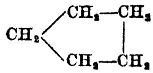
pentagraph. A *pantograph* (q.v.).

pentagrid (*Thermionics*). See **heptode.**

pentahy'dric alcohols (*Chem.*). Alcohols containing five hydroxyl groups: e.g. arabitol, $HO{\cdot}CH_2{\cdot}(CHOH)_3{\cdot}CH_2OH$, xylitol (stereoisomeric) and rhamnitol, $HO{\cdot}CH_2{\cdot}(CHOH)_4{\cdot}CH_3$.

pentam'erous (*Bot.*). Having five members in a whorl.

pentameth'ylene or ***cyclo*pentane** (*Chem.*). A saturated cyclic hydrocarbon oil of the formula:



It belongs to the group of naphthenes and occurs in crude petroleum.

pentamethylene-diamine (*Chem.*). *Cadaverine* (q v.).

pentanes (*Chem*). C_5H_{12}. Low-boiling paraffin hydrocarbons. The *n*-pentane has a b p. 36° C., sp. gr. 0 63.

pentane lamp (*Light*) See **Vernon-Harcourt pentane lamp.**

pentane standard (*Light*) See **international candle.**

pentan'gular (*Bot*). Having five angles with flat or concave surfaces between them.

pen'taploi'dy (*Cyt*) The condition of having five times the haploid number of chromosomes.

Pentasto'mida (*Zool*). A class of minute *Arthropoda*, parasitic in the nasal sinuses of flesh-eating Vertebrates; elongate, vermiform animals having a pair of claws on both sides of the mouth and lacking a respiratory system.

pen'tastyle (*Arch*). A row of five columns.

pentava'lent (*Chem.*). Capable of combining with five atoms of hydrogen or their equivalent.

pent'landite (*Min.*). A sulphide of iron and nickel which crystallises in the cubic system. It commonly occurs intergrown with pyrrhotite, from which it can be distinguished by its octahedral cleavage. Also called NICOPYRITE.

pentode valve or **pentode** (*Thermionics*). A five-electrode thermionic tube, comprising an emitting cathode, control grid, a screen (or auxiliary grid) maintained at a positive potential approximately the same as that of the anode, a suppressor grid maintained at about cathode potential, and an anode. It has characteristics similar to those of a screen-grid valve, except that the secondary emission effects are suppressed.

Pentone (*Thermionics*). A trade-name for the *pentode*.

pen'tosans (*Chem.*). $(C_5H_8O_4)_x$, polysaccharides, comprising arabinans and xylans.

pentoses (*Chem.*). A group of monosaccharoses containing five oxygen atoms in the molecule, and having the formula $HO{\cdot}CH_2{\cdot}(CHOH)_3{\cdot}CHO$ and $CH_3{\cdot}(CHOH)_4{\cdot}CHO$. Important pentoses are *l*-arabinose, *l*-xylose, rhamnose, and fucose. Pentoses cannot be fermented. They are characterised by the fact that they yield furfuraldehyde or its homologues on boiling with dilute acids. A qualitative test for pentoses is the occurrence of a bright-red colour when they are boiled with HCl and phloroglucinol.

penultimate cell (*Bot.*). The last cell but one at the tip of an ascogenous hypha; it is commonly binucleate, and later becomes the ascus.

penum'bra (*Astron.*). See **umbra.**—(*Light*) See **shadow.**

pe'po (*Bot.*). A fleshy or succulent fruit, often of large size, formed from an inferior syncarpous ovary, and containing many seeds; it is a particular type of a berry. The cucumber is a familiar example.

peppertype (*Photog.*). A printing process using pepper and rubber as the sensitive surface to be exposed and dusted with powdered colour. See **powder process.**

pep'sin (*Zool.*). A protein-digesting ferment of the alimentary canal of Vertebrates; secreted by the gastric glands.

peptic ulcer (*Med.*). An ulcer of the stomach or of the duodenum.

peptisation (*Chem.*). The production of a colloidal solution of a substance, especially the formation of a sol from a gel.

pep'tonephrid'ia (*Zool*). In some *Oligochaeta*, modified nephridia which open into the cavity of the alimentary canal instead of to the exterior.

peptones (*Chem.*). Products obtained by the progressive action of enzymes on albuminous matter. They do not coagulate and cannot be precipitated by ammonium sulphate. They still show the xanthoprotein and biuret reactions.

per- (*Chem.*). (1) A prefix which properly should be restricted to compounds which are closely related to hydrogen peroxide, and thus contain two oxygen atoms linked together, e g. *persulphates*, *percarbonates*, *perchromates*.—(2) A prefix which is loosely used to denote that the central atom of a compound is in a higher state of oxidation than the usual, e g *perchlorates*, *permanganates*.

per-acid (*Chem*) A true per-acid is either formed by the action of hydrogen peroxide on a normal acid, or yields hydrogen peroxide by the action of dilute acids. Organic per-acids are assumed to contain the group –CO·O·OH.

per-salts (*Chem.*). Salts corresponding to *per-acids*. A solid per-salt reacts immediately and quantitatively with neutral potassium iodide to form iodine.

Per'acar'ida (*Zool.*) A division of *Crustacea* in which there are six abdominal somites and the thoracic limbs have a two-jointed protopodite; the carapace, when present, leaves four thoracic somites distinct; the first thoracic somite is fused with the head and the protopodite of the antenna is three-jointed.

perambulator (*Surv*). An instrument for distance measurement consisting of a large wheel (often 6 ft. in circumference) supported on its axis by a long handle, so that it may be wheeled along the distance to be measured. A recording mechanism records the number of revolutions of the wheel and is calibrated to give distance traversed directly. Also called an AMBULATOR or ODOMETER.

percentage articulation (*Elec. Comm.*). The percentage of elementary speech-sounds received correctly when logatoms are called over a telephone circuit in the standard manner.

percentage differential relay (*Elec. Eng.*). A differential relay which operates at a current which, instead of being fixed, is a fixed percentage of the current in the operating coils.

percentage modulation (*Radio*). See **depth of modulation.**

percentage registration (*Elec. Eng.*). The registration of an integrating meter expressed as a percentage of the true value.

perception (*Bot.*). The first changes which must be assumed to occur when a plant is stimulated; they lead to the appropriate reaction in due course.

perception (*Psychol.*). The faculty of recognising external objects through the senses. Disorders of perception are *agnosia*, *illusion*, and *hallucination* (qq.v.).

perch (*Build.*). A measure of stonework, usually about 25 cub. ft.

perching (*Leather*). A process for stretching and softening a skin by working over it with a crutch stake, on the flesh side, while it is fixed to a horizontal pole (*perch*).

perching (*Textiles*). The examination of a fabric after weaving, and at various stages of finishing, for possible defects; the cloth is drawn over the *perch*—two spars or rollers a few feet apart, overhead—and the cloth hanging from the front roller is examined in a good light.

perchlor'ates (*Chem.*). Salts of perchloric acid, $HClO_4$. They are all soluble in water, though the potassium and rubidium salts are only slightly soluble. The alkali perchlorates are isomorphous with the corresponding permanganates.

perchlor-ether (*Chem.*). $(C_2Cl_5)_2O$, a solid mass, of camphor-like odour. It is the final substitution product of ether by chlorine, and can be obtained by the action of chlorine upon ether in the dark and in the cold.

perchloric acid (*Chem.*). $HClO_4$. A colourless fuming liquid, m.p. –112° C., b.p. 110° C, a powerful oxidising agent; harmful to the skin; monobasic, and forms perchlorates.

perchro'mates (*Chem.*). Recently three series of perchromates have been recognised: M_3CrO_8 (red salts), $MCrO_6$ (blue salts), and the brown salts, which are co-ordination compounds of the oxide CrO_4. The red perchromates are formed by the action of hydrogen peroxide on chromates in slightly alkaline solution, and on heating change back to chromates. The blue perchromates are formed by the action of hydrogen peroxide on chromates in acid solution.

perc'nosome (*Bot.*). An inclusion of obscure nature found in the cytoplasm of sperm mother cells in mosses.

percolating filter (*Sewage*). A bed of filtering material, such as broken stone or slag, used in the final or oxidising stage in sewage treatment. This stage consists in sprinkling the liquid sewage over the filter, through which it percolates. Also called a CONTINUOUS FILTER. See **contact bed.**

Percomor'phi (*Zool.*). A very large order of *Neopterygii* having bony fin-rays; pelvic fins thoracic in position, typically with one spine and five rays; perch-like forms of varied habits occurring in both salt and fresh waters. Bream, Perch, Mullet, Wrasse, Parrot-fishes, Bass, Snappers, Drums, Butterfly-fishes, Horse Mackerel, Dragonets.

percrystallisation (*Chem.*). The crystallisation of a substance from a solution which is being dialysed.

percurrent (*Bot.*). Said of a vein which runs through the whole length of a leaf but does not project beyond the tip.—(*Zool.*) Running from one end to the other of the body: extending from base to apex.

percussion (*Med.*). The act of striking with one finger lightly and sharply against another finger placed on the surface of the body, so as to determine, by the sound produced, the physical state of the part beneath.

percussion, centre of (*Phys.*). The same as *centre of oscillation* (q.v.).

percussion figure (*Min.*). A figure produced on the basal pinacoid or cleavage face of mica when it is sharply tapped with a centre punch. It consists of a six-rayed star, two rays more prominent than the others, lying in the unique plane of symmetry.

percussion fuse (*Ammunition*). A mechanism fitted either to the nose or in the base of H.E. shell to produce detonation on impact with an obstruction.

percussive boring (*Civ. Eng.*). The process of sinking a borehole in the earth by repeatedly dropping on the same spot, from a suitable height, a heavy tool which pulverises the earth and gradually penetrates.

percussive welding (*Elec. Eng.*). See **resistance percussive welding.**

perdistillation (*Chem.*). Distillation through a dialysing membrane.

pereion, per-ī'on (*Zool.*). In *Crustacea*, the thoracic region. Cf. *pleon.*

perei'opods (*Zool*). In higher *Crustacea*, the thoracic appendages modified as walking-legs. Cf. *pleopods.*

perenna'tion (*Bot.*). Survival from season to season, with generally a period of reduced activity between each season.

peren'nial (*Bot.*). A plant which lives for three or more years, and normally flowers and fruits at least in its second and subsequent years.

peren'nibran'chiate (*Zool.*). Retaining the gills throughout life, as certain *Amphibia.*

perfect (*Bot., Zool*). Having all organs in a functional condition.

perfect fluid (*Hyd.*). An ideal fluid which is incompressible, has a uniform density, and offers no resistance at all to distorting forces.

perfect frame (*Struct.*). A frame which has just sufficient members to keep it stable in equilibrium under any system of external forces acting at its joints, without change of shape.

perfect gas (*Chem., Phys.*). A gas which obeys the gas laws, particularly Boyle's law. The equation of state of a perfect gas is $pv=nRT$, where p is the pressure, v the volume, n the number of gram molecules, R the gas constant, and T is the absolute temperature. The nearest approach to a perfect gas is given by the 'permanent' gases, hydrogen, helium, oxygen, and nitrogen.

perfect paper (*Print.*). Reams of paper made up to a printer's ream, i.e. 516 sheets. Since the standardisation of paper quantities the term has been largely discarded.

perfect up (*Print.*). To print the second side of a sheet of paper, and so complete the section.

perfecting engine (*Paper*). A machine with fixed and moving bars which by interaction reduce knots and large particles in the pulp. In more modern practice large particles are discharged by centrifugal action. Also known as a REFINER.

perfector (*Print.*). A type of machine which prints both sides of the paper before delivery.

perfo'liate (*Bot.*). Said of a leaf base which surrounds a stem completely so that the latter appears to pass through it.

per'forate (*Bot.*). (1) Pierced by holes.—(2) Containing small rounded transparent dots which give the appearance of holes.

perforate (*Zool.*). Having apertures, said especially of shells: (of gastropod shells) having a hollow columella.

perforated bars (*Textiles*). Flexible strips of steel in the well of a lace machine which guide the warp threads.

perforating fibres (*Zool.*). See **Sharpey's fibres.**

perforation (*Bot.*). An interruption in the continuity of a stele not due to a leaf gap.

perforato'rium (*Zool.*). An *acrosome* (q.v.).

pergamenta'ceous (*Bot.*). Having the appearance or texture of parchment.

pargeting (*Build.*). See **pargetting.**

peri- (Greek *peri*, round). A prefix used in the construction of compound terms; e.g. *peridental*, surrounding a tooth.

***peri* position** (*Chem.*). The 1,8-position in naphthalene derivatives.

peria'nal (*Anat.*). The region round the anus.

perian'dra (*Bot.*). The leaves surrounding a group of antheridia in mosses.

per'ianth (*Bot.*). (1) A general term for calyx and corolla together.—(2) The outer whorl of a flower when it is not distinctly composed of sepals and petals.—(3) A cup-shaped or tubular sheath surrounding the archegonia of some liverworts.

per'iarteri'tis nodo'sa (*Med.*). A rare and usually fatal disease characterised by inflammation of the arteries, in the walls of which small inflammatory nodules appear.

periartic'ular (*Anat.*). Said of the tissues immediately around a joint.

perias'tron (*Astron.*). That point in an orbit about a star in which the body describing the orbit is nearest to the star; applied to the relative orbit of a double star.

per'iblast (*Zool.*). In meroblastic eggs, the margin of the blastoderm merging with the surrounding yolk. See also **periplasm.**

periblast'ic (*Zool.*). (Of cleavage) superficial.

per'iblem (*Bot.*). That portion of an apical meristem from which the cortex is ultimately formed.

peribran'chial (*Zool.*). Surrounding a gill or gills, as part of the atrium in *Urochorda.*

pericar'diomediastini'tis (*Med.*). Inflammation both of the pericardium and of the mediastinum.

pericardioper'itone'al canal (*Zool.*). In *Selachii*, a small aperture which puts the pericardial and peritoneal cavities into communication.

pericardiot'omy (*Surg.*). Incision of the pericardium.

pericardi'tis (*Med.*). Inflammation of the pericardium.

pericar'dium (*Zool.*). The space surrounding the heart: the membrane enveloping the heart.—*adj.* **pericardial.**

per'icarp (*Bot*). The wall of a fruit, if derived from the wall of the ovary.

pericen'tral siphon (*Bot.*). One of the tubular elements surrounding the central siphon in the thallus of certain red algae.

perichaetial bract, —kē'ti-al (*Bot.*). One of the leaves composing the perichaetium in a moss.

perichae'tine (*Zool.*). In *Oligochaeta*, a complete ring of chaetae surrounding the body.

perichae'tium (*Bot.*). (1) A cup-like sheath surrounding the archegonia in some liverworts.—(2) The group of involucral leaves around the archegonia of a moss.

perichondri'tis (*Med.*). Inflammation of the perichondrium, especially of the perichondrium of the cartilages of the larynx.

perichon'drium (*Zool.*). The envelope of areolar connective tissue surrounding cartilage.

perichor'dal (*Zool.*). Encircling or ensheathing the notocord.

perichordal centra (*Zool.*). Centra which arise by chondrification or ossification of tissues surrounding the notochord without invasion of the notochord sheath.

perichordal sheath (*Zool.*). The mesenchymatous layer surrounding the notochord in adult Cyclostomes and the very young forms of all other Vertebrates.

perichy'lous (*Bot.*). Having water-storage tissue surrounding the chlorophyll-containing tissue.

per'iclase (*Min.*). Native magnesia. Oxide of magnesium, which crystallises in the cubic system. It is commonly found in metamorphosed magnesian limestones, but when exposed to a damp atmosphere it hydrates to the much commoner brucite.

pericli'nal chimaera (*Bot.*). A chimaera in which one component is completely enclosed by the other.

periclinal wall (*Bot.*). A cell wall which is parallel to the surface of an apical meristem or other part of a plant.

per'icline (*Min.*). A variety of *albite* (q.v.) which usually occurs as elongated crystals which are twinned (*pericline law*).

pericoli'tis (*Med.*). Inflammation of the peritoneum covering the colon.

pericra'nium (*Zool*). The fibrous tissue layer which surrounds the bony or cartilaginous cranium in *Vertebrata.*

per'icycle (*Bot.*). A layer, one or more cells thick, of non-conducting cells at the periphery of a stele.

pericy'clic fibre (*Bot.*). A strand of sclerenchyma in the pericycle.

per'iderm (*Bot.*). A protective layer which develops on the outside of parts of plants which last for some time ; it consists of cork, the cork cambium, and, usually, some phelloderm.

periderm (*Zool.*). See **perisarc.**

perides'mium (*Zool*). The coat of connective tissue which ensheathes a ligament.

peridid'ymis (*Zool*). The fibrous coat which encapsules the testis in higher Vertebrates.

perid'ium (*Bot*) A general term for the outer wall of the fruit body of a fungus, when the wall is organised as a distinct layer or envelope surrounding the spore-bearing organs partially or completely.

per'idot (*Min.*). See **olivine** ; also **Brazilian peridot, Ceylonese peridot.**

perido'tite (*Geol.*) A coarse-grained ultramafic igneous rock consisting essentially of olivine, with other mafic minerals such as hypersthene, augite, biotite, and hornblende, but free from plagioclase. See **dunite, kimberlite, scyelite.**

peridu'ral (*Zool.*). Surrounding the dura mater.

perigastri'tis (*Med*). Inflammation of the external surface of the stomach (as a result usually of gastric ulcer), with the formation of adhesions between it and other abdominal viscera.

per'igee (*Astron.*). That point in the moon's orbit where the moon at one end of the apse line is nearest to the earth.

per'igone (*Bot.*). A perianth which is not clearly differentiated into calyx and corolla.

perigo'nial bract (*Bot.*). One leaf of the perigonium in mosses.

perigo'nium (*Bot.*). A group of leaves, often forming a flat rosette, around the base of the group of antheridia in mosses.

perigy'nium (*Bot.*). A group of leaves around the group of archegonia in mosses : a tubular sheath surrounding the archegonia in hepatics.

perigy'nous (*Bot.*). Said of a flower in which the receptacle is developed into a flange or into a concave to deeply concave structure, on which the sepals, petals, and stamens are borne ; the receptacle remains distinct from the carpels.—*n.* **perigy'ny.**

perihae'mal (*Zool.*). Said (1) of an anterior paired prolongation of the trunk coelom lying beside the dorsal blood-vessel in *Enteropneusta* ; (2) of a system of coelomic cavities in *Echinodermata* which derives its name from the fact that in *Asteroidea* its radial branches surround the radial blood-vessels.

perihaemal system (*Zool.*). The perihaemal coelomic cavities of *Echinodermata.* See **perihaemal.**

perihe'lion (*Astron.*). That point in the orbit of any heavenly body moving about the sun at which it is nearest to the sun ; applied to all the planets and also to comets.

perihepati'tis (*Med.*). Inflammation of the peritoneum covering the liver.

perikinet'ic (*Chem.*). Pertaining to the Brownian movement.

perikon detector (*Radio*). A crystal detector comprising a point-contact between crystals of zincite and bornite.

per'ilymph (*Zool.*). The fluid which fills the space between the membranous labyrinth and the bony labyrinth of the internal ear in Vertebrates.—*adj.* **perilymphatic.**

perimedul'lary zone (*Bot.*). See **medullary sheath.**

perim'eter (*Med.*). An instrument, in the form of an arc, for measuring a person's field of vision.

perimetri'tis (*Med.*). Inflammation of the peritoneum covering the uterus.

perime'trium (*Anat.*). The peritoneum covering the uterus.

perimy'sium (*Zool.*). The connective tissue which binds muscle fibres into bundles and muscles.

perinaeum (*Zool.*). See **perineum.**

perine'al glands (*Zool.*). In some Mammals, a pair of small glands beside the anus which secrete a substance with a characteristic odour.

perine'oplasty (*Surg.*). Repair of the perinaeum by plastic surgery.

perineor'rhaphy (*Surg.*). Stitching of the perinaeum torn during child-birth.

perinep'hric (*Anat.*). Said of the tissues round the kidney ; e.g. *perinephric* abscess.

perinephri'tis (*Med.*). Inflammation of the tissues round the kidney.

perine'um, perinae'um (*Zool.*). The tissue wall between the rectum and the urinogenital ducts in Mammals.—*adj.* **perineal, perinaeal.**

perineu'rium (*Zool.*). The coat of connective tissue which ensheathes a funiculus of nerve fibres.

perin'ium (*Bot.*). See **epispore.**

period (*Chem*). The elements between an alkali metal and the rare gas of next highest atomic number, inclusive, occupying one (*short p.*) or two (*long p.*) horizontal rows in the periodic system.

period (*Cinema.*). The division of time effected by the intermittent mechanism in a projector or camera.

See **moving— projection— stationary— period** or **periodic time** (*Phys.*). The time for one complete cycle of any periodic phenomenon. The period of oscillation of a vibrating body is the time between successive passages in the same direction across the position of rest; it is the reciprocal of the frequency.

period-luminosity curve (*Astron.*). A relationship between the period and absolute brightness, discovered by Miss Leavitt to hold for all Cepheid variables ; it enables the distance of any observable Cepheid to be found from observation of its light curve and apparent magnitude, this indirectly deduced distance being called the *Cepheid parallax.*

period of decay (*Chem.*). See **half-life.**

period of induction (*Chem.*). See **induction period.**

period of reverberation (*Acous.*). See **reverberation time.**

peri'odates (*Chem.*). Formed by the oxidation of iodates. Periodates form heteropolybasic compounds of the types $M_5[I(WO_4)_6]$ and $M_5[I(MoO_4)_6]$.

periodic acid, —ī-ŏ'dik (*Chem.*). H_5IO_6. A weaker acid and a stronger oxidising agent than iodic acid. May be regarded as orthoperiodic acid. Exists in deliquescent crystals. Resembles phosphoric acid in furnishing partially dehydrated acids.

periodic law, per-i-od'ik (*Chem.*). See **periodic system.**

periodic precipitation (*Chem.*). See **Liesegang phenomenon.**

periodic system (*Chem.*). A classification of the chemical elements, in nine groups, which demonstrates the fact that the physical and chemical properties of an element and its compounds vary periodically with the atomic number of the element. The system was perfected, as far as possible, from 1869 onwards, by Meyer and Mendeléev.

periodic table (*Chem.*). See **periodic system.**

periodic time. See **period.**

periodicity (*Biol.*). Rhythmic activity.

periodicity (*Phys*, *etc.*). See **frequency.**

perio'donti'tis (*Med.*). Inflammation of the membrane investing that part of the tooth seated in the jaw.

perioesophage'al, per-i-ē'—(*Zool.*). Encircling the oesophagus

peri-oöphori'tis (*Med.*). Inflammation of the peritoneum investing the ovary and of the cortex of the ovary.

periop'ticon (*Zool.*). The ganglionic plate or outer zone of the optic lobe of the brain in Insects.

perios'teum (*Zool.*). The covering of areolar connective tissue on bone.

periosti'tis (*Med.*). Inflammation of the periosteum.

perios'tracum (*Zool.*). The horny outer layer of a Molluscan shell.

periot'ic (*Zool.*). In higher Vertebrates, a bone enclosing the inner ear and formed by the fusion of the otic bones: petrosal.

peripharynge'al (*Zool*). Encircling the pharynx.

periph'eral. Situated or produced around the edge.

periphlebi'tis (*Med.*). Inflammation of the outer coat of a vein.

per'iphy'sis (*Bot.*). A hair-like extension of the end of a hypha, forming with many others of the same kind a pile-like lining in the ostiole of a perithecium.

per'iplasm (*Bot.*). The plasma lying just within the oögonial wall in some *Oomycetes*; it contains degenerating nuclei and contributes to the formation of the wall of the oöspore.—(*Zool.*) A bounding layer of protoplasm surrounding an egg just beneath the vitelline membrane, as in Insects.

periplasmo'dium (*Bot.*). The material produced by the breakdown of the tapetum in the sporangia of *Pteridophyta* and *Phanerogamae*; it helps in the nutrition of the developing spores.

per'iplast (*Zool.*). The cuticle of *Mastigophora*, formed by the conversion of the ectoplasm and containing myonemes.

peripneu'stic (*Zool.*). (Of *Insecta*) having the spiracles arranged in a row along each side of the body.

peripo'dial (*Zool.*). Surrounding an appendage.

per'iproct (*Zool.*). The area surrounding the anus.

periprocti'tis (*Med.*). Inflammation of the cellular connective tissue round the rectum.

perisalpingi'tis (*Med.*). Inflammation of the peritoneum covering the Fallopian tube.

per'isarc (*Zool*). In *Coelenterata*, the horny cuticular covering of a hydroid colony.

perisomat'ic (*Zool.*). Surrounding the body, as the *perisomatic cavity* of a developing *Sacculina*.

per'isperm (*Bot.*). A nutritive tissue present in some seeds, derived from the nucellus of the ovule.

perispleni'tis (*Med.*). Inflammation of the capsule of the spleen and of the peritoneum investing it.

per'ispore (*Bot.*). Remains of the contents of the cells of the tapetum, forming a deposit on the outside of the walls of the spores of ferns.

peris'sodac'tyl (*Zool.*). Having an odd number of digits.

peristal'tic (*Zool.*). Compressive: contracting in successive circles; said of waves of contraction passing from mouth to anus along the alimentary canal; cf. *antiperistaltic, systaltic.*—*n.* **peristal'sis.**

peris'terite (*Min.*). A whitish variety of albite, which is beautifully iridescent.

peristo'mate (*Bot.*). Possessing a peristome.

per'istome (*Bot.*). (1) A fringe of elongated teeth around the mouth of the capsule of a moss; the teeth are formed from persistent remains of unevenly thickened cell walls.—(2) A fringe of hyphae around the opening of the fruit body of some *Gasteromycetes.*—(3) A kind of lip arising as an outgrowth in some *Protophyta*, assisting in the ingestion of solid food.

peristome (*Zool.*). (1) The margin of the aperture of a gastropod shell.—(2) In some *Ciliophora*, a specialised food-collecting, frequently funnel-shaped, structure surrounding the cell-mouth.—(3) More generally, the area surrounding the mouth.

peristo'mial. *Adj.* from *peristome.*

peristo'mium (*Zool.*). In *Chaetopoda*, the somite in which the mouth is situated: in some forms (as *Nereis*) two somites have been fused to form the apparent peristomium.

per'istyle (*Arch.*). A colonnade encircling a building.

perisys'tole (*Zool.*). The period between diastole and systole in cardiac contraction.

perithe'cium (*Bot.*). A globose or flask-shaped structure with a sterile wall enclosing asci and paraphyses, the characteristic fruit body of the *Pyrenomycetes.* A true perithecium has an ostiole, but the term is often used to include the *cleistocarp*, which has no ostiole.

perithelio'ma (*Med.*). A tumour the cells of which are arranged in sheath-like fashion around thin-walled blood-vessels and are believed to arise from endothelium.

peritone'al cavity (*Zool.*). In Vertebrates, that part of the coelom containing the viscera; the abdominal body cavity.

peritone'um (*Zool.*). In Vertebrates, a serous membrane which lines the peritoneal cavity and extends over the mesenteries and viscera.—*adj.* **peritone'al.**

peritoni'tis (*Med.*). Inflammation of the peritoneum.

per'itreme (*Zool.*). In Insects, the annular sclerite which surrounds the external opening of a trachea: the margin of a shell aperture.

Peritrich'a (*Zool.*). An order of *Ciliata* the members of which are usually of sedentary habit; they possess a permanent gullet with undulating membrane; cilia are either absent or reduced to a single ring.

peritrich'ous *or* —tri'kus (*Bot.*). Said of bacteria when there are flagella distributed over the whole surface of the cell.

peritrichous (*Zool.*). Having an adoral wreath of cilia surrounding the cytopharynx.

peritro'phic (*Zool.*). Surrounding the gut; as the *peritrophic membrane* of Insects, a membranous tube lining the stomach and partially separated from the stomach epithelium by the peritrophic space.

Perkin's phenomenon (*Elec. Eng.*). The decrease which is observed to occur in the conductivity of a rod of graphite when a negative electric charge is imparted to it.

Perkin's synthesis (*Chem.*). The synthesis of unsaturated aromatic acids by the action of aromatic aldehydes upon the sodium salts of fatty acids in the presence of a condensing agent, e.g. acetic anhydride.

perknite (*Geol.*). A family of coarse-grained ultramafic igneous rocks which consist essentially of pyroxenes and amphiboles, but contain no feldspar.

perlite (*Geol.*). An acid and glassy igneous rock which exhibits perlitic structure.

Perlite Iron (*Met.*). See **pearlite iron.**

perlit'ic structure (*Geol.*). A structure found in glassy igneous rocks, which consists of systems of spheroidal concentric cracks produced during cooling.

Permali (*Diel.*). Beech plywood impregnated with bakelite. Electrical strength is 60-90 kV/cm. across the grain and 20-30 kV/cm. along the grain.

Permalloy (*Met.*). An alloy with high magnetic permeability at low field strength, and low hysteresis loss. Original composition nickel 78·5%, iron 21·5%, but the term is now used generally to cover numerous alloys produced by adding other elements, e g. copper, molybdenum, chromium, cobalt, manganese, etc. Some of these have special names, e.g. *Mu-metal, Perminvar, Hypernik* (qq.v.).

permanent adjustment (*Surv.*). An adjustment to a surveying instrument which need be made only occasionally, not each time the instrument is used, e.g. adjustment of line of collimation so that it may be parallel to the axis of the draw tube.

permanent collenchyma (*Bot.*). Functional collenchyma present in petioles and in the stems of herbaceous plants.

permanent dentition (*Zool.*). In Mammals, the second set of teeth, which replaces the milk dentition.

permanent finish (*Textiles*). A cloth finish which will maintain its appearance; the cloth will not shrink or develop dull spots after rain.

permanent hardness (*Chem.*). (Of water) the hardness which remains after prolonged boiling is *permanent hardness*. Due to the presence of calcium and magnesium chlorides or sulphates in the water.

permanent hybrid (*Gen.*). A hybrid which breeds true because some types of possible offspring are prevented from developing by the operation of lethal factors.

permanent load (*Struct.*). The dead loading on a structure, consisting of the weight of the structure itself and the fixed loading carried by it, as distinct from any moving loads.

permanent magnet (*Elec. Eng.*). A magnet of hard steel which, having once been magnetised, retains the greater portion of its magnetisation.

permanent-magnet instrument (*Elec. Eng.*). An electrical measuring instrument of the moving-coil type in which the necessary magnetic field is provided by a permanent magnet.

permanent mould (*Met*). A metal mould (other than an ingot mould) used for the production of castings, e.g. in die-casting.

permanent set (*Eng.*). (1) An extension remaining after load has been removed from a test piece, when the elastic limit has been exceeded.—(2) Permanent deflection of any structure after being subjected to a full load.

permanent tissue (*Bot.*). Tissue consisting of fully differentiated elements.

permanent way (*Civ. Eng.*). The ballast, sleepers, and rails forming the finished track for a railway, as distinct from a *temporary way*.

permanent white (*Dec.*). A name given to both zinc white and blanc fixe.

permanent wilting (*Bot.*). Wilting from which a plant does not recover if placed in a saturated atmosphere.

perman'ganates (*Chem.*). Oxidising agents, the best known being *potassium permanganate* (q.v.), the commonest salt of manganese.

permangan'ic acid (*Chem.*). $HMnO_4$. Powerful oxidising agent. Decomposes in the presence of organic matter.

permeability (*Phys.*). The rate of diffusion of gas or liquid under a pressure gradient through a porous material. Expressed, for thin material, as the rate per unit area, and for thicker material, per unit area of unit thickness.

permeability (*Elec. Comm.*). The ratio B/H for a magnetised material within a current-carrying coil, where B is the flux density produced, and H is the magnetising force, dependent on the ampere-turns per unit length of coil.

See **differential— incremental— initial—**

permeability (*Elec. Eng.*). ABSOLUTE PERMEABILITY, the ratio of the magnetic flux density produced in a medium to the magnetising force producing it.—RELATIVE PERMEABILITY, the ratio of the magnetic flux density produced in a medium to that which would be produced in a vacuum by the same magnetising force.

permeability bridge (*Elec. Eng.*). A device for measuring the magnetic properties of a sample of magnetic material, fluxes in different branches of a divided magnetic circuit being balanced against each other.

See **Ewing— Holden—**

permeability tuning (*Radio*). A method of tuning a resonant circuit by varying the value of the inductance by means of a movable iron core.

permeameter, per-me-am'— (*Elec. Eng.*). An instrument for measuring magnetic permeability.

See **Drysdale— traction—**

per'meance (*Elec. Eng.*). The reciprocal of the reluctance of a magnetic circuit.

Permian System (*Geol.*) That system of rocks deposited between the Carboniferous and Triassic Periods of geological time, the type area being Perm in Russia. Permian rocks include the Magnesian Limestone of N.E. England, the Brockram and the Penrith Sandstone, as well as important gypsum and salt deposits, the whole assemblage bearing evidence of accumulation under arid, desert conditions.

Permic (*Geol.*). Equivalent to *Permian* (see above); comprises the continental Dunkard Series, essentially similar to the Pennsylvanian. See also **Guadaloupian Group.**

Perminvar (*Met.*). An alloy of the Permalloy type, developed to give constant permeability over a range of field strengths. Typical compositions are: nickel 45%, cobalt 25%, and iron 30%; and nickel 45%, cobalt 25%, iron 23%, and molybdenum 7%.

permissive waste (*Build.*). Dilapidations resulting from the neglect of a tenant.

permittivity (*Elec. Eng*). ABSOLUTE PERMITTIVITY, the ratio of the electric displacement of a medium to the electric force producing it.—RELATIVE PERMITTIVITY, the ratio of the electric flux density produced in a medium to that which would be produced in a vacuum by the same electric force. Also called SPECIFIC INDUCTIVE CAPACITY, DIELECTRIC CONSTANT.

permo (*Textiles*). A lustre dress fabric with a crêpe-like appearance; the weft is hard-spun Botany worsted and the warp lightly spun mohair and cotton. The cotton is removed, after weaving, by carbonising or other process of extraction.

Per'moglaze (*Paint.*). Trade-name for a liquid which on application to a wall produces a hard, transparent, non-absorbent, glass-like surface.

Per'mutite (*Min.*). A trade-name for artificial *natrolite* (q.v.), a zeolite used for water-softening, as it readily exchanges lime in the water for soda in its own structure. See **base exchange.**

permutoid (*Chem.*). Involving a double decomposition between a soluble substance and an insoluble one.

pernicious anaemia (*Med.*). Addison's anaemia. A disease characterised by anaemia, abnormalities in the size and shape of red-blood corpuscles, *achylia gastrica* (q.v.), and changes in the nervous system, due to the absence, from the body, of an anti-anaemic factor normally present in liver.

Peromedu'sae (*Zool.*). An order of *Scyphozoa* comprising active medusoid marine forms with four inter-radial tentaculocysts; alternation of generations does not occur.

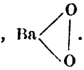
per'onate (*Bot.*). Having the stipe, particularly at the base, covered by a thick felted sheath.

perone'us, peronae'us (*Zool.*). In Vertebrates, the fibula: in Birds, a leg muscle.—*adj.* **perone'al.**

pero'ral (*Zool.*). Surrounding the mouth; as the *peroral membrane* of *Ciliophora*, which surrounds the cytopharynx.

perov'skite (*Min.*). Titanate of calcium, which may crystallise in the cubic system or else in the orthorhombic (to which system its optical characters conform). An accessory mineral in melilite-basalt.

perox'idases (*Chem.*). Enzymes which activate hydrogen peroxide and induce reactions which hydrogen peroxide alone would not effect.

perox'ides (*Chem.*). (1) Oxides whose molecules contain two atoms of oxygen linked together and which yield hydrogen peroxide with acids, e.g. barium peroxide,  . Organic peroxides are known, e.g. diethyl peroxide, $C_2H_5{\cdot}O{\cdot}O{\cdot}C_2H_5$.—(2) The term is used loosely for certain oxides in which the valency of the central atom is greater than the usual value, e.g. lead dioxide or peroxide, $O{=}Pb{=}O$.

per'pend, perpend-stone (*Masonry*). See **through stone.**

per-radius (*Zool.*). In *Coelenterata*, one of the four primary radii.

perrhe'nates (*Chem.*). See **rhenium oxides.**

perrhe'nic acid (*Chem.*). See **rhenium oxides.**

perron (*Build.*). An external staircase to a building, leading from ground-level to the first floor.

Per'seids (*Astron.*). A swarm of meteors whose orbit round the sun is crossed by the earth on August 11, on or about which date a shower with its radiant point in the constellation Perseus may be expected.

persevera'tion (*Med.*). Meaningless repetition of an action or utterance.

Persian (*Leather*). The terms *Persian goat* and *Persian sheep* are used in the trade for goat and sheep skins tanned in India.

persistence of vision (*Optics, Cinema.*). The ability of the eye to retain perception for a short time after the stimulus has been removed; thus the intermittent flashes of pictures on a cinematograph screen give the illusion of a continuously moving image.

persistent (*Zool.*). Continuing to grow or develop after the normal period for the cessation of growth or development, as teeth; said also of structures present in the adult which normally disappear in the young stages.

persistent perianth (*Bot.*). A perianth which remains unwithered, and often enlarged, around the fruit.

person (*Zool.*). An individual organism.

persona (*Psychol.*). A term used by Jung to denote the outermost part of consciousness which is in relation to the outside world; it is viewed as the expression of the personality of the individual. It contrasts strongly with the *anima* or *animus* (qq.v.), which is the unconscious collective aspect of the self. Also MASK.

personal equation. The correction which is to be applied to the reading of an instrument on account of the tendency of the observer to read too high or too low. For a given observer and instrument, the personal equation is usually constant.

personality (*Psychol.*). The integrated organisation of all the psychological, intellectual, emotional, and physical characteristics of an individual, especially as they are presented to other people.

per'sonate (*Bot.*). Said of a two-lipped corolla which has some likeness to a mask or to the face of an animal, as in the snapdragon.

persorption (*Chem.*). The extremely effective absorption of a gas by a solid, with the formation of an almost molecular mixture of the two substances.

perspective (*Acous.*). See **acoustic perspective.**

perspective, aerial (*Photog.*). See **aerial perspective** and **atmosphere.**

Perthe's disease (*Med.*). Osteochondritis deformans juvenilis. A deformed condition of the epiphysis of the head of the femur in young children, associated with a painful limp.

perthite (*Min.*). The general name for megascopic intergrowths of potash- and soda-feldspars, both components having been miscible to form a homogeneous compound at high temperatures, but the one having been thrown out of solution at a lower temperature, thus appearing as inclusions in the other. See also **microperthite.**

perth'osite (*Geol.*). A type of soda-syenite consisting to a very large extent of perthitic feldspars, occurring at Ben Loyal and Loch Ailsh in Scotland.

perturbations (*Astron.*). Those departures from regularity in the orbital motion of a planet, comet, or other body, caused by the disturbing gravitational force of another body.

per'tusate (*Bot.*). Perforated: pierced by slits.

pertus'sis (*Med.*). Whooping cough. An acute infectious disease, due to infection with the bacillus *Haemophilus pertussis*; characterised by catarrh of the respiratory tract, also by periodic, recurring spasms of the larynx, which end in the prolonged crowing inspiration known as the 'whoop.'

Peru balsam (*Chem.*). See **balsam of Peru.**

pervaporation (*Chem.*). The evaporation of a solvent from the outside of a semi-permeable or dialysing membrane.

perversion (*Psycho-path.*). Any pathological state in which there is a deviation from the normal method of sexual gratification with the love-object; exemplified in sadism, masochism, fetishism, homosexuality, etc.

pes, pēz (*Zool.*). The podium of the hind limb in land Vertebrates.—*pl.* **pedes.**

pes ca'vus, pes arcua'tus (*Med.*). Claw foot. A condition of the foot in which the balls of the toes approximate to the heel, so that the foot is shortened and the instep abnormally high.

pes pla'nus, pes valgus (*Med.*). Flat foot. A condition of the foot in which the longitudinal arch is lost, so that the foot is flattened and turned outwards.

pes'sary (*Med.*). An instrument worn in the vagina to remedy displacements of the uterus: any occlusive or medicated appliance for insertion into the vagina to prevent conception.

pes'sulus (*Zool.*). In Birds, an osseous band which traverses the trachea horizontally at the point of origin of the bronchi, forming a vertical septum between the two bronchial apertures.

pestle (*Chem.*). A club-shaped instrument, of glass or porcelain, for grinding and pounding solids in a mortar.

pet cock (*Eng.*). A small plug-cock for draining condensed steam from steam-engine cylinders, or for testing the water-level in a boiler.

petal (*Bot.*). One of the leaves (often coloured) composing the corolla.

pet'alite (*Min.*). A silicate of lithia and aluminium which crystallises in the monoclinic system. Crystals are rare.

petalo'dy (*Bot.*). The transformation of stamens into petals.

pet'aloid (*Bot., Zool.*). Looking like a petal: petal-shaped, as the dorsal parts of the ambulacra in certain *Echinoidea*.

petaloma'nia (*Bot.*). An abnormal increase in the number of petals.

petas'ma (*Zool.*). A curtain-like structure of certain Prawns (*Penaeidae, Sergestidae*) formed by the union of lobes projecting inwards from the base of the first pair of pleopods in the male.

pete'chia (*Med*). A small red spot due to minute haemorrhage into the skin.

pete'chial fever (*Vet.*). See **purpura haemorrhagica.**

Peterlineum (*Build.*). A liquid, similar to creosote, applied to timber as a preservative.

Petersburg standard (*Timber*). 165 cubic feet.

Petersen coil (*Elec. Eng.*). A reactor placed between the neutral-point of an electric-power system and earth. The value of the reactance is such that, when an earth fault occurs, the current through the reactor exactly balances the capacitance current flowing through the fault, so that any tendency to arcing is suppressed. Also called ARC-SUPPRESSION COIL.

pe'tiolate (*Bot.*). Having a leaf stalk.

pe'tiole (*Bot.*). The stalk of a leaf.

petiole (*Zool*). The narrow stalk-like zone formed by the constriction of the second abdominal segment in certain *Hymenoptera* (*Apocrita*); cf. *propodeum.*—*adj.* **petiolate.**

pe'tiolule (*Bot.*). The stalk of a leaflet of a compound leaf.

petit mal, pe-tĕ mal (*Med*) A form of epileptic attack in which convulsions are absent and certain transient phenomena, e.g. brief loss of consciousness, occur.

petrail (*Carp*). A heavy beam in the framing of a timber building.

petri-, petro- (Greek *petros*, stone) A prefix used in the construction of compound terms; e.g. *petrifaction* (q.v.), *petro-squamosal*, pertaining to the squamosal and the petrous part of the temporal

petrifaction (*Geol*). The term applied to any organic remains which have been changed in composition by molecular replacement but whose original structure is in large measure retained.

petrified wood (*Min*). Wood which has had its structure replaced by calcium carbonate, silica, or agate in solution. Many of the original minute structures are preserved.

petrographic province (*Geol*). The name given, by Professor Judd, to a group of igneous rocks which have originated during a definite cycle of igneous activity. They usually possess certain chemical, mineral, and textural similarities which suggest a common origin and evolution. As a group of rocks cannot constitute a 'province,' the term *comagmatic assemblage* is much to be preferred.

petrog'raphy (*Geol.*). Systematic description of rocks, based on observations in the field, on hand specimens, and on thin microscopic sections. Cf. *petrology*.

petrol or **gasolene** (*Fuels*). The lightest product obtained by the fractional distillation of petroleum, or from synthesised hydrocarbon oils; sp. gr. at 60° F. ranging from ·720 (aviation petrol) to ·745, and flash-point ranging from 70° F. to less than 100° F. The fuel is generally a blend of natural and cracked petrol; used in light combustion-engines. See **cracking.**

petrol-electric generating set (*Elec. Eng.*). A small generating plant using a petrol engine as the prime-mover.

petrol engine (*I.C. Engs.*). A reciprocating engine, working on the Otto 4-stroke or the 2-stroke cycle, in which the air charge is carburetted by a petrol spray from a carburettor, or alternatively by *direct petrol injection* (q.v.). In 4-stroke engines, inlet and exhaust valves control the entry of charge and the exit of exhaust gases; in 2-stroke engines the piston is usually made to act both as inlet and exhaust valve. Ignition of the combustible mixture is effected by sparking-plug, operated either by coil and battery or by magneto.

petrol pump (*Automobiles*). (1) A small pump of the diaphragm type, operated either mechanically from the camshaft, or electrically. It draws petrol from the tank and delivers it to the carburettor.—(2) A pump at a petrol station for delivering a supply of petrol to an automobile or other vehicle. The quantity is indicated on a dial.

petroleum (*Chem*). Crude mineral hydrocarbon oils obtained from natural oil-wells in many parts of the world—in Texas, California, Mexico, Venezuela, Trinidad, Persia, Iraq, Russia, Rumania, etc. It consists chiefly of saturated and unsaturated aliphatic, and partly of aromatic, hydrocarbons. Petroleum from some sources (e.g. Russia) contains a large proportion of naphthenes. For commercial use it is refined and distilled to remove sulphur, resinous matter, etc. See also **liquefied petroleum gases*.**

petroleum ether (*Chem.*). See **gasolene.**

petroleum jelly or **petrolatum.** A mixture of petroleum hydrocarbons; used for making emollients, for impregnating the paper covering of electric cables, and as a lubricant. See **paraffin (liquid).**

petrology (*Geol.*) That study of rocks which includes consideration of their mode of origin, present conditions, chemical and mineral composition, their alteration and decay.

Petropine (*Build.*). A composition used in forming jointless flooring.

petro'sal (*Zool.*). In higher Vertebrates, a bone formed by the fusion of the various otic bones.

pet'rous (*Zool*). Stony, hard (as a portion of the temporal bone in higher Vertebrates): situated in the region of the petrous portion of the temporal bone.

petticoat (*Elec. Eng.*). One of the umbrella-shaped shields commonly provided on pin-type insulators in order to increase the length of the leakage path which will remain dry under rain conditions.

petticoat insulator (*Elec. Eng.*). A pin-type insulator equipped with one or more petticoats.

petuntse, —oont'se (*Pot.*) China stone, a fusible feldspathic substance, represented in England by 'moorstone.'

petzite (*Min.*). A telluride of silver and gold. It is steel-grey to black and often shows tarnish.

pewter (*Met*). An alloy containing 80-90% of tin and 10-20% of lead. Extensively used in the past for household utensils and ornamental articles. Now little used.

Peyer's patches (*Zool.*). In higher Vertebrates, lymph follicles occurring on the walls of the intestine and consisting of masses of reticular tissue containing numerous lymphocytes. Also called SOLITARY FOLLICLES, SOLITARY GLANDS.

peziz'oid (*Bot.*). Resembling a cup-shaped apothecium.

P.F. (*Build.*). Abbrev. for *plain face.*

pF., pf. (*Elec. Eng.*). Abbrev. for *pico-farad* (q.v.).

Pfann'kuch protection (*Cables*). A protective system for use with the cables of an electric-power system; some of the strands of the cable are lightly insulated from the others and have an e.m.f. applied between them, this e.m.f. causing a current to flow and operate relays if the insulation is destroyed by a fault. The system is widely used in Germany.

P.F.I. & R. (*Build.*). Abbrev. for *part fill in and ram.*

Pflüger's egg-tubes (*Zool.*). In higher Vertebrates, rounded strings of epithelium cells growing inwards into the stroma of the ovary from the germinal epithelium.

Pflüger's rule (*Cyt.*). The mitotic figure elongates in the direction of least resistance.

Ph (*Chem.*). A symbol for the phenyl radical C_6H_5-.

***p*H-value** (*Chem.*). The logarithm, to the base 10, of the reciprocal of the concentration of hydrogen ions in an aqueous solution. It is a convenient method of expressing small differences in the acidity or alkalinity of nearly neutral solutions; such differences are of great importance in many biological and electrolytic processes. See **hydrogen ion concentration.**

φ (*Chem.*) A symbol for the phenyl radical C_6H_5—.

φ- (*Chem.*). A symbol for *amphi-*, i.e. containing a condensed double aromatic nucleus substituted in the 2.6 positions.

phacel'la (*Zool.*). In some *Coelenterata*, a gastral filament bearing nematocysts.

phacel'lite (*Min.*). See **kaliophilite.**

phacoi'dal structure (*Geol.*). A rock structure in which mineral or rock-fragments of lens-like form are included. The term is applicable to igneous rocks containing softened and drawn-out inclusions; also to metamorphic rocks such as crush-breccias and crush-conglomerates; and to certain gneisses. (Greek *phakos*, lentil; see **lens.**)

phac'olite (*Min.*). A mineral of the zeolite group, related to chabazite; so named from its lens-like crystal form.

phac'olith (*Geol.*). A minor intrusion of igneous rock occupying the crest of an anticlinal fold. Its form is due to the folding, hence it is not the cause of the uparching of the roof (cf. *laccolith*). The type example is the Corndon phacolith in Shropshire, England.

phacomala'cia (*Med.*). Pathological softening of the lens of the eye.

phaeic, phaeochrous, fē'ik, fē-ōk'rus (*Zool.*). Dusky.—*n.* **phaeism.**

phae'nogam'ous (*Bot.*). Relating to a flowering plant.

phae'nogams (*Bot.*). See **Phanerogamae.**

phaeo-, pheo- (Greek *phaios*, dusky). A prefix used in the construction of compound terms.

phaeochro'macyto'ma (*Med.*). See **paraganglioma.**

phae'ochrome (*Zool.*). Chromaphil.

phaeochrous, fē-ōk'rus (*Zool.*). See **phaeic.**

phaeo'dium (*Zool.*). In some *Radiolaria*, a greenish or brownish mass, situated at the main opening of the central capsule; it consists of food-material and excretory substances.

Phae'ophy'ta, Phae'ophy'ceae (*Bot.*). The brown seaweeds. A large group of algae, almost all marine, in which the green chlorophyll is more or less masked by a yellow pigment, fucoxanthin, so that the plants look brownish. The thallus may be of simple construction, but it is often very complicated; some members of the group are the largest algae known, and may reach many feet in length.

phae'oplast (*Bot.*). The chromatophore of the *Phaeophyceae.*

phae'ospo'rous (*Bot.*). Having dark-coloured one-celled spores.

phag-, phago- (Greek *phagein*, to eat). A prefix used in the construction of compound terms; e.g. *phagocyte.* The corresponding suffix is *-phagy*; e.g. *oliphagy,* the habit of feeding on a restricted range of food plants.

phagedae'na, phagede'na (*Med.*). Rapidly spreading and destructive ulceration.

phag'ocyte (*Zool.*). A cell which exhibits amoeboid phenomena, i.e. spontaneous change of form, ability to throw out pseudopodia (and so to engulf foreign bodies), and to migrate from place to place. See **opsonin.**

phagocyto'sis (*Zool.*). Destruction of tissue-cells or microparasites by the action of phagocytes.

phalan'ges (*Zool.*). In Vertebrates, the bones supporting the segments of the digits: fiddle-shaped rings composing the reticular lamina of the organ of Corti.—*sing.* **phalanx.**

Phalangid'ea (*Zool.*). See **Opiliones.**

phalanx (*Zool.*). See **phalanges.**

phallus (*Zool.*). The penis of Mammals: the primordium of the penis or clitoris of Mammals.

phanero- (Greek *phaneros*, visible). A prefix used in the construction of compound terms; e.g. *phanerocrystalline* (q.v.).

Phan'eroceph'ala (*Zool.*). A subclass of *Polychaeta* in which the body somites are similar, eyes, cirri, and tentacles usually occur, and the prostomium is not hidden by the peristomium.

phan'erocodon'ic (*Zool.*). Detached and free-swimming; said of a medusoid person.

phan'erocrys'talline (*Min.*). Said of an igneous rock in which the crystals of all the essential minerals can be discerned by the naked eye.

Phan'erogam'ae, Phan'erogam'ia (*Bot.*). A large group of higher plants, including about 200,000 species, which produce flowers in which the sexual organs are readily discerned. They are divided into *Gymnospermae*, with seeds produced naked on the surface of a scale, and *Angiospermae*, with seeds enclosed in an ovary.

phan'erogam'ous (*Bot.*). Relating to a flowering plant.

phan'erophyte (*Bot.*). A tree or shrub with the resting buds freely exposed to the air on branches raised above the surface of the soil.

phantasy (*Psychol.*). A mental state of preoccupation with thoughts and ideas which are associated with certain desires unobtainable in reality.

phantom antenna (*Radio*). See **dummy antenna.**

phantom circuit (*Teleph.*). A telephonic circuit using pairs of conductors in parallel for the go and return circuits, the pairs of conductors each forming a side-circuit.

phantom loading (*Teleph.*). The loading which is inserted in phantom circuits, the two legs of each side-circuit being taken round the coil as if one winding; resistance is added to the side-circuit, but not inductance.

phar'macolite (*Min.*). A hydrous arsenate of calcium which crystallises in the monoclinic system. It is a product of the late alteration of mineral deposits which carry arsenopyrite and the arsenical ores of cobalt and silver.

pharmacology (*Med.*). The scientific study of drugs (Greek *pharmakon*, drug) and their action.—*n.* **pharmacol'ogist.**

phar'macosid'erite (*Min.*). Hydrated arsenate of iron. It crystallises in the cubic system, and is a product of the alteration of arsenical ores.

pharos (*Civ. Eng.*). A *lighthouse* (q.v.).

pharyng-, pharyngo- (Greek *pharyngx*, gullet). A prefix used in the construction of compound terms; e.g. *pharyngobranchial*, pertaining to the pharynx and the gills.

pharyngis'mus (*Med.*). Spasm of the muscles of the pharynx.

pharyngi'tis (*Med.*). Inflammation of the pharynx.

pharyngobran'chial (*Zool.*). The uppermost element of a branchial arch.

pharyngople'gia (*Med.*). Paralysis of the muscles of the pharynx.

pharyng'oscope (*Med.*). An instrument for viewing the pharynx.

pharyngot'omy (*Surg.*). Incision into the pharynx.

pharynx (*Zool.*). In Vertebrates, that portion of the alimentary canal which intervenes between the mouth cavity and the oesophagus and serves both for the passage of food and the performance of respiratory functions: in Invertebrates, the corresponding portion of the alimentary canal lying immediately posterior to the buccal cavity, usually having a highly muscular wall.—*adj.* **pharynge'al.**

phase (*Astron.*). (Of the moon) the name given to the changing shape of the visible illuminated surface of the moon due to the varying relative positions at the earth, sun, and moon during the synodic month. Starting from *new moon*, the phase increases through *crescent*, *first quarter*, *gibbous*, to *full moon*, and then decreases through *gibbous*, *third quarter*, waning to *new moon* again.

phase (*Chem.*). The sum of all those portions of a material system which are identical in chemical composition and physical state.

phase (*Elec. Eng.*). One of the windings or circuits of a piece of polyphase electrical apparatus or system.

See **single-phase**
two-phase
three-phase
polyphase
in-phase
out-of-phase
phase-angle.

phase advancer (*Elec. Eng.*). A machine connected in the secondary circuit of an induction, in order to improve its power factor.

See **Kapp—**
Le Blanc—
Scherbius—
Walker—

phase-angle (*Elec. Eng.*). (1) The angle between the two vectors representing two harmonically varying quantities (e.g. a current and a voltage) having the same frequency.—(2) The phase difference between the primary current (or voltage) and the reversed secondary current (or voltage) of a current (or voltage) transformer. Sometimes called PHASE-ANGLE ERROR.

phase-angle error (*Elec. Eng.*). See **phase-angle.**

phase changer (*Elec. Eng.*). A machine for transferring power from a system having one number of phases to a system having another number of phases. Also called a ROTARY PHASE CONVERTOR.

phase compensation (*Elec. Comm.*). The use of networks for correcting the varying phase delay with frequency which arises in long transmission lines and which results in delay or phase distortion.

phase compensator (*Elec. Comm.*). An electrical non-dissipative network introduced into a communication circuit for adjusting the phase delay in the system.

phase constant (*Elec. Comm.*). The same as *wavelength constant*. See **image phase constant.**

phase correction (*Elec. Comm.*). The same as *phase compensation*.

phase delay (*Elec. Comm.*). The delay, in radians or seconds, for the transmission of a wave of a single frequency through the whole or part of a communication system.

phase delay distortion (*Elec. Comm.*). Distortion of a signal transmitted over a long line, so that the difference in time of arrival of the components of a complex wave is noticeable.

phase difference (*Elec. Eng., etc.*). The difference between the phase-angles of two harmonically varying quantities. Also called PHASE DISPLACEMENT.

phase distortion (*Elec. Comm.*). Distortion in the wave-form of a transmitted signal on account of the non-linear relation of the wavelength constant of a line, or the image phase constant of an amplifier or network, with frequency.

phase equalisation (*Elec. Comm.*). See **phase compensation.**

phase indicator (*Elec. Eng.*). See **power-factor meter.**

phase intercept (*Elec. Comm.*). The phase delay, in radians for zero frequency, for the whole or part of a transmission system; obtained by extending the curve for the phase delay with respect to frequency, as measured or calculated.

phase intercept distortion (*Elec. Comm.*). Distortion in a received signal wave-form solely because the phase delay for zero frequency is not an exact multiple of π.

phase meter (*Elec. Eng.*). See **power-factor meter.**

phase modifier (*Elec. Eng.*). A term sometimes used to denote a synchronous condenser when this is used for varying the power factor of the current in a transmission line in order to effect voltage regulation.

phase modulation (*Radio*). Periodic variation in the phase of a high-frequency current or voltage in accordance with a lower impressed modulating frequency. It usually occurs as an unwanted by-product of amplitude modulation, but can be independently produced.

phase reaction (*Chem.*). A reaction involving a change in the proportions of the phases present in a system. It takes place at constant temperature and involves the absorption or evolution of heat.

phase retardation (*Elec. Comm.*). The same as *phase delay*, but usually expressed in radians, whereas phase delay generally refers to time in seconds.

phase reversal (*Chem.*). An interchange of the components of an emulsion; e g. under certain conditions an emulsion of an oil in water may become an emulsion of water in the oil.

phase rule (*Chem.*). A generalisation of great value in the study of equilibria between phases. In any system, $P+F=C+2$, where P is the number of phases, F the number of *degrees of freedom* (1, q.v), C the number of components.

phase-sequence (*Elec. Eng.*). The order in which the phase voltages of a polyphase system reach their maximum values. If the phases of a three-phase system are given the standard colourings of Red, Yellow, Blue, this phase-sequence is said to be a *positive phase-sequence*.

See **negative—**
zero—

phase-sequence indicator (*Elec. Eng.*) An instrument for determining the phase-sequence of a polyphase system.

phase shifting transformer (*Elec. Eng.*). A specially designed transformer so constructed that the phase-angle between the primary and secondary voltages is not zero or 180°. In some cases the phase-angle between the two may be made variable.

phase splitter (*Elec. Eng.*). A machine or other device whereby a polyphase system of voltages may be obtained from a single-phase supply.

phase swinging (*Elec. Eng.*). Periodic variations in the phase-angle between two synchronous machines running in parallel.

phase swinging (*Television*). Lack of synchronism throughout the individual cycles of the frame frequency generators at the transmitting and receiving ends of a television system, causing the received picture to wander over the screen.

phase velocity (*Radio*). The velocity of propagation of any one phase state, such as a point of zero instantaneous field, in a steady train of sinusoidal waves. It may differ from the velocity of propagation of the disturbance, or group velocity, and, in the case of transmission through ionised air, may exceed that of light. Cf. *group velocity*. Also called WAVE VELOCITY.

phase voltage (*Elec. Eng.*). See **voltage to neutral.**

phased (*Cinema.*). Said of camera drives when they are switched on to speed-controlled mains, ready to be brought up to speed by starting the generator which supplies these mains.

phaseo′liform (*Bot.*). Shaped like a beam.

phasmajec′tor (*Television*). A device for providing a standard video signal for testing television circuits, the signal being thermionically generated.

phellan′drene (*Chem.*). $C_{10}H_{16}$, a terpene existing in a *d*- and *l*-form, which is Δ-1,5-terpadiene, b.p. 62° C. (12 mm.).

phellem (*Bot.*). The tissue formed externally to the phellogen; cork.

phel'loderm (*Bot.*). A layer or layers of thin-walled cells, with cellulose walls, often containing starch and sometimes chloroplasts, formed internally to the phellogen; a kind of secondary cortex.

phel'logen (*Bot*). The layer of meristematic cells lying a little inside the surface of a root or stem, forming cork on its outer surface and phelloderm internally; the cork cambium.

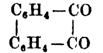
phelloid (*Bot*). A crust of non-suberised or weakly suberised cells present in the surface of some plants, replacing true cork.

phenacetin, fen-as'— (*Chem.*). $C_2H_5O{\cdot}C_6H_4{\cdot}NH{\cdot}CO{\cdot}CH_3$, aceto-*p*-phenetidine, colourless crystals, m.p. 135° C., used as an antipyretic.

phenakis'toscope (*Photog*). A development of the zoetrope, using a disc and a mirror; images on the disc are seen intermittently and give the illusion of animated motion.

phen'akite (*Min.*). An orthosilicate of beryllium, crystallising in the hexagonal system. It is commonly found as a product of pneumatolysis. Sometimes cut as a gemstone, having great brilliance of lustre but lacking fire. The name (Greek, 'the deceiver') refers to the frequency with which it has been confused with quartz.

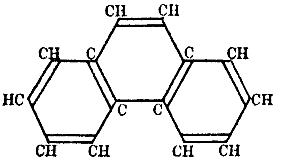
phenan'thraquinone' (*Chem*). A diketone obtained from phenanthrene and chromic acid. It has the formula:



$$\begin{array}{l} C_6H_4-CO \\ \;| \qquad\;\; | \\ C_6H_4-CO \end{array}$$

It crystallises in orange needles; m.p. 200° C.

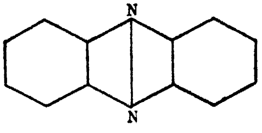
phenan'threne (*Chem.*). $C_{14}H_{10}$, white, glistening plates, m.p. 99° C., b.p. 340° C.; its solutions show a blue fluorescence. It has the formula:



It occurs in coal-tar, and can be synthesised by various reactions, the most important of which is the synthesis by Pschorr, based upon the condensation of *o*-nitrobenzaldehyde with sodium phenylacetate yielding α-phenyl-*o*-nitrocinnamic acid, which on reduction, diazotisation, and subsequent elimination of N_2 and H_2O, yields phenanthrene-10-carboxylic acid. This acid yields phenanthrene on distillation. The 9-10-phenanthrene bridge is readily attacked by reagents, yielding diphenyl derivatives.

phe'nates (*Chem.*). Salts formed by phenols, e.g. C_6H_5ONa, sodium phenate.

phen'azine (*Chem.*). A heterocyclic compound, which can be considered as anthracene in which two CH groups have been replaced by two N atoms. It has the formula:



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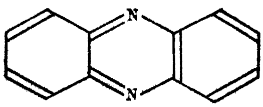


It crystallises in yellow needles, m.p. 171° C., and can be readily sublimed.

***p*-phenet'idine** (*Chem.*). $H_2N{\cdot}C_6H_4{\cdot}OC_2H_5$, the ethyl ether of *p*-aminophenol, basis for a number of pharmaceutical preparations, e g. phenacetin, $H_3C{\cdot}CO{\cdot}NH{\cdot}C_6H_4{\cdot}OC_2H_5$.

phen'etole (*Chem.*). $C_6H_5{\cdot}O{\cdot}C_2H_5$, phenyl ethyl ether, a colourless liquid of pleasant odour, b.p. 172° C.

phe'nocrysts (*Geol.*). Large (megascopic) crystals, usually of perfect crystalline shape, found in a fine-grained matrix in igneous rocks. See **porphyritic texture.**

phe'nol (*Chem*). C_6H_5OH, carbolic acid, colourless hygroscopic needles, m p. 43° C., b p. 183° C., chief constituent of the coal-tar fraction boiling between 170° and 230° C., soluble in caustic soda and potash, forming Na and K phenates or phenolates. It forms with bromine 2,4,6-tribromophenol. Sodium phenolate reacts with CO_2 under certain conditions, yielding sodium salicylate. It is a strong disinfectant.

phenols (*Chem*). A group of aromatic compounds having the hydroxyl group directly attached to the benzene nucleus. They give the reactions of alcohols, forming esters, ethers, thio-compounds, but also have feeble acidic properties and form salts or phenolates by the action of caustic soda or potash. Phenols are divided into mono-, di-, tri-, tetra-, and polyhydric phenols. Phenols are more reactive than the benzene hydrocarbons.

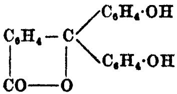
phenol'ic acids (*Chem.*). A group of aromatic acids containing one or more hydroxyl groups attached to the benzene nucleus. The *o*-hydroxy acids are volatile in steam, soluble in cold chloroform, and give a violet or blue coloration with ferric chloride. The *m*-hydroxy acids are the most stable acids. Important phenolic acids are *salicylic acid, gallic acid, tannin* (qq v.).

phenolic alcohols (*Chem.*). A group of compounds possessing phenolic properties in addition to those of an alcohol. Some of them occur as glucosides in nature. Important representatives of this group are saligenin or *o*-hydroxybenzyl alcohol, and coniferyl alcohol.

phenolic resins (*Plastics*). The largest group (weight-manufactured) of artificial plastics, made from a phenol (phenol, *m*-cresol, *p*-cresol, catechol, resorcinol, or quinol) and an aldehyde (formaldehyde, acetaldehyde, benzaldehyde, or furfuraldehyde). An acid catalyst produces a permanently soluble and fusible resin, used in varnishes and lacquers; while an alkaline catalyst results in the formation, after moulding, of an insoluble and infusible resin. Phenolics may be moulded, laminated, or cast.

phenology (*Biol.*). The study of organisms in relation to climate.

phe'nolphthal'ein (*Chem.*). A triphenylmethane derivative, obtained by the condensation of phthalic anhydride and phenol by the action of concentrated sulphuric acid. It has the formula:



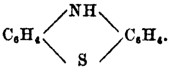
$$\begin{array}{l} \qquad\qquad\quad\; C_6H_4{\cdot}OH \\ C_6H_4-C \\ \;| \qquad\quad | \quad C_6H_4{\cdot}OH \\ CO—O \end{array}$$

It forms colourless crystals which dissolve with a red colour in alkalis. It is used as an indicator in volumetric analysis. The colourless substance has the lactone formula, whereas its coloured salts have a quinonoid structure.

phe'notype (*Gen.*). One of a group of individuals all of which have a similar appearance regardless of their factorial constitution.

phenotyp'ic (*Biol.*). Caused or produced by environmental factors.

phenthi'azine (*Chem*.). A heterocyclic compound of the formula



$C_6H_4\left\langle {NH \atop S} \right\rangle C_6H_4$.

phe'nyl group, *or* fē'nil (*Chem*.). The group C_6H_5—.

phenyl acetate (*Chem*.) $C_6H_5O{\cdot}CO{\cdot}CH_3$, a colourless liquid, b.p. 193° C., obtained from phenol, acetic anhydride, and dry sodium acetate. It is readily hydrolysed.

phenylacetic acid (*Chem*.). $C_6H_5{\cdot}CH_2{\cdot}COOH$, colourless crystals, m p. 76° C.

phenylamine' (*Chem*.). Aminobenzene or *aniline* (q.v.).

phenylbenzine (*Chem*.). See **diphenyl.**

phenyl cyanide (*Chem*.). *Benzonitrile* (q.v.).

phenyl ethyl alcohol (*Chem*.). $C_6H_5{\cdot}CH_2{\cdot}CH_2OH$, an aromatic alcohol of pleasant odour, b.p. 220° C., a constituent of rose oil.

phenyl ethyl ether (*Chem*.). See **phenetole.**

phenylhy'drazine (*Chem*.). $C_6H_5{\cdot}NH{\cdot}NH_2$, a colourless crystalline mass, m.p. 23° C. It is easily oxidised, and is a strong reducing agent. It forms salts with acids. Phenylhydrazine reacts readily with aldehydes and ketones, forming phenylhydrazones, which are crystalline substances and serve to identify the respective aldehydes and ketones.

phenylhy'drazones (*Chem*.). The reaction products of *phenylhydrazine* (q.v.) with aldehydes and ketones, formed by the elimination of two hydrogen atoms of the amino group and the oxygen atom of the aldehyde or ketone group as water.

phenylhydroxyl'amine (*Chem*.). $C_6H_5{\cdot}NH{\cdot}OH$, a colourless crystalline substance, m p. 81° C., obtained by the reduction of nitrobenzene with zinc dust and water in the presence of a mineral salt. It is very unstable and easily oxidised. Mineral acids cause intramolecular rearrangement into *p*-aminophenol, $H_2N{\cdot}C_6H_4{\cdot}OH$.

phenyl methyl ether (*Chem*.). See **anisole.**

phen'ylenedi'amines (*Chem*.). $C_6H_4(NH_2)_2$, obtained by the reduction of the dinitro, the nitroamino, or the aminoazo compounds. The diamines are crystalline substances with strong basic properties. There are three isomers, viz., *o*-phenylenediamine, m p. 102° C., b.p. 252° C.; *m*-phenylenediamine, m.p. 63° C., b.p. 287° C.; *p*-phenylenediamine, m.p. 147° C., b.p. 267° C.

phi'alide (*Bot*.). A short flask-shaped sterigma.

phi'aliform (*Bot*.). Shaped like a saucer or cup.

Philadelphia rod (*Surv*.). A popular type of levelling staff in America, capable of being used either as a self-reading staff or as a target rod.

phil'lipsite (*Min*.). A fibrous zeolite; hydrated silicate of potassium, calcium, and aluminium, usually grouped in the monoclinic system. Some twinned forms possess pseudo-symmetry.

philosopher's wool (*Chem*.). An old name given to the flocculent zinc oxide produced when zinc is burnt in air.

-philous (*Bot*., *Zool*.). Suffix meaning *inhabiting*, *preferring*.

phimo'sis (*Med*.). Narrowness of the prepuce (foreskin) so that it cannot be drawn back over the glans penis.

phleb-, phlebo- (Greek *phleps*, gen. *phlebos*, vein). A prefix used in the construction of compound terms; e.g. *phlebolith* (q.v.).

phlebec'tomy (*Surg*.). Surgical removal of a vein or part of a vein.

phlebenter'ic (*Zool*.). Having branches of the alimentary canal extending into the appendages or limbs, as in *Pycnogonida*.

phlebi'tis (*Med*.). Inflammation of the coats of a vein.

phleboede'sis (*Zool*.). The condition of having a haemocoelic body cavity, the coelom being reduced by the enlargement of the blood-vessels, as in *Mollusca* and *Arthropoda*.

phleb'olith (*Med*.). A concretion in a vein due to calcification of a thrombus.

phlebosclero'sis (*Med*.). Thickening of a vein due chiefly to a pathological increase in the connective tissue of the middle coat.

phlebot'omus fever (*Med*.). See **sandfly fever.**

phlebot'omy (*Med*.). The cutting of a vein for the purpose of letting blood.

phlegma'sia alba dolens (*Med*.). White-leg, milk-leg. Painful swelling of the leg, the skin of which is shiny and white, occurring in women after childbirth; due to thrombosis of veins and obstruction of lymphatics.

phleg'mon (*Med*.). Purulent inflammation, with necrosis of tissue.—*adj*. **phleg'monous.**

phlo'baphene (*Bot*.). Yellow-to-brown substances occurring inside cork cells, probably derived by the decomposition of tannins.

phlo'em (*Bot*.). The conducting tissue present in vascular plants, chiefly concerned with the transport of elaborated food materials about the plant. When fully developed, phloem consists of sieve tubes, companion cells, and parenchyma, but companion cells may not be present.

phloem fibre (*Bot*.). A sclerenchymatous element (or a strand of such elements) present in phloem, affording support to the delicate sieve tubes.

phloem island (*Bot*.). A patch of phloem surrounded by secondary wood.

phloem ray (*Bot*.) That portion of a vascular ray which traverses the phloem.

phloeoter'ma, flē'ō— (*Bot*.). Endodermis in which the radial walls and the inner tangential walls are heavily thickened.

phlogis'ticated air (*Chem*.). An old name for nitrogen.

phlo'gopite (*Min*.). Silicate of potassium, magnesium, aluminium, and hydrogen, crystallising in the monoclinic system. It is a magnesium mica, and is usually a product of metamorphism, being found in crystalline limestone.—(*Diel*.) Phlogopite is not so good as *muscovite* (q.v.) at low temperatures, but it keeps its water of composition until 950° C.

phloroglu'cinol (*Chem*.). 1,3,5-Trihydroxybenzene, $C_6H_3(OH)_3$, large prisms, m p. 218° C., which sublime without decomposition. It can be obtained by the fusion of resorcinol with caustic soda. It possesses reducing properties, and gives a violet coloration with ferric chloride.

phlyc'ten, phlycte'na, phlycten'ule, phlycten'ula (*Med*.). A small round, grey or yellow nodule, occurring on the conjunctiva where it covers the sclera and cornea of the eye. (Greek *phlyctaina*, a bleb.)

phlycten'ular conjunctivitis (*Med*.). Eczematous conjunctivitis. An inflammation of the conjunctiva covering the sclera and cornea of the eye and giving rise to phlyctens.

phobia (*Psycho-path*.). Fear of an internal danger which has been projected on to an external object, e.g. *claustrophobia*.

pho'botax'is (*Biol*.). Response or reaction of an organism to nocuous stimuli, the organism withdrawing at an angle not necessarily related to the direction of the stimulus; also qualified by standard prefixes, as *chemo*phobotaxis.

-pho'bous (*Bot*., *Zool*.). Suffix meaning *avoiding*, *disliking*.

pholido'sis (*Zool*.). The order and arrangement of scales, e.g. of Fish and Reptiles.

phon-, phono- (Greek *phōne*, voice). A prefix used in the construction of compound terms; e.g. *phonautograph* (q.v.).

phon (*Acous*.). The unit of the objective loudness or sound-level scale; the decibel unit of the 1000 cycles per second intensity-level scale which is used for deciding the apparent loudness of an unknown sound or noise, when a measure of loudness is required. This is effected either by subjective comparison by the ear, or by objective comparison with a microphone-amplifier and a weighting network. See **noise meter** and **reftone.**

phon-meter (*Acous.*). An apparatus for the estimation of loudness-level of a sound on the phon scale by subjective comparison.

phon scale (*Acous*). The scale of intensity of the 1000 cycles per second reference tone, with decibel steps above the agreed threshold of the aural perception (0·2 r.m.s. milli-dyne per sq. cm), which is used as an objective loudness scale for noise and other sound measurements. Also called SOUND-LEVEL SCALE.

phonation (*Zool*). Sound-production.

phonaut'ograph (*Acous.*). A primitive recording machine in which sound energy is collected by a horn, operates a needle through a diaphragm, and so makes a trace on a smoked cylinder.

phonen'doscope (*Med.*). A stethoscope fitted with a diaphragm for the amplification of the sounds heard through it.

phonic wheel (or **drum**) (*Elec. Comm.*). An elementary synchronous motor capable of being driven with low power from valve oscillators, so that the frequency of the latter can be measured by a revolution counter.

phonochemistry (*Chem.*). The study of the effect of sound and ultrasonic waves on chemical reactions.

pho'nogram (*Teleph.*). A telegram which is dictated over the telephone, a spelling code (*A* for *Arthur*, etc.) being used to ensure accuracy.

phonogram circuit (*Teleph*). A circuit, from an exchange to a telegraph centre, over which telegrams can be dictated for transmission or reception.

phonogram position (*Teleph*). In a telephone exchange, the position where operators receive and transmit telegraph messages over the telephone system, either to post offices in the locality or direct to subscribers.

pho'nograph (*Acous.*). The obsolete name for the *gramophone*. Strictly it refers to the *Edison phonograph* (q.v.).

pho'nolite (*Geol.*). A fine-grained igneous rock of intermediate composition, consisting essentially of nepheline, subordinate alkali feldspar (sanidine), and soda-rich coloured silicates. Termed also CLINK-STONE, because it rings under the hammer when struck.

pho'novision (*Television*). A system in which the picture-forming signals are recorded on a gramophone record and subsequently reproduced.

-phore (*Chem.*). A suffix which denotes a group of atoms responsible for the corresponding property; e.g. *chromophore*.

phor'esy (*Zool.*). Transport or dispersal achieved by clinging to another animal; e.g. certain Mites which achieve dispersal by attaching themselves to various Insects.

pho'rone (*Chem.*). $(CH_3)_2C{:}CH{\cdot}CO{\cdot}CH{:}C(CH_3)_2$, yellow crystals, m.p. 28° C., b.p. 196° C., a condensation product of acetone obtained by treating it with HCl gas or $ZnCl_2$.

Phoronid'ea (*Zool.*). A phylum of hermaphrodite *Coelomata*, of tubicolous habit, having a U-shaped gut, a dorsal anus, and a lophophore in the form of a double horizontal spiral; marine forms occurring in the sand and mud of the sea bottom.

phorozo'oid (*Zool.*). In *Cyclomyaria*, a zooid of the media row, never sexually mature, acting as a nurse, usually bearing a gonozooid with which it is later liberated.

phoroso'on (*Zool.*). An asexual form preceding, in the life-history, the sexual form.

phos'gene (*Chem.*). $COCl_2$. A very poisonous, colourless, heavy gas with a nauseating, choking smell; b.p. 8° C. It is manufactured by passing carbon monoxide and chlorine over a charcoal catalyst. It is used for the manufacture of intermediates in the dyestuff industry, and as a poison gas in warfare.*

phos'genite (*Min*). A chloro-carbonate of lead, crystallising in the tetragonal system. It is a rare mineral found in association with cerussite.

phosphates (*Chem.*). Salts of phosphoric acid. There are three series of orthophosphates, MH_2PO_4, M_2HPO_4, and M_3PO_4; the first yield acid, the second are practically neutral, and the third alkaline, aqueous solutions. Metaphosphates, MPO_3, and pyrophosphates, $M_4P_2O_7$, are also known. All phosphates give a yellow precipitate on heating with ammonium molybdate in nitric acid.

phosphate printing (*Photog.*). Printing on a slow-printing paper sensitised with silver phosphate.

phosphat'ic deposits (*Geol.*). Beds containing calcium phosphate which are formed especially in areas of low rainfall, and which may be exploited as sources of phosphate. See also **guano, phosphatic nodules.**

phosphatic nodules (*Geol.*). Rounded masses containing calcium phosphate, which are found at various horizons and which represent inhibited deposition.

phosphatu'ria (*Med.*). The presence of an excess of phosphates in the urine.

phos'phides (*Chem.*). Phosphorus unites directly with many metals to form *phosphides*.

phos'phine (*Chem.*). (1) PH_3. A colourless, evil-smelling gas which usually burns spontaneously in air to form phosphorus pentoxide. It has reducing properties and precipitates phosphides from solutions of many metallic salts.—(2) Leather-yellow, impure chrysaniline, 10-*p*-aminophenyl-2-aminoacridine, obtained as a by-product in the manufacture of fuchsine.

phosphines (*Chem*). Derivatives of PH_3, obtained by the exchange of hydrogen for alkyl radicals; classified according to the extent of substitution into *primary*, *secondary*, and *tertiary phosphines*. They correspond closely to the amines, except that they are easily oxidised even in the air, that they are only feebly basic, and that the P atom has a tendency to pass from the tri- to the quinquevalent state.

phosphites (*Chem.*). Salts of phosphorous acid. Soluble in water.

phospho'nium bases (*Chem*). Compounds formed by the combination of a tertiary phosphine with an alkyl halide.

phosphonium salts (*Chem.*). The so-called phosphonium salts are formed when phosphine is brought into contact with hydrogen chloride, hydrogen bromide, or hydrogen iodide. Formed in a similar way to ammonium compounds.

phos'phopro'teins (*Chem.*). Compounds formed by a protein with a substance containing phosphorus, other than a nucleic acid or lecithin, e.g. caseinogen, vitellin.

phosphor (*Cathode Ray Tubes*). A generic name for any fluorescent substance used for coating the screen of a cathode ray tube.

phosphor-bronze (*Met.*). A term sometimes applied to alpha (low tin) bronze deoxidised with phosphorus, but generally it means a bronze containing 10-14% of tin and 0·1-0·3% of phosphorus, with or without additions of lead and nickel. Used, in cast condition, where resistance to corrosion and wear is required, e.g. gears, bearings, boiler fittings, parts exposed to sea water, etc.

phosphores'cence (*Chem.*). The greenish glow observed during the slow oxidation of white phosphorus in the air.—(*Phys.*) A glow emitted by certain substances after having been illuminated by visible or ultra-violet rays. It may be regarded as *fluorescence* (q v.) which persists after the exciting radiation has ceased.—(*Zool.*) Luminosity; production of light, usually (in animals) with little production of heat; as in Glow-worms.—*adj.* **phosphorescent.**

phosphoret'ted hydrogen (*Chem.*). See **phosphine.**

Phosphoria formation (*Geol.*). Important phosphate-bearing beds occurring in the Permian of Idaho, Wyoming, and N. Utah.

phosphor'ic acid (*Chem.*). H_3PO_4. *Orthophosphoric acid* (q.v.)

phosphorised copper (*Met*) Copper deoxidised with phosphorus. Contains a small amount (about 0·02%) of residual phosphorus, which lowers the conductivity.

phos'phorite or **rock-phosphate** (*Min.*). The fibrous concretionary variety of *apatite*.

phos'phorofluor'ic acid (*Chem*). See **hexafluorophosphoric acid.**

phos'phorous acid (*Chem.*). H_3PO_3. Formed by the action of cold water on phosphorous oxide, decomposes on heating; forms phosphites; reducing agent.

phosphorous oxide (*Chem*). P_4O_6. Poisonous; oxidises to the pentoxide on exposure to air; with cold water forms *phosphorous acid*.

phos'phorus (*Chem*). Symbol, P. A non-metallic element in the fifth group of the periodic system. At. no. 15, at. wt 31·02, valencies 3, 5. White phosphorus is a waxy, poisonous, spontaneously inflammable solid; m p. 44·1° C, b.p. 280° C, sp. gr. 1·83. Red phosphorus is non-poisonous and ignites in air only when heated above about 300° C.; m.p. 500-600° C., sp. gr. 2·20. Phosphorus is widely and abundantly distributed in minerals as phosphates, and in all living matter. It is manufactured by heating calcium phosphate with sand and carbon in an electric furnace, and is used mainly in the manufacture of matches.

phosphorus chloronitrides (*Chem.*). Formed by the interaction of phosphorus pentachloride and ammonium chloride.

phosphorus oxychloride (*Chem.*). $POCl_3$. Liquid; fumes in air; slowly hydrolysed by water, forming phosphoric and hydrochloric acids. It is formed when compounds containing a hydroxyl group are treated with phosphorus pentachloride.

phosphorus pentahalides (*Chem.*). The phosphorus pentahalides, *phosphorus pentachloride* (PCl_5), *phosphorus pentabromide* (PBr_5), and *phosphorus pentafluoride* (PF_5), are formed by the action of the dry halogen on the trihalide. The properties of the pentahalides are similar. They transform hydroxyl compounds into the corresponding halides.

phosphorus pentoxide (*Chem.*). P_2O_5; used as a drying agent for the absorption of moisture; when dissolved in water it forms phosphoric or orthophosphoric acid.

phosphorus trihalides (*Chem.*). Phosphorus trichloride (PCl_3), phosphorus tribromide (PBr_3), phosphorus tri-iodide (PI_3), and phosphorus trifluoride (PF_3).

phosphorus trioxide (*Chem.*). P_4O_6. See also **phosphorous oxide.**

phos'phoryl bromide (*Chem.*). $POBr_3$. Formed in a similar manner to phosphoryl chloride or phosphorus oxychloride.

phosphoryl chloride (*Chem.*). *Phosphorus oxychloride* (q.v.).

phosphoryl fluoride (*Chem.*). POF_3. May be made by the action of hydrofluoric acid on phosphorus pentoxide; similar in properties to the other phosphoryl compounds.

phot (*Light*). The unit of light flux, the centimetre-candle; it is the illumination produced on a surface one centimetre from a standard candle.

photo- (Greek *phōs*, gen. *phōtos*, light). A prefix used in the construction of compound terms; e.g. *photography*, *photo-sensitive*, etc.

photo-active (*Photog.*). The same as *photo-sensitive*

photo-aquatint (*Photog.*). An alternative name for *photogravure*.

photo-catalysis (*Chem*). The acceleration or retardation of the rate of a chemical reaction by light.

photo-cathode (*Photo-electric Cells*). A cathode from which electrons are emitted by the action of incident light.

photocell. Contraction for *photo-electric cell*.

photo-chemical cell (*Photo-electronics*). A photo-electric cell comprising two electrodes of similar metal, such as silver, immersed in an electrolyte. Illumination of one of the electrodes causes a P.D. to be developed between them. Also called PHOTO-ELECTROLYTIC CELL, PHOTO-VOLTAIC CELL.

photochemical equivalence (*Chem.*). See **Einstein's law of photochemical equivalence.**

photochemical induction (*Chem.*). The lapse of an appreciable time between the absorption of light by a system and the occurrence of the resulting chemical reaction.

photochemistry (*Chem.*). The study of the chemical effects of radiation, chiefly visible and ultra-violet, and of the direct production of radiation by chemical change.

photochon'dria (*Zool.*). Granules occurring in the cytoplasm of a luminous cell or animalcule.

photochro'moscope (*Photog.*). An alternative name for a *kromskop* (q.v.).

photochron'ograph (*Astron.*). An instrument for recording time photographically. It consists of a rotating drum, covered with sensitised paper, on which is recorded the movement of a spot of light controlled by either a pendulum or some other oscillator, according to the order of interval to be measured; applied astronomically *inter alia* to the analysis of the ratio of observatory clocks.

photo-composition (*Print.*). (1) A method of composing lettering for printing consisting in the projection of light images of the letters successively on to a photo-sensitive material, thus giving a photographic negative for use, particularly in surface and intaglio printing processes, in place of impressions from printer's type.—(2) A term used in America for a composite surface or intaglio printing surface made up of photographic negatives.

photo-conductivity (*Photo-electronics*). The property possessed by certain materials, such as selenium, of varying their electrical conductivity under the influence of light.

photo-current (*Photo-electronics*). The current released from the sensitised surface of a photo-electric cell on the incidence of light, the electrons which form the current being attracted to an anode polarised positively with respect to the surface. The true photo-current is augmented by the presence of gas through ionisation by collision.

photodissociation (*Chem.*). Dissociation produced by the absorption of radiant energy.

photo-elasticity (*Eng.*). The technique of determining the stress distribution in bodies under complex systems of loading by passing polarised light through a nitro-cellulose model.

photo-electric cell. Generally, any device in which the incidence of light causes an alteration in the electrical state. Specifically, any device using the principle of photo-emission.—(*Cinema.*) The light-sensitive device which receives the light from a constant exciter lamp, after this light has been modulated by the sound-track on film being passed through the projector. The consequent electric currents are amplified and operate loud-speakers behind the cinema screen.

photo-electric cell amplifier (*Cinema.*). The thermionic amplifier located in close proximity to the photo-electric cell which receives the light-beam modulated by the sound-track, when the latter passes through the sound-gate in a projector. Abbrev. **P.E.C.** (or **pec) amplifier.**

photo-electric effect (*Photo-electronics, Phys.*). The loss of negative electric charge, or acquisition of positive charge, by an insulated conductor when exposed to light. It is due to *photo-emission* (q.v.), each electron being released by one or more *photons* (q.v.).

photo-electric exposure meter (*Photog.*). A meter which incorporates a photo-electric cell as the essential device for indicating an intensity of illumination from which photographic exposures can be estimated.

photo-electric photometer (*Illum.*). A photometer in which the light from the lamp under test is measured by the current from a photo-electric cell.

photo-electricity. Electricity produced by the action of light.

photo-electrolytic cell. The same as *photo-chemical cell.*

photo-electron'ics. The science dealing with the interactions of electricity and light, especially with those which involve free electrons.

photo-electrons. Electrons ejected from the surface of a body by the action of incident light.

photo-emission (*Photo-electronics*). The emission of electrons from the surface of a body (usually an electro-positive metal) by the incidence of light.

Photoflood lamp (*Cinema*). The same as *Movie-flood lamp.*

pho'togen (*Zool.*). A light-producing or phosphorescent organ; as in some *Polychaeta.*

pho'togene (*Photog.*). The name for a sensitive emulsion, particularly a gum bichromated surface for a powder or dusting-on process.

photogen'ic (*Photog.*). Having the quality of registering photographically acceptable images.

photogenic (*Bot., Zool.*). Emitting light, light-producing; e g. *photogenic bacteria.*

pho'toglyph (*Photog.*). Photographic engraving such as photogravure.

photogram'metry (*Photog.*). The making of photographs (e.g. from the air) for survey work.

photographic barometer (*Photog.*). A formalin-hardened bromide print, coated with cobalt; used to indicate the humidity: pink in damp weather, blue in dry weather.

photographic developers (*Photog.*). Reducing agents for silver salts, usually polyhydric phenols or their derivatives.

photographic efficiency of a light source (*Photog.*). The fraction of the light energy in the emitted spectrum which is usefully registered on a photographic emulsion.

photographic memory (*Psychol.*). See **eidetic imagery.**

photographic recorder (*Cinema.*). The same as *film recorder.*

photographic recording (*Acous.*). The registering of a modulated track on photographic film, so that it can be scanned by a constant beam of light, fluctuations of which, after being converted into corresponding electric currents by a photocell, can be amplified and reproduced as sound by loudspeakers. See **photo-electric cell, sound-film.**

photographic surveying (*Surv.*). A method of surveying employing the principles of *intersection* (q.v.) by means of a special instrument called a photo-theodolite, with which a series of photographs is taken of the points whose positions are required, each point appearing in at least two different photographs.

photographic telescope (*Astron.*). An astronomical telescope in which a camera replaces the eye-piece; it is modified with regard to focal length and composition of the object glass to suit photographic rather than visual work.

photography. The art and science of making permanent images by exposing certain chemical substances to light rays, after which an actual or potential physical or chemical change can be made manifest.

See **aerial—**
colour—
instantaneous—

photogravure, —gra-vūr' (*Photog.*). Printing by means of etched copper plates, prepared by etching through a gelatine relief print of the subject, which has been transferred to the copper plate before development.

photoha'lide (*Chem.*). A halogen salt which is sensitive to light.

photo-lithography (*Photog., Print.*). A process of lithographic printing in which the original subject is photographed, and the negative printed on a grained plate sensitised with bichromated albumen and coated with ink before development, so as to produce a greasy image.

photol'ysis, *or* —lī'-zis (*Bot.*). The grouping of the chloroplasts in relation to the amount of light falling on the plant.

photolysis (*Chem.*). The decomposition or dissociation of a molecule as the result of the absorption of light.

Photom'aton (*Photog.*). An automatic photographing machine which includes automatic reversing of images taken on emulsions on paper supports.

photom'eter (*Light*) An instrument for comparing the luminous intensities of two sources of light. Most photometers employ the principle that, if equal illumination is produced on similar surfaces illuminated normally by two light sources, the ratio of their intensities equals the square of the ratio of their distances from the surfaces.

See **flicker—**
grease-spot (Bunsen)—
integrating—
Lummer-Brodhun—
photo-electric—
portable—
Trotter—
Ulbricht globe—
Weber—
wedge—

photometer bench (*Illum.*). A bench upon which is mounted the apparatus for carrying out photometric tests by comparison with a standard lamp. The apparatus consists of a mounting for the standard lamp, the photometer itself, a mounting for the lamp under test, and equipment for moving any or all of these and determining their position.

photometer head (*Light*). The unit in an optical measuring system which contains the device for making the actual balance or measurement.

photomet'ric integrator (*Illum.*). That part of an integrating photometer which actually sums up the light flux; e.g. the globe of the Ulbricht globe photometer.

photometric surface (*Light*). A surface used for photometric comparisons.

photom'etry (*Chem.*). Volumetric analysis in which the end-point of a reaction is determined by means of turbidity measurements made with the aid of photo-electric cells.

photometry (*Light*). The measurement of the luminous intensities of light sources and of luminous flux and illumination. See **photometer.**

photo-micrography (*Photog.*). The production of normal negatives and prints of objects of microscopic dimensions.

photo-montage (*Photog.*). See **montage photograph.**

photomorpho'sis (*Bot.*). A change in the structure of a plant following exposure to strong light.

photomu'rals (*Photog.*). Enlarged photographs suitable for wall decoration or for exhibitions.

pho'ton (*Phys.*). A light quantum. It may be considered as a coherent train of waves, that is, one without abrupt discontinuities of phase, or as a particle of mass $h\nu/c^2$, where ν is the frequency of vibration, h is Planck's constant, and c is the velocity of light. See **Compton effect, photo-electric effect**; also Supplement.

pho'tonas'ty (*Bot., Zool*). Response to variation in the intensity of illumination, or to the stimulus of diffuse light.

pho'topathy (*Biol*). Negative phototaxis.

photopercep'tor (*Bot.*). The part of an eye spot which is sensitive to light.

photope'riodism (*Bot.*). The response of a plant to the relative lengths of day and night as these affect the amount of light received by the plant.

photoph'ilous (*Biol.*). Light-seeking, light-loving; said of plants which inhabit sunny places.

photopho'bia (*Med.*). Intolerance of the eye to light, with spasm of the eyelids.

Pho'tophone (*Cinema.*). The trade-name for a system of sound-recording on photographic film, using the variable-area principle.

pho'tophore (*Zool*). A luminous organ of Fish.

photophore'sis (*Chem.*). The migration of suspended particles under the influence of light.

photophthal'mia (*Med.*). Electric-light ophthalmia. Burning pain in the eyes, lacrimation, photophobia, and swelling and spasm of the eyelids as a result of exposure to an intensely bright light (e.g. a naked arc light); due to the action of ultra-violet rays.

photophy'gous (*Zool.*). Shunning strong light.

pho'toplasm (*Zool.*). The photochondria-containing cytoplasm of a luminous cell or animalcule.

photop'sy, photop'sia (*Med.*). The appearance of flashes of light in front of the eyes, due to irritability of the retina

photo-radiogram (*Radio*). A still picture transmitted by radio.

photorecep'tor (*Zool.*). A sensory nerve-ending receiving light stimuli.

photo-sensitive (*Phys*). The property of being sensitive to the action of visible or invisible light, whether subsequent development is required to exhibit sensitivity or not. See **photo-electric cell, photography.**

pho'tosphere (*Astron.*). The name given to the visible surface of the sun on which sun-spots and other physical markings appear; it is the limit of the distance into the sun that we can see.

photosphere (*Zool.*). A light-producing or phosphorescent organ; as in some *Crustacea.*

pho'tostage (*Bot.*). An early stage in the development of a seedling, during which it needs a supply of light.

Pho'tostat (*Photog.*). Trade-name for photographic apparatus (also for any print made by it) designed for rapidly copying, to the required size, flat originals on sensitised paper, and giving a negative image.

photosyn'thesis (*Bot.*). The building up, in the green cells of a plant, of simple carbohydrates from carbon dioxide and water, with the liberation of elementary oxygen. The process goes on only when the plant is sufficiently supplied with light, the chlorophyll acting as an energy transformer, which enables the plant to use the light as a source of energy.

photosynthet'ic capacity (*Bot.*). The efficiency of a plant, a cell, or a chloroplast, in carrying out the process of photosynthesis.

photosynthetic number (*Bot.*). The ratio between the number of grams of carbon dioxide absorbed per hour by a unit of leaf to the number of grams of chlorophyll which that unit contains.

photosynthetic quotient, photosynthetic ratio (*Bot.*). The ratio between the volume of carbon dioxide absorbed to the volume of oxygen set free, during a given time, by plant material occupied in photosynthesis.

phototax'is (*Biol.*). Response or reaction of an organism to the stimulus of light.—*adj.* **phototactic.**

photo-telegraphy (*Teleg.*). *Facsimile telegraphy* (q.v.).

photo-theodolite (*Surv.*). A photographic camera of fixed known focal length, with horizontal and vertical cross-wires pressing tightly against the sensitive plate, on which they are photographed. It is mounted on a tripod and fitted with levelling screws, a graduated horizontal circle, and a telescope for sighting. See **photographic surveying.**

photo-therapy (*Med.*). Light treatment, i.e. the application to the body of radiant heat or ultra-violet rays for therapeutic reasons.

phototo'nus (*Bot*). The condition of a leaf which is able to respond to a stimulus, because it has received an adequate amount of light.

phototro'pism (*Biol.*). See **phototaxis.**

phototropism (*Bot*). The reaction of a plant, by growth curvatures, to light falling upon it in a given direction.

photot'ropy (*Chem.*). (1) The property possessed by some substances, e.g. the fulgides, of changing colour according to the wavelength of the incident light.—(2) The loss of the colour of a dyestuff under the influence of light of a definite wavelength.

photo-voltaic cell (*Photo-electric Cells*). See **photo-chemical cell.**

Photox cell (*Photo-electric Cells*). A copper-oxide dry photo-voltaic cell The electrodes are a disc of copper and a thin film of metal on the surface of the oxidised disc.

Photronic exposure meter (*Photog.*). An exposure meter incorporating a photronic surface of selenium, which gives rise to an electromotive force on illumination, and thus gives an indication of illumination intensity for estimating exposures.

phrag'ma (*Zool*). A septum or partition: an apodeme of the endothorax formed by the infolding of a portion of the tergal region of a somite: an endotergite.

phrag'mobasid'ium (*Bot*). A basidium which becomes septate, and is then divided into four cells.

phreatic gases, frē-at'ik (*Geol.*). Those vapours and gases of atmospheric or oceanic origin which, coming into contact with ascending magma, may provide the motive force for volcanic eruptions.

phreni- (Greek *phrēn*, diaphragm). A prefix used in the construction of compound terms; e.g. *phreni-costal*, pertaining to the diaphragm and ribs.

phren'ic (*Zool.*). Pertaining to, or situated near, the diaphragm (in Mammals).

phrenicec'tomy (*Surg.*). Excision of a part of the phrenic nerve in order to paralyse the diaphragm on the same side; done in the treatment of lung disease.

phrenicot'omy (*Surg.*). The cutting of the phrenic nerve in order to paralyse the diaphragm on one side; done in the treatment of lung disease.

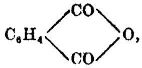
phren'osin (*Chem.*). A cerebroside obtained from the brain substance, a crystalline mass forming an amorphous anhydride. On hydrolysis it yields a fatty acid (*phrenosinic acid*), galactose, and a base (called *sphingosine*).

phthaleins, thal'-e-inz (*Chem.*). Triphenylmethane derivatives obtained by the action of phenols upon phthalic anhydride.

phthalic acid (*Chem.*). $C_6H_4(COOH)_2$, benzene-*o*-dicarboxylic acid, colourless prisms or plates, m.p. 213° C., soluble in water, alcohol, ether.

When heated above the melting-point it yields its anhydride. It is prepared technically by the oxidation of naphthalene with concentrated sulphuric acid in the presence of a small amount of mercuric sulphate.

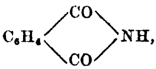
phthalic anhydride (*Chem.*).



$C_6H_4{<}\substack{CO\\ \\ CO}{>}O$, long prisms which can be sublimed, m p. 128° C., b.p. 284° C.

phthalic glyceride resins (*Plastics*). See **glyptal resins.**

phthal'imide (*Chem.*)



$C_6H_4{<}\substack{CO\\ \\ CO}{>}NH$, colourless crystals, m.p. 238° C., obtainable by passing ammonia over heated phthalic anhydride. The imide hydrogen is replaceable by Na or K.

phthiri'asis (*Med.*). Infestation with lice. See also **pediculosis.**

phthisan'er (*Zool.*). An abortive male ant which fails to complete its metamorphosis as a result of its being parasitised by *Orasema.*

phthiser'gate (*Zool*). An abortive worker ant which fails to complete its metamorphosis as a result of its being parasitised by *Orasema.*

phthisis, thī'sis (*Med.*). (1) Wasting of the body.—(2) Pulmonary tuberculosis.—*adj.* **phthisical.**

phthi'sogyne (*Zool*) An abortive queen ant which fails to complete its metamorphosis as a result of its being parasitised by *Orasema.*

phu'goid oscillation (*Aero.*). A longitudinal periodic fluctuation in speed, i.e. a velocity-modulation, in the motion of an aircraft.

phy'cocy'anin (*Bot.*). The blue pigment present in *Myxophyceae.*

phycoerythrin, fī'ko-er'— (*Bot.*). A red pigment, of protein nature, soluble in water, present in the cell sap of *Rhodophyta.*

phycol'ogy (*Bot.*). The study of *Algae.*

Phy'comyce'tes (*Bot.*). The lower Fungi, including 1000 species. The thallus ranges from a rounded sac to an ordinary mycelium, in which regular septation is unusual. Many species are aquatic, reproducing freely by zoospores, and the sexual organs, when present, are either isogametes, heterogametes, or well-defined antheridia and oögonia, or else gametangia which unite without individualisation of the gametes.

phylac'tocarp (*Zool.*). A hydrocladium bearing gonangia.

Phylac'tolae'mata (*Zool.*). An order of fresh-water *Ectoprocta* in which the lophophore is U-shaped and an epistome is present.

phylet'ic classification (*Biol.*). A scheme of plant classification based on the presumed evolutionary descent of organisms.

phyl'lary (*Bot.*). One of the involucral bracts on the outside of a capitulum.

phyllid'ium (*Zool.*). See **bothrydium.**

phyllite (*Geol.*, *Min.*). A name which has been used in several different senses : (1) for the pseudo-hexagonal platy minerals including mica, chlorite, and talc (by some French authors); (2) for argillaceous rocks in a condition of metamorphism between slate and mica-schist (by most English authors). Phyllite in the latter (usual) sense is characterised by a silky lustre due to the minute flakes of white mica which, however, are individually too small to be seen with the naked eye.

phyllobran'chia (*Zool.*). A gill composed of numerous thin plate-like lamellae.

Phyllocar'ida (*Zool.*). A division of *Malacostraca* in which the abdomen consists of seven somites, the last one being apodous ; the telson is usually provided with movable caudal furca ; an adductor muscle joins the valves of the carapace ; and the thoracic limbs are all alike—foliaceous and with a three-jointed protopodite.

phyl'locar'pic movement (*Bot.*). A curvature of the fruit stalk bringing the young fruit under the shelter of the leaves.

phyl'loclade (*Bot.*). A branch which is so flattened that it looks like a leaf, and which functions as a leaf.

phyl'locyst (*Zool.*). In some *Siphonophora,* a dilatation at the apex of a hydrophyllium.

phyllode (*Bot.*). A petiole which is flattened and leaf-like and functions as a leaf; phyllodes are often set on the plant so that they turn their edges to the direction of the brightest light.

phyllo'dy (*Bot.*). The transformation of parts of a flower into leaves.

phyllome (*Bot*). A general term for all leaves and leaf-like organs.

phyllopo'dium (*Bot*). The petiole and rachis of the leaf of a fern.

phyllopodium (*Zool.*). The thin leaf-like swimming foot characteristic of *Branchiopoda,* with broad flat exopodite and endopodite. Cf. *stenopodium.*

phyl'losiphon'ic (*Bot.*). Said of a siphonostele which has both leaf gaps and branch gaps.

phyl'lotax'is, phyl'lotax'y (*Bot.*). The arrangement of leaves on a shoot.

phyllozo'id (*Zool.*) See **hydrophyllium.**

phy'lo- (Greek *phulon,* race) A prefix used in the construction of compound terms; e.g. *phylogenesis,* the history of racial development.

phylo-epheb'ic (*Zool*) Pertaining to the period of maximum vigour of a race or species.

phylogen'esis, phy'logeny *or* —loj'en-i (*Bot.*, *Zool.*). The history of the development of a race; cf. *ontogeny.*—*adj.* **phylogenetic.**

phylogenet'ic series (*Zool.*). The complete range of organisms, extant and extinct, which shows the evolution of the higher from the lower forms. Cf. *taxonomic series.*

phylogeron'tic (*Zool.*). Said of that period in the history of a race or species which corresponds to the senescent period in the life-history of an individual.

phy'lon (*Biol.*). A line of descent.

phy'loneanic,—nē-an'ık (*Zool.*). Said of that period in the history of a race or species which corresponds to the adolescent period in the life-history of an individual.

phy'lonepion'ic (*Zool.*). Said of that period in the history of a race or species which corresponds to the embryonic period in the life-history of an individual.

phy'lum (*Zool.*). A category or group of related forms constituting one of the major subdivisions of the animal kingdom.

physical astronomy. See **astrophysics.**

physical barrier (*Biol.*). Anything which imposes a barrier to the migration of plants or animals; e.g. a sea or a high range of mountains.

physical chemistry (*Chem.*). The study of the dependence of physical properties on chemical composition, and of the physical changes accompanying chemical reactions.

physical circuit (*Teleph.*). The normal loop circuit for telephony, as contrasted with a superposed or phantom circuit.

physical optics (*Light*). That branch of the study of light dealing with phenomena, such as diffraction and interference, which are best considered from the standpoint of the wave theory of light. See **geometrical optics.**

physiog'nomy (*Bot.*). The characteristic appearance of a plant community, by which it can often be recognised at a distance. It is usually determined by the dominant plants of the community.

physiographic climax (*Bot.*). A plant community maintained at a certain stage of development by some natural feature of the habitat, such as active erosion or slow but persistent movement of the ground.

physiological (*Bot.*, *Zool.*). Relating to the functions of plant or animal as a living organism.

physiological anatomy (*Biol.*). The study of the relation between structure and function.

physiological drought (*Bot.*). The condition when a plant is unable to take in water because of low temperature, or because the water available to it holds substances in solution which hinder absorption by the plant.

physiological race (*Zool*). A group of individuals within the limits of a species but differing from other members of the species in habits (as host, larval food, etc.).

physiological variety (*Bot.*). See **biologic form.**

physiological zero (*Biol.*). The threshold temperature below which the metabolism of a cell, organ, or organism ceases.

physiology (*Bot.*, *Zool.*). The study of the manner in which organisms carry on their life processes.

physio-therapy (*Med.*). See **electro-therapy.**

phy'soclis'tous (*Zool.*). (Of fish) having no pneumatic duct connecting the air-bladder with the alimentary canal.

phy'sostig'mine (*Chem.*). Eserine, $C_{15}H_{21}O_2N_3$, an alkaloid of unknown constitution, obtained from the seeds of Calabar beans (*Physostigma venenosum*). It crystallises in two forms (*a*) m.p. 86°-87° C.; (*b*) m.p. 105°-106° C., soluble in alcohol, ether, chloroform.

physosto'mous (*Zool.*). (Of Fish) having a persistent pneumatic duct connecting the air-bladder with the alimentary canal.

phy'toben'thon (*Bot.*). Plants living at the bottom of water.

Phytomastigi'na (*Zool.*). A subclass of *Mastigophora* comprising mainly holophytic forms possessing chromatophores, rarely having more than two flagella and frequently having starch reserves; a few members are colourless and practise holozoic or saprophytic nutrition.

phy'ton (*Bot.*). (Greek *phyton*, plant.) A hypothetical plant unit composed of leaf, blade, and stalk.

phy'topathol'ogy (*Bot.*). The study of plant diseases, and especially of plants in relation to parasites.

phytoph'ilous, phytoph'agous (*Zool.*). Plant-feeding.

phy'toplank'ton (*Bot.*). Plankton consisting of plants.

phytos'terol (*Chem.*). A terpene alcohol, m.p. 137° C. It resembles closely *cholesterol* (q.v.).

phytot'omy (*Bot.*). See **anatomy.**

pi-network (*Elec. Comm.*). See **π-network** (p. 608).

pi'a ma'ter (*Zool.*). In Vertebrates, the innermost of the three membranes surrounding the brain and spinal cord, a thin vascular layer.

pian, pi-an' (*Med.*). See **yaws.**

Pianotron (*Acous.*). A piano in which the normal vibration of the strings is used to modulate the potential applied to electrostatic screw pick-ups, with subsequent amplification and radiation by loudspeaking receivers.

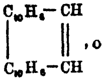
piano whine (*Acous.*). A peculiar defect in gramophone recording caused by sudden variations in the turntable speed due to the large amplitudes occurring in piano music.

piazza, pi-at'za (*Arch.*). (1) An enclosed court in a building.—(2) A colonnade or arcade.

pi'ca (*Med.*). An unnatural craving for unusual articles of food.

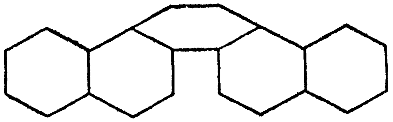
pica (*Typog.*). The old name for a type-size now standardised as 12-point. The pica em is a unit of measurement; it is equal to $\frac{1}{6}$ in.

pi'cene (*Chem.*). $C_{22}H_{14}$, a complicated hydrocarbon, obtained from the coal-tar fraction boiling above 360° C. It has the formula:



$$\begin{array}{l}C_{10}H_6-CH\\ \quad| \qquad\quad \| \\ C_{10}H_6-CH\end{array}$$

, or



pick (*Tools*). A double-headed tool, pointed at both ends, having the handle fastened into the middle of the head (as in a hammer); used for rough digging by quarrymen, road builders, etc.

pick (*Weaving*). See under **weft.**

pick-and-pick (*Weaving*). A term indicating alternate picks of yarns of two different colours or kinds.

pick-at-will (*Weaving*). A mechanism which enables the shuttle from any box to be thrown through a shed.

pick-axe (*Tools*). A tool similar to a pick but having one end edged so that it may cut.

picklock (*Textiles*). The term applied by wool-sorters to the best sort of wool from a fleece.

pick-up (*Acous.*) The reproducing device holding the needle which follows the track on a disc gramophone record.

See **balanced armature— carbon— condenser— electromagnetic— needle—**

pick-up (*Elec. Comm.*). See **a.c. pick-up.**

pick-up well (*Automobiles*). A small petrol reservoir arranged between the metering jet and the spraying tube in some carburettors; it provides a temporarily enriched mixture during acceleration.

Pick's bundle (*Zool.*). A tract of fibres in the medulla oblongata of higher Vertebrates.

Pick's disease (*Med.*). Concato's disease.

picker (*Weaving*). The specially designed implement of leather or textile material which propels the shuttle across a loom.

picker leather (*Leather*). A leather which has been specially prepared for making picker bands (see **picker**).

pick'eringite (*Min.*). Magnesia alum. Hydrated sulphate of aluminium and magnesium, crystallising in the monoclinic system. It usually occurs in fibrous masses, and is formed by the weathering of pyrite-bearing schists.

picket (*Build.*). A narrow upright board in a fence; frequently pointed at the top.

picket (*Surv.*). A short ranging rod about 6 ft. long.

picking (*Textiles*). The operation of removing from the face of a cloth extraneous matters such as hairs, slubs, kemps, etc., by means of burling irons.

picking (*Weaving*). The operation of throwing the shuttle across a loom through the shed formed in the warp threads; it travels along a raceboard, guided by the reed.

picking-up (*Carp.*). Said of wood which on being cut leaves a *fluffy* (q.v.) surface.

pickling (*Eng.*). The process of removing a coating of scale, oxide, tarnish, etc., from metal objects, so as to obtain a chemically clean surface; effected by immersing in an acid bath.

pickling (*Leather*). The treatment of light skins with a dilute solution of sulphuric acid and salt, after dehairing.

picksman (*Mining*). A man who gets coal by hand, not by machine.

Pickwell Down Sandstones (*Geol.*). A series of sandstones found in North Devon and West Somerset; grouped among the Upper Devonian rocks.

pico-farad, pē'ko (*Elec. Eng.*). The same unit as *micro-micro-farad* (q.v.).

pic'olines (*Chem.*). Methyl-pyridines, $CH_3\cdot C_5H_4N$. The three isomers are *α*-picoline, b.p. 129° C.; *β*-picoline, b.p. 142°-143° C.; *γ*-picoline, b.p. 144°-145° C.

pic'otite (*Min.*). A dark-coloured spinel containing iron, magnesium, and chromium.

picric acid (*Chem.*). $C_6H_2(NO_2)_3OH$, 2,4,6-trinitrophenol, yellow plates or prisms, m.p. 122° C., made by nitrating phenol; slightly soluble in water. It is a strong acid and dyes wool and silk yellow. Used for the preparation of explosives; lyddite or melinite is compressed or fused picric acid.

picrite (*Geol.*). A general name for ultramafic coarse-grained igneous rocks, consisting essentially of olivine and other ferromagnesian minerals, together with a small amount of plagioclase.

picrite-basalt (*Geol.*). An unsatisfactory name —used in current geological literature, however— for basalts particularly rich in mafic minerals, thus bearing the same relationship to normal basalts that picrites bear to normal gabbros.

Pictou cattle disease (*Vet.*). Cirrhosis of the liver of horses and cattle, due usually to chronic poisoning through consumption of plants of the *Senecio* group.

picture-chasing circuit (*Television*). A circuit, used in conjunction with intermediate film-scanning systems, in which the film is continuously moving.

picture cycle (*Cinema*). The complete sequence of events during the displacement of one frame and the displacement of the next in a camera or projector.

picture element (*Television*). Any one of the large number of minute uniformly illuminated areas which go to make up a television image. Also called PICTURE POINT.

picture frequency (*Television*). See **frame frequency.**

picture head (*Cinema.*). That part of the projector mechanism which includes the intermittent motion for projecting the picture frames on the screen.

picture point (*Television*). See **picture element.**

picture rail (*Join.*). A decorative moulding around the walls of a room near the ceiling; provided as a means of support for the hanging of pictures.

picture ratio (*Television*). The ratio of the height to the width of a television image.

picture signal (*Television*). That portion of a television signal which carries the information relative to the picture itself, as distinct from the synchronising portions. Also called VIDEO SIGNAL.

picture telegraphy (*Teleg.*). The same as *facsimile telegraphy.*

picture track (*Cinema.*). The part of the width of a sound-film print which is allocated to the picture frames. See **mute** and **sound-track.**

picture traversing circuit (*Television*). The circuit associated with the frame frequency generator which causes the slower of the two motions of the scanning spot.

Pidgeon machine (*Elec. Eng.*). An improved form of the Wimshurst machine having special features, such as embedded sectors.

pie (*Typog.*). To upset type-matter accidentally.

piece (*Artillery*). An artillery weapon is frequently referred to as a *piece of ordnance.* See **ordnance.**

pieces (*Textiles*). Staples, from different types of fleece, accumulated during sorting and sold as mixed lots or otherwise.

piece cart (*Textiles*). A piece of apparatus in which lengths of woollen and worsted fabrics are placed, in the metal-lined paper process of finishing, to be subjected to pressure.

Piedmont glacier, pēd'mont (*Geol.*). A glacier of the ' expanded foot ' type; one which, after being restricted within a valley, spreads out on reaching the flat ground into which the latter opens.

Piedmont gravels (*Geol.*). Accumulations of coarse breccia, gravel, and pebbles brought down from high ground by mountain torrents and spread out on the flat ground where the velocity of the water is checked. Literally, mountain-foot gravels, typical of the outer zone of arid areas of inland drainage such as the Lop Nor Basin in Chinese Turkestan.

piedmontite, pēd'— (*Min.*). A silicate of calcium, aluminium, manganese, and hydrogen, crystallising in the monoclinic system. Also called MANGAN-EPIDOTE.

piedroit, pi-ā-drwa' (*Build.*). A pier projecting from a wall but having neither cap nor base. Cf. *pilaster.*

piend, pēnd (*Build.*). An *arris* (q.v.).

piend check (*Masonry*). The rebate cut along a lower corner of a stone step to enable it to sit upon the step below.

piend rafter (*Carp.*). A hip rafter.

Pieper system (*Elec. Eng.*). See **automixte system.**

pier (*Build.*). (1) The part of a wall between doors and windows.—(2) A *buttress* (q.v.).

pier (*Civ. Eng.*). (1) A breakwater adapted for service as a landing.—(2) A support for an arch, bridge, etc.

pier arch (*Civ. Eng.*). An arch carried on piers.

pier template (*Civ. Eng.*). A stone slab laid on a brickwork pier to ensure that the load is distributed over the full area of the pier.

pierre perdue, pi-ār' per-du' (*Civ. Eng.*). Work consisting of stone blocks deposited at random to form a foundation; e.g. in some breakwater construction.

piezo-, pī-ē'zo (Greek *piczein,* to press). A prefix used in the construction of compound terms; e.g. *piezochemistry* (q v.).

piezochemistry (*Chem.*). The study of the effect of very high pressures on chemical reactions.

piezo-electric crystal (*Radio*). A crystal of quartz, tourmaline, Rochelle salt, or other piezo-electric substance, ground to particular dimensions and cut in a particular orientation with respect to the crystallographic axes; used as an oscillating or resonating standard of frequency.

piezo-electric effect (*Elec. Comm., Phys., Radio*). The phenomenon exhibited by certain crystals (see **piezo-electric crystal**) of expansion along one axis and contraction along another when subjected to an electric field. The converse effect, whereby mechanical strains produce opposite charges on different faces of the crystal, also obtains. The effect is the basis of operation of the piezo-electric resonator, piezo microphone, etc.

piezo-electric resonator (*Radio*). A piezo-electric crystal used as a resonating standard of frequency, in the same manner as a circuit made up of a fixed inductance shunted by a fixed condenser.

piezo microphone (*Acous.*). A microphone in which the generated electromotive force is dependent on the piezo effect in a Rochelle salt crystal unit; made in such a way that the minute acoustic pressures are mechanically transformed by a bending action.

piezo receiver (*Acous.*). A head-telephone receiver, usually grouped in pairs, in which the diaphragm is driven electrostatically through the medium of a Rochelle salt crystal, as in a piezo microphone.

pig (*Glass*). An iron block laid against the pot mouth as a support for the blowing iron.

pig (*Met.*). A mass of metal (e.g. cast-iron, copper, or lead) cast in a simple shape for transportation or storage, and subsequently remelted for purification, alloying, casting into final shapes, or into ingots for rolling.

pig bed (*Met.*). A series of moulds for iron pigs, made in a bed of sand. Connected to each other and to the tap hole of the blast-furnace by channels, along which the molten metal runs.

pig boiling (*Met.*). See **puddling.**

pig iron (*Met.*). The crude iron produced in the blast furnace and cast into pigs, which are used for making steel, cast-iron, or wrought-iron. Principal impurities are carbon, silicon, manganese, sulphur, and phosphorus. Composition varies according to the ores used, the smelting practice, and the purpose for which the iron will be used.

pig-lug (*Plumb.*). A *dog's ear* (q.v.).

pigtail (*Elec. Eng.*). The short length of flexible conductor connecting the brush of an electric machine to the brush-holder.

pigeon-holed (*Build.*). Said of a wall built with regular gaps in it (e.g. a *honeycomb wall*, q.v.).

pigeonite (*Min.*). One of the pyroxenes, intermediate in composition between clino-enstatite and diopside. It is a mixture of two molecules: a silicate of iron and magnesium, and a silicate of calcium and magnesium. Named from Pigeon Point, Minnesota.

pigment (*Paint., etc.*). See **base.**

pigment cell (*Zool.*). A cell containing pigment granules, usually a connective-tissue corpuscle; a chromatophore.

pigment process (*Photog.*). Any process which involves pigment suspended in a tissue, which may be partially dissolved away to form the required image.

pig'mentary colours (*Zool*). Colours produced by the presence of drops or granules of pigment in the integument, as in most Fish. Cf. *structural colours.*

pigmento'sa (*Bot.*). The pigmented part of an eye-spot.

pi'la (*Zool.*). A pillar-shaped structure; as the *pilae antoticae*, pillars of cartilage in the developing chondrocranium.

pilas'ter (*Build.*). A square pier projecting from a wall, having both a cap and a base. Cf. *piedroit.*

pilaster strip (*Build.*). A pilaster without a cap.

Pilcher's Stoprot (*Build.*). A trade-name for a timber preservative.

pile (*Civ. Eng.*). A column or sheeting which is sunk into the ground to support vertical loading or to resist lateral pressures.

pile bridge (*Civ. Eng.*). A bridge whose superstructure is carried on piles.

pile cap (*Civ. Eng.*). (1) A horizontal beam connecting the heads of piles driven in a row.—(2) A *dolly* (q.v.).

pile-drawer (*Civ. Eng.*). An appliance for extracting driven or partly driven piles from the ground.

pile-driver (*Civ. Eng.*). A framed construction erected above the spot where a pile is to be driven into the ground. It is provided with a heavy weight which runs in upright guides and is so arranged that it may fall by gravity on to the head of the pile and drive it in. Also called PILE FRAME.

pile hoop (*Civ. Eng.*). An iron or steel band fitted around the head of a pile to prevent brooming.

pile pier (*Civ. Eng.*). A pier which is supported upon piles.

pile shoe (*Civ. Eng.*). The iron or steel point fitted to the foot of a pile to give it strength to pierce the earth and so assist driving.

pile (*Med.*). See **haemorrhoid.**

pile (*Met.*). A number of wrought-iron bars arranged in an orderly pile which is to be heated to a welding heat and rolled into a single bar.

pile of plates (*Light*). A device for producing plane-polarised light. It consists of a number of parallel glass plates in contact with each other and arranged so that light is reflected from them at the polarising angle—55° for glass.

pile (*Textiles*). A covering on the surface of a fabric, formed by threads that stand out from it. Pile in the form of loops is termed *loop pile* or *terry*; if the loops are cut, it is termed *cut pile*. The latter type is also produced by weaving two or more cloths together face to face, and then cutting them apart.

pileate, pī'le-āt (*Bot.*). (1) Shaped like a cap.—(2) Having a pileus.—(*Zool.*) Crested.

pile'um (*Zool.*). In Birds, the top of the head.

pileus, pī-lē'us (*Bot.*). The widened cap-like portion of an agaric: by extension, the corresponding part of the fruit body of other fungi.

pileus (*Meteor.*). See **cap.**

pilid'ium (*Zool.*). A helmet-shaped larval form of some *Nemertea*, having a prominent apical tuft of cilia and a pair of lateral ciliated lappets.

pi'lifer (*Zool*). One of a pair of lateral projections of the labrum, found in some families of *Lepidoptera.*

pilif'erous (*Bot*). Ending in a delicate hair-like point.

piliferous layer (*Bot.*). The outermost cell layer of a young root, corresponding to the epidermis of a stem. It bears the root hairs.

pi'liform (*Bot*). Resembling a long, zigzag hair.

piling-up (*I.C. Engs.*). Deposition of liquid petrol in the induction manifold of a petrol-engine, due to the engine's being motored round at a small throttle opening (as during the dive of an aircraft), thus leading to an over-rich mixture on opening up.

pillar (*Build.*). A detached column or pier for the support of a superstructure.

pillar (*Elec. Eng.*). A structure of pillar form for containing switch or protective gear. Also called a SWITCHGEAR PILLAR.

See **distribution— terminal— feeder—**

pillar (*Horol.*). Any cylindrical pieces of brass or steel which act as distance pieces to hold the plates of a clock or watch in their correct relative position.

pillar drill (*Eng.*). A drilling machine in which the spindle and table are supported by brackets carried by a pillar, the table bracket usually being slidable thereon.

pillar plate (*Horol.*). In a clock or watch, the plate to which the pillars are fixed.

pillow distortion (*Photog.*). A defect in a photographic lens system characterised by a bending inwards of parallel lines in the image. See **pincushion distortion.**

pillow lava (*Geol.*). A lava-flow exhibiting pillow structure.

pillowphone (*Acous.*). A telephone receiver, concealed in a pillow, for reproducing, without sound radiation, broadcast programmes for a listener.

pillow structure (*Geol.*). A term applied to lavas consisting of ellipsoidal and pillow-like masses which have cooled under submarine conditions. The interspaces between the pillows consist, in different cases, of chert, limestones, or volcanic ash.

pi'locar'pine (*Chem.*). $C_{11}H_{16}O_2N_2$, an alkaloid of the glyoxaline group, obtained from jaborandi leaves (*Pilocarpus* species). It is a colourless oil, b.p. 260° C. (5 mm.), soluble in water, alcohol, chloroform, but almost insoluble in ether and light petroleum.

pi'lomo'tor (*Anat.*). Causing movements of hair.

pi'lose (*Bot.*). Bearing a scattering of simple, moderately stiff hairs.

pilot (*Aero.*). The person who actually operates the flying controls of an aircraft.

pilot (*Elec. Eng.*) In power systems, a conductor used for auxiliary purposes, not for the transmission of energy. Also called PILOT-WIRE.

pilot balloon (*Meteor.*). A small rubber balloon, filled with hydrogen, used for determining the direction and velocity of air currents at high altitudes. The balloon is observed by means of a theodolite after being released from the ground.

pilot carrier (*Radio*). In a suppressed carrier system, such as is used in single sideband working, a small portion of the original carrier wave transmitted to provide a reference frequency with which the local oscillator at the receiving end may be synchronised.

pilot cell (*Elec. Eng.*). A cell of a battery upon which readings are taken in order to give an indication of the state of the whole battery.

pilot cloth (*Textiles*) A heavily milled fabric, with a raised nap, made from fine merino wools; used for uniforms, overcoatings, etc.; lower qualities are mixtures of wool and cotton.

pilot controller (*Elec. Eng.*). A *master controller* (q.v.).

pilot engine (*Rail.*). A separate locomotive preceding a train as a precaution against accidents to the latter.

pilot lamp (*Illum.*). A small lamp connected to a circuit, such as an electric cooker, to indicate when the circuit is alive.—(*Teleph.*) A lamp which indicates that one of a group of circuits is requiring attention; also called PILOT SIGNAL.

pilot nail (*Carp.*). A temporary nail used in fixing shuttering.

pilot pins (*Cinema.*). In a film printer, the detachable pins which are changed over when a double-coated positive is being exposed for the second time.

pilot (or **relay**) **valve** (*Eng.*). A small balanced valve, operated by a governor or by hand, which controls a supply of oil under pressure to the piston of a *servomotor* (q.v.) or relay connected to a large control valve, which it is desired to operate.

pilot voltmeter (*Elec. Eng.*). A voltmeter used in a power station or substation to indicate the voltage at the remote end of a feeder to which it is connected by means of a pilot.

pilot wave (*Elec. Comm.*). A carrier oscillatory current or voltage which is independently amplified in a high-efficiency amplifier independently of the side-frequencies, which are added subsequently.

pilot wire (*Elec. Comm.*). In a multi-core transmission cable, a wire which is solely concerned with detecting deterioration of the main insulation of the cable.—(*Elec. Eng.*) See **pilot.**

pi'lotaxit'ic texture (*Geol.*). The term applied to the groundmass of certain holocrystalline andesitic lavas in which there is a felt-like interweaving of feldspar microlites. Cf. *hyalopilitic texture.*

Piltdown deposits (*Geol.*). A series of gravels found on the South Downs in Southern England, from which remains of the Piltdown Man (*Eoanthropus dawsoni*) were excavated.

pime'lic acid (*Chem.*). HOOC·$(CH_2)_5$·COOH, a saturated dibasic acid of the oxalic acid series, crystals, m.p. 105° C.

pimple (*Acous.*). A defect in a gramophone record caused by a dent in the stamper, the dent being due to some hard impurity in the record stock.

pin (*Carp., Join., etc.*). (1) A small wooden peg or nail.—(2) The male part of a dovetail joint.

pin barrel (*Horol.*). A cylindrical piece on the periphery of which are short vertical pins for lifting the hammers in a chiming clock, or for lifting the comb in a musical clock.

pin cop (*Cotton Spinning*). A small cop or package of yarn made of suitable size for a loom shuttle.

pincushion distortion (*Light*). A type of distortion produced by a lens by which the image of a square appears with sides curved inwards, giving a shape similar to a pincushion. The defect is caused by placing a stop on the image side of a lens suffering from spherical aberration. See **barrel distortion, pillow distortion.**

pin-eyed (*Bot.*). Having the throat of the corolla more or less closed by a stigma shaped like a pin head; applied to the primrose and its relatives.

pin hinge (*Join.*). A form of butt hinge which has a removable pin connecting the two leaves.

pinhole photography (*Photog.*). Photography involving the use of a pinhole instead of a lens to form an image on a camera plate.

pinholes (*Hosiery*). In knitted fabrics, defects, such as irregular texture, which may be due to the use of too dry or inelastic yarns.

pinholes (*Photog.*). A photographic defect during development, whereby air-bells or dust particles prevent access of developer to the emulsion, causing lack of density.

pinholing (*Paint.*). A varnishing defect in which the surface becomes pitted with small holes.

pin insulator (*Elec.*). An insulator which is supported from the cross-arm by a pin. Suitable up to 33 kV.

pin joint (*Struct.*). A joint between members in a structural framework in which moments are not transmitted from one member to another.

pin knot (*Carp., etc.*). A knot which does not exceed ½in. in diameter.

pin mark (*Typog.*). A mark near the top of the type shank, made in casting.

pin pallet escapement (*Horol.*). An escapement in which the pallets are vertical pins of steel or jewels. The impulse is derived entirely from the teeth of the escape wheel. Used extensively for inexpensive watches, alarm clocks, and small drum movements.

pin rail (*Join.*). A wooden rail fitted with pegs for the hanging of hats and coats.

pin tongs (*Horol.*). Small hand-vices with a split draw-in chuck.

pin wheel (*Horol.*). A wheel having pins, fixed at right-angles to the plane of the wheel, which lift the hammer of a striking clock.

pin wheel escapement (*Horol.*). An escapement, used in turret clocks, in which semicircular or D-shaped pins standing at right-angles to the plane of the wheel give impulse to the pallets. The action of the escapement is similar to that of the dead-beat.

pinac'ocytes (*Zool.*). The flattened epithelial cells forming the outer part of the dermal layer in Sponges.

pin'acoid (*Crystal.*). An open crystal form which consists of two parallel faces.

pinac'oline (*Chem.*). CH_3·CO·$C(CH_3)_3$, methyl *tertiary* butyl ketone, produced by the action of dilute sulphuric acid upon *pinacone* (q.v.). A colourless liquid, b.p. 106° C., sp. gr. 0·800 at 16° C.

pin'acone (*Chem.*). $(CH_3)_2$:C(OH)·C(OH):$(CH_3)_2$, tetramethyl-ethylene glycol, crystallises with 6 H_2O. The anhydrous substance has a m.p. 38° C., b.p. 172° C., and is obtained by the reduction and condensation of acetone by the action of metallic sodium. Pinacone forms *pinacoline* (q.v.) by the elimination of water and intramolecular transformation in the presence of dilute acids. It is the simplest member of a series of tetra alkyl glycols known as *pinacols.*

pin'atype (*Photog.*). A process involving the differential dyeing of soft portions of the gelatine portions of the image.

pincers (*Zool.*). Claws adapted for grasping; as chelae, chelicerae.

pinch (*Acous.*). An effect due to the variation in the width of the groove cut by a stylus in gramophone recording; the tip of the round reproducing needle rises in the groove when it crosses the mean track.

pinch effect (*Elec. Eng.*). A constriction which occurs when a liquid conductor such as mercury or molten metal is made to carry a heavy current; it is caused by the magnetic attraction between adjacent elements of the conductor.

pinched post (*Paper*). A size of writing paper, 14¾ × 18½ in.

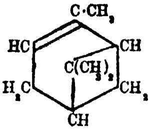
pi'neal eye (*Zool.*). See **parapineal body.**

pineal gland (or **body**) (*Zool.*). In Vertebrates, a dorsal outgrowth of the roof of the thalamencephalon arising between the habenular ganglion and the posterior commissure.

pinealec'tomy (*Surg.*). Surgical removal of the pineal gland.

pinealo'ma (*Med.*). A tumour of the pineal gland.

pi'nene (*Chem.*). There are four terpenes known as pinenes. α-Pinene, $C_{10}H_{16}$, is the chief constituent of turpentine, eucalyptus, juniper oil, etc.; b.p. 146° C. It has the formula:



It forms a hydrochloride, $C_{10}H_{17}Cl$, a white crystalline mass, of camphor-like odour, m.p. 131° C. As it contains a double bond it forms a dibromide which can be converted into a glycol.

pinguecula, pin-gwek'— (*Med.*). A yellow, triangular patch on the conjunctiva covering the sclera, occurring usually in elderly people.

pinion (*Eng.*). The smaller of a pair of high-ratio toothed spur-wheels.—(*Horol.*) A small-toothed wheel, which normally has less than 12 teeth (leaves). In a clock or watch the pinions act as followers.

pinion leaf (*Horol.*). A tooth of a pinion.

pinion wire (*Horol.*). Steel or brass wire drawn to the section of a pinion.

pin'ite (*Min.*). A hydrous silicate of aluminium and potassium which is usually amorphous. It is an alteration product of cordierite, spodumene, feldspar, etc., approximating to muscovite in composition.

pink disease (*Med.*). See **erythroedema.**

pink-eye (*Med.*). Acute mucopurulent conjunctivitis (the inflammation of the conjunctiva making it red), due to infection with various bacteria.—(*Vet.*) See **influenza (equine).**

pinking (*I.C. Eng.*). See **knocking.**

pinking (*Jewel.*). A method of changing colourless, yellow, or brown precious stones to red by exposure to heat.

pinna (*Bot.*). (1) A leaflet, when part of a pinnate compound leaf.—(2) A branch of a thallus, when these are arranged in opposite rows.

pinna (*Zool.*). In Fish, a fin: in Mammals, the outer ear: in Birds, a feather or wing.

pinnate (*Bot.*). (1) Said of a compound leaf having leaflets arranged in two ranks, one on each side of the rachis.—(2) Said of a thallus having branches arranged on each side of a middle axis.

pinnate (*Zool.*). Feather-like: bearing lateral processes.

pinnat'ifid (*Bot.*). Said of a leaf-blade which is cut, about half-way towards the midrib, into a number of pinnately arranged lobes.

pinnat'iped, pinn'iped (*Zool.*). Having the digits of the feet united by flesh or membrane. Cf. *fissiped.*

pinnat'isect (*Bot.*). Pinnatifid but with the cuts reaching nearly to the midrib.

pinning-in (*Masonry*). The operation of inserting small splinters of stone in the joints of coarse masonry.

pinnule (*Bot.*). One of the lobes or segments when a leaflet of a pinnate leaf is itself more or less divided into parts in a pinnate manner.

pinnule (*Zool.*). One of the branchlets borne by the arms in *Crinoidea.*

pino'leum blind (*Build.*). An outside blind composed of narrow splines of cane or pine woven into a fabric; used as a protection from the sun.

Pinskey Gill Beds (*Geol.*). A series of grits and shales found in Westmorland; they constitute the oldest beds in the Carboniferous System in this district.

pinta (*Med.*). Caraate. Mal de los pintos. A contagious skin disease, characterised by patches of coloured pigmentation; probably due to infection with various fungi; occurs in tropical America.

pintle (*Eng., etc.*). (1) The pin of a hinge.—(2) The king pin of a wagon.—(3) An iron bolt on which a chassis turns.—(4) One of the metal braces on which a rudder swings, supported by a *dumb-pintle* at its heel.—(5) The plunger or needle of an oil-engine injection valve, opened by oil pressure on an annular face, and closed by a spring.

pintle chain (*Eng., etc.*). A sprocket chain.

Pioneer (*Plast.*). A proprietary plaster setting with a hard face.

pioneer community (*Bot.*). The first plant community to become prominent on a piece of ground which has been stripped of its vegetation and is being reoccupied by plants.

pioneer species (*Bot.*). A species of which the members tend to be among the first to occupy bared ground; these plants are often intolerant of competition, and especially of shading, and may be crowded out as the community develops.

pi'onnote (*Bot.*). A continuous layer of fungal spores, often slimy.

pi'oscope (*Chem.*). An instrument in which the fat content of milk is estimated colorimetrically.

pipe. A tube for the conveyance of fluids.

pipe (*Acous.*). A musical instrument, mainly used in organs, in which the note is produced by longitudinal resonance of an air column when excited by an edge-tone at one end. The timbre of the emitted note depends on the scale, taper, and material of the pipe, since these determine the relative responses to overtones.

See **closed— open— reed—**
flue— pitch— stopped organ—

pipe (*Horol.*). A tubular boss or extension.

pipe (*Met.*). A conical cavity formed in the top central portion of ingots. It arises because the solid occupies less volume than the molten metal and solidification proceeds from the sides and bottom towards the top and centre, where the effects of the liquid-solid contraction are concentrated.

pipe coupling (*Plumb.*). A short collar with female threads at both ends into which screw the ends of successive lengths of piping which are to be connected co-axially.

pipe moulding (*Foundry*). The production of cast-iron pipes either by moulding in green sand, using split patterns, or by the process of *centrifugal casting* (q.v.).

pipe resonance (*Acous.*). Acoustic resonance of a pipe when the length, allowing for a constant end-correction, is an integral number of half-wavelengths when it is open at both ends, and odd multiples of a quarter-wavelength when it is closed at one end.

pipe resonator (*Acous.*). An acoustic resonator in the form of a pipe, which may be open at one or both ends, as in organ pipes, or entirely closed. Resonance arises from the stationary waves set up by a plane-progressive wave being reflected at the ends, open or closed.

pipe stopper (*San. Eng.*). An expanding form of drain plug for closing the outlet of drain pipes which are to be tested.

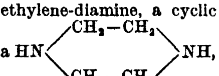
pipe-ventilated (*Elec. Eng.*). Said of an electric machine so constructed that a supply of ventilating air can be drawn from and returned to a source at some distance from the machine itself; used where the surrounding air is too dirty for ventilating purposes.

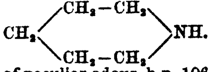
pipe work (*Acous*). The collection of pipes in ranks in an organ.

pipe wrench (*Plumb*). A tool adapted to turning a pipe or rod about its axis. Also called a CYLINDER WRENCH.

pipeclay (*Geol.*). A white clay, nearly pure and free from iron, occurring in England (in the Eocene Reading and Bagshot Beds and in the Miocene Bovey Tracey Beds) in thin laminae, but occasionally in deposits extensive enough to be exploited in the pottery industry.

pipeless organ (*Acous.*). A musical instrument, operated by a normal console, in which the emitted sounds are generated by a loudspeaker, the driving currents being synthesised, by the manuals, pedals, and registers, from fundamental frequencies generated by electrostatic, electromagnetic, mechanical, photo-electric, or other electronic means. Such organs may generate sounds not normally obtainable from pipe organs, such as harpsichord tones or bells.

piper'azine (*Chem.*). Diethylene-diamine, a cyclic compound of the formula  colourless crystals, m p. 104° C., b.p. 145° C. It is a strong base and has the property of forming with uric acid salts which are easily soluble in water; it is therefore used in medicine.

piper'idine (*Chem.*). $C_5H_{11}N$, a heterocyclic reduction product of pyridine, having the formula  It is a colourless liquid, of peculiar odour, b.p. 106° C. It is soluble in water and alcohol, has strong basic properties, and forms salts. It is a secondary amine, and the imino hydrogen is replaceable by alkyl or acyl radicals.

pip'erine (*Chem.*). An optically inactive alkaloid occurring in pepper, $C_5H_{10}N{\cdot}C_{12}H_9O_3$, piperylpiperidine, which crystallises in prisms, m.p. 129° C.

pip'eronal (*Chem.*). $CH_2O_2{:}C_6H_3{\cdot}CHO$, methyleneprotocatechuic aldehyde, a phenolic aldehyde of very pleasant odour, used as a perfume under the name of HELIOTROPIN.

pipette' (*Chem.*). Laboratory apparatus consisting of a glass tube which is calibrated to deliver a measured amount of a liquid. The liquid is usually drawn into the tube by suction.

pipless lamp (*Illum.*). An electric lamp in which the sealing-off tip of the bulb is inside the cap.

piqué, pē-kā (*Textiles*). A cotton fabric of good quality which has a plain face weave and has cords running across from selvedge to selvedge. Used for men's dress waistcoats, dress ties, etc.

pirn (*Weaving*). A small wooden bobbin which fits the shuttle of a loom and carries weft.

piroplasmo'sis (*Vet.*). Infection of the blood of animals by the unicellular protozoan, *Piroplasma.*

Pirquet's reaction, pĕr-kā (*Med.*). The reaction of scarified skin to the presence on it of tuberculin; a local inflammatory swelling—positive reaction—indicates that a tuberculous lesion, not necessarily active, exists in the body.

Pisces, pis'ēz (*Astron.*). Fishes. Twelfth sign of the *Zodiac* (q.v.).

Pisces (*Zool.*). A class of aquatic *Craniata* breathing by gills, having a biting mouth with well-developed jaws, paired fins, and a skeleton largely composed of bone; a bony gill-cover is always present. Bony Fishes.

piscic'olous (*Zool.*). Living within a Fish, as certain parasites.

pisciv'orous (*Zool.*). Fish-eating.

pisé de terre, pē-zā de tār (*Build.*). A kind of cob wall used sometimes in cottage construction, the cob usually being moulded between forms.

pisiform, piz'—(*Zool.*). Pea-shaped; as one of the carpal bones of Man.

pi'solite (*Geol.*). A type of limestone built of rounded bodies similar to oöliths, but of less regular form and 2 mm. or more in diameter. See **Pea Grit.**

pisolit'ic (*Geol.*). A term descriptive of the structure of certain sedimentary rocks containing pisoliths (see **pisolite** above). Calcite-limestones, dolomitic limestones, laterites, iron-ores, and bauxites may be pisolitic.

pis'tacite (*Min.*). Epidote.

pistil (*Bot.*). See **gynaeceum.**

pis'tillar (*Bot.*). Club-shaped.

pis'tillate (*Bot.*). Said of a flower which has a gynaeceum, but in which the stamens are lacking or non-functional.

pistillid'ium (*Bot.*). Archegonium.

pis'tillode (*Bot.*). An abortive or non-functional pistil.

pistil'lum (*Zool.*). In *Siphonophora*, the central tube of an aurophore.

pistol (*Small Arms*). A weapon which can be discharged with one hand. See **revolver.**

piston. A cylindrical metal piece which moves or reciprocates in a cylinder, either under fluid pressure, as in engines, or to displace or compress a fluid, as in pumps and compressors. Leakage is prevented by spring rings, leather packing, hat leather, etc. See **bucket** (1), **hat-leather packing, piston ring, plunger, slipper piston, trunk piston.**

piston (*Acous.*). (1) In brass musical instruments, a valve mechanism which alters the effective length of the resonating air-column and thereby permits the voicing of extra notes in the scale.—(2) A push key arranged with others in a row between the manuals on an organ console. It is for operation by the thumb, so that a combination of stops, previously selected on a commutator board, can be operated simultaneously. See **toe piston.**

piston mechanism (*Bot.*). A device, found in some flowers, in which the pollen is shed into a tube from which it is pushed by the style, thus coming into contact with an insect visitor.

pistonphone (*Acous.*). A device in which a rigid piston is vibrated, so that, by measurement of its motion, acoustic pressures and velocities can be calculated.

piston pin (*I.C. Engs.*). See **gudgeon pin.**

piston ring (*Eng.*). A cast-iron ring, of rectangular section, fitted in a circumferential groove in a piston, and springing outward against the cylinder wall to prevent leakage. It is cut through at one point to increase its springiness and allow of fitting. See **junk ring, mitre-cut piston ring, scraper ring.**

piston rod (*Eng.*). The rod connecting the piston of a reciprocating engine with the crosshead.

piston rod gland (*Eng.*). The gland in the stuffing box in the cylinder end of an engine through which the piston rod passes.

piston slap (*I.C. Engs.*). The light knock caused by a worn or loose piston slapping against the cylinder wall when the connecting-rod thrust is reversed.

piston valve (*Eng.*). A steam-engine slide-valve in which the sealing or sliding surfaces of the valve are formed by two short pistons attached to the valve-rod, working over cylindrical port faces in the steam chest; commonly used on steam locomotives.

pit (*Bot.*). (1) A thin localised area in the wall of a cell or other element of plant structure.—(2) The two opposite thin areas in the walls of two cells or vessels in contact.—(3) A local thin spot in the wall of the oögonium of some *Oömycetes.*

pit cavity (*Bot.*). The excavation in the wall where the thinning is apparent.

pit membrane (*Bot.*). The thin sheet of unbroken wall between two opposite pit cavities.

pit (*Eng.*). A small opening or chamber formed in a floor, either to accommodate the moving parts of a large engine (e.g. a *crank-pit*) or to facilitate inspection of the underside of a machine or vehicle.

pit (*Mining, etc.*). (1) A place whence minerals are dug.—(2) The shaft of a mine.

pit-brow (*Mining*). See **brow.**

pitmen (*Mining*). Men employed in shaft sinking or shaft inspection and repair.

pit-saw (*Tools*). A large two-handled rip-saw used for cutting logs. Also called a CLEAVING SAW.

pit work (*Mining*). The moving beams and balance bobs actuated in a shaft by a Cornish pump or beam engine.

Pitanco (*Build.*). A proprietary insulating compound in plastic form.

pitch. A dark-coloured, fusible, more or less solid material, containing bituminous or resinous substances, insoluble in water, soluble in several organic solvents. Usually obtained as the distillation residue of tars.

pitchblende (*Min.*). Uraninite. Radium was first discovered in this mineral. This and helium are due to the disintegration of uranium.

pitch pine (*Timber*). A strong, heavy wood coming from the south of the U.S.A. Commonly used for heavy framing and for piles, as well as for internal joinery.

pitchstone (*Geol.*). A glassy igneous rock which has a pitch-like (resinous) lustre and contains crystallites and microlites. It is usually of acid to subacid composition, and contains a notable amount of water (4% or more).

pitch (*Acous.*). The subjective property of a simple or complex tone which enables the ear to allocate its position on a frequency scale. If the fundamental of a complex tone is absent, the pitch of this fundamental is still recognised, because of subjective difference tones amongst the partials. See **concert pitch.**

pitch pipe (*Acous.*). A pipe, somewhat remote from an organ, which is tuned to a standard frequency and then used for adjusting pipes in the organ, its remoteness being necessary to obviate acoustic coupling and the pulling of the frequency of emitted sounds from pipes which are slightly mistuned.

pitch (*Build.*). The ratio between the rise and the span of a roof, or the angular slope to the horizontal.

pitch (*Cinema.*). The distance between perforations (sprocket holes) on the edges of cinematograph film.

pitch (*Elec. Eng.*). A term used in connexion with electrical machines to denote the distance measured along the armature periphery between various parts.

See **pole— slot— winding—**

pitch, angle of (*Aero.*). Of an aircraft in flight, the angle between the plane of its horizontal axes and the direction of the wind relative to the aircraft.

pitchboard (*Join.*). A triangular board used as a templet for setting out stairs, the sides of the triangle corresponding to the *rise*, the *going*, and the *pitch* of the steps.

pitch circle (*Eng.*). In a toothed wheel, an imaginary circle along which the tooth pitch is measured, and with respect to which tooth proportions are given. For two wheels in mesh, the pitch circles roll in contact.

pitch cone (*Eng.*). A conical surface through the teeth of a bevel wheel, corresponding to the pitch circle of a spur gear. For two bevels in mesh, their pitch cones roll together.

pitch control (*Television*). Control of the number of lines per unit length in a television image.

pitch face (*Masonry*). A stone surface left with a rough finish produced by the hammer.

pitch line (*Eng.*). The line along which the pitch of a rack is marked out, corresponding to the pitch circle of a spur wheel.

pitch of organ pipe stops (*Acous.*). The pitch of a stop, which potentially brings into action a rank of pipes, is known as the *footage* (q.v.). The footages are related, in terms of frequency, as follows:

Relative Frequency.	Name of Relative Pitch.	Name of Manual Stop Pitch.
$\frac{1}{2}$ f	*sub-octave, double, contra* . . .	16 ft.
f	*unison, prime* . .	8 ft.
$1\frac{1}{2}$ f	*sub-third octave, quint*	$5\frac{1}{3}$ ft.
2 f	*octave, principal* .	4 ft.
3 f	*nazard* or *12th* . .	$2\frac{2}{3}$ ft.
4 f	*double octave* or *15th* .	2 ft.
5 f	*tierce* or *17th* . .	$1\frac{3}{5}$ ft.
6 f	*larigot* or *19th* . .	$1\frac{1}{3}$ ft.
7 f	*septième* or *20th* .	$1\frac{1}{7}$ ft.
8 f	*3rd octave* or *22nd* .	1 ft.
9 f	*nonième* . . .	$\frac{8}{9}$ ft.

For pedals the unison is 16 ft., the other pitches of pedal stops being in accordance.

pitched roof (*Build., Civ. Eng.*). A roof having a sloping surface or surfaces.

pitched work (*Masonry*). Stone facing work for the slopes of jetties, breakwaters, etc., executed by pitching the stones into place with some regularity. Cf. *pierre perdue, coursed masonry.*

pitcher (*Bot.*). An urn-shaped or vase-shaped modification of a leaf, or part of a leaf, developed by certain plants; it serves as a means of trapping insects and other small animals, which are killed and digested.

pitcher (*Civ. Eng.*). A term applied to a granite sett used in paving.

pitcher (*Pot.*). A fired earthenware mould formed from a block mould.

pitching. The angular motion of a ship or aircraft in a vertical plane about a lateral axis.

pitching (*Brew.*). The process of mixing the yeast intended to ferment a brew of beer with a small quantity of wort, in the fermenting vat, previous to admitting the remainder of the wort. This induces rapid fermentation.

pitching (*Civ. Eng.*). The foundation layer of well-rammed and consolidated broken stone upon which a road surfacing of setts is built.

pitching fold (*Geol.*). A fold whose crest or trough line is not horizontal when traced in the general direction of strike, because the fold varies in amplitude.

pitching moment (*Aero.*). The component of the couple about the lateral axis, acting on an aircraft in flight.

pitching period (*Ships*). The phenomenon of a ship's behaviour in waves, wherein she changes her trim. The time of complete reversal of trim from forward to aft (or vice versa) is the *pitching period*.

pitching-piece (*Carp.*). See **apron piece.**

pitching tool (*Masonry*). A chisel with a very blunt edge, used to knock off superfluous stone.

pith (*Bot.*). A cylinder of cells, chiefly parenchymatous, lying centrally in an axis and surrounded by vascular tissue.

pith (*Horol.*). The pith of elderwood used in cleaning watches and clocks.

pith (*Timber*). The central core of a log.

pith-ball electroscope (*Elec. Eng.*). An apparatus consisting of two pith balls suspended by silk threads. When charged, the balls repel each other and can therefore be used for detecting the presence of electric charges.

pith ray (*Bot.*) See **vascular ray.**

pith ray fleck (*Bot.*). A dark spot in timber, composed of cells which have filled a cavity resulting from the attacks of insects on the cambium.

pithed (*Zool.*). Having the central nervous system (spinal cord and brain) destroyed.

pithi'atism (*Med.*). Those phenomena of hysteria which can be produced by suggestion and removed by persuasion.

Pitot tube, pē-tō (*Aero, etc.*). A tube with an open end facing the relative air current or direction in which it is being carried.

pitted (*Bot., etc.*). (1) Having pits in the walls.—(2) Having the surface marked by small excavations.

pitted vessel (*Bot.*). A vessel with pits in its walls.

pitting (*Build.*). See **blowing.**

pitting (*Eng.*) (1) Corrosion of metal surfaces, as boiler plates, due to local chemical action.—(2) A form of failure of gear teeth, due to imperfect lubrication under heavy tooth pressure.

pitting (*Varn.*). Varnished work disfigured by small holes. See **pinholing.**

pitu'itary body (*Zool.*). An endocrine gland of Vertebrates formed by the union of a ventral outgrowth of the floor of the diencephalon and an ectodermal diverticulum; hypophysis.

pityri'asis (*Med.*). A term common to various skin diseases in which branny scales appear.

pivot. See **fulcrum.**

pivot (*Horol.*). The reduced end of an arbor or staff which runs in a hole, jewel, or screw. It may be parallel, shouldered, or conical.

pivot bridge (*Struct.*). A form of swing bridge in which the vertical pivot is located at the middle of the length of the bridge.

pivot jaw (*Elec. Eng.*). A fixed jaw to which the blade of a switch is pivoted.

pivot joint (*Zool.*). An articulation permitting rotary movements only.

pivoted brace (*Horol.*). A form of hooking for the mainspring to the barrel. The brace or post is pivoted into holes in the barrel and barrel cap, the end of the spring being looped round the centre portion of the brace.

pivoted detent (*Horol.*). A detent which is carried on pivots, as distinct from a spring detent such as is used in English chronometers.

place bricks (*Build.*). See **grizzle bricks.**

placen'ta (*Bot.*). (1) The portion of the carpel wall, often somewhat fleshy, to which the ovules are attached.—(2) Any mass of tissue to which sporangia or spores are attached.

placenta (*Zool.*). In *Eutheria*, a flattened cake-like structure formed by the intimate union of the allantois and chorion with the uterine wall of the mother; it serves for the respiration and nutrition of the growing young.—*adjs.* **placen'tal, placentate, placentif'erous, placentig'erous.**

placenta vera (*Zool.*). A deciduate placenta in which both maternal and foetal parts are thrown off at birth. Cf. *semiplacenta.*

placental scale (*Bot.*). See **ovuliferous scale.**

Placenta'lia (*Zool.*). See **Eutheria.**

placentation (*Bot.*). The arrangement of the placentae in an ovary, and of the ovules on the placentae.—(*Zool.*) The method of union of the foetal and maternal tissues in a placenta.

placen'tiform (*Bot.*). Like a flat cake or cushion.

placers, placer deposits, plas'er (*Geol.*). Superficial deposits, chiefly of fluviatile origin, rich in heavy ore minerals such as cassiterite, native gold, platinum, which have become concentrated in the course of time by long-continued disintegration and removal from the neighbourhood of the lighter associated minerals. See also **auriferous deposits.**

placing plant (*Build., Civ. Eng.*). A mast up which concrete can be hoisted to a given height, to be then discharged to any desired position on the site down an inclined flume.

placode (*Zool.*). Any plate-like structure: in Vertebrates, an ectodermal thickening contributing to a dorsal nerve-ganglion in the head region.

placo'dioid (*Bot.*). Said of the thallus of a lichen which is rounded in outline and has that outline edged by small scales.

placo'dium (*Bot.*). A hardened hyphal layer surrounding the openings of the ostioles of perithecia embedded in a stroma.

placoid (*Zool.*). Plate-shaped; as the scales and teeth of *Selachii.*

plac'ula (*Zool.*). A flattened blastula with reduced segmentation cavity occurring in the development of some *Urochorda.*

plafond, pla-fon^{g} (*Arch.*). The under surface of the corona in an entablature.

plagio- (Greek *plagios*, slanting, oblique). A prefix used in the construction of compound terms; e.g. *plagiocephaly* (q.v.).

pla'gioceph'aly, plagioceph'alism (*Med.*). An asymmetrical and twisted condition of the head.

pla'gioclase feldspars (*Min.*). An isomorphous series of triclinic minerals which consist of albite and anorthite combined in all proportions, ranging from pure soda feldspar to pure lime feldspar. See **feldspar**; also **albite, andesine, anorthite, labradorite, oligoclase.**

pla'giotrop'ic, pla'giotrop'ous (*Bot.*). Said of members which become oriented in a position at right-angles across the direction in which a stimulus is acting.

plague (*Med.*). A disease of rodents due to infection with the *Bacillus pestis*, transmitted to man by rat-fleas, epizootics in rats invariably preceding epidemics. In Man the disease is characterised by enlargement of lymphatic glands (*bubonic plague*), severe prostration, a tendency to septicaemia, and occasional involvement of the lungs.

pla'gula (*Zool.*). A chitinous plate of the prosoma of *Solifugae.*

plaid (*Textiles*). A woollen shawl or wrap, usually with a kind of check pattern, once worn in Scotland.

plain antenna system (*Radio*). An early form of spark transmission system in which the spark gap was included in the antenna circuit itself.

plain conduit (*Elec. Eng.*). See **plain steel conduit.**

plain coupler (*Elec. Eng.*). A short length of tubing serving to connect the end of two adjacent pieces of plain steel conduit in line with each other in an electrical installation. Also called a SLEEVE.

plain loom (*Weaving*). A machine designed for the production of cloth of plain weave.

plain muscle (*Zool.*). See **unstriated muscle.**

plain Oxford (*Textiles*). See **Oxford shirting.**

plain steel conduit (*Elec. Eng.*). Conduit consisting of light-gauge steel tubing not having the ends screwed; used for containing the conductors in electrical installations. Cf. *screwed steel conduit.* Also called PLAIN CONDUIT.

plain tile (*Build.*). The ordinary flat tile, usually 10½ × 6½ × ⅜-½ in., with two nibs for hanging from the battens.

plain weave (*Weaving*). The simplest interlacing of warp and weft threads. Each warp thread is alternately over and under the weft, while adjacent warp threads work opposite to each other. Also called CALICO (or TABBY) WEAVE.

planceer′ or **plancier′** (*Build.*). A soffit, especially the under surface of the corona in a cornice.

planceer piece (*Build.*). A horizontal timber to which the soffit boards of an overhanging eave are fastened.

Planck's constant (*Phys.*). A universal constant, defined as the ratio of a quantum of radiant energy of a particular frequency to the frequency. Its value is $6{\cdot}547 \times 10^{-27}$ erg-sec. Symbol ***h***.

Planck's quantum of action (*Phys.*). See **Planck's constant.**

Planck's radiation formula (*Phys.*). An expression for the quantity of energy of frequency ν radiated per second from unit area of a black body at absolute temperature T:

$$E_\nu = \frac{h\nu^5}{c^3\left(e^{\frac{h\nu}{kT}} - 1\right)},$$

where c is the velocity of light, h is Planck's constant, k is Boltzmann's constant, and e is the base of natural logarithms.

plane (*Aero.*). (1) A colloquial abbrev. for *aeroplane* or *airplane.*—(2) MAIN PLANES, the principal supporting surfaces of an aeroplane, including the ailerons.—STUB PLANE, a short length of plane which projects from the body of an aeroplane and forms the connexion for the main planes. In flying-boats, one of the projections from the hull, just above the waterline, which gives lateral stability on the water.—TAIL PLANE, a horizontal plane forming part of the tail unit, serving to control the longitudinal stability of an aeroplane.

plane (*Carp., Join.*). A wood-working tool used for the purpose of smoothing surfaces.

plane ashlar (*Masonry*). A block of stone which has the marks of the tool dressed out.

plane, focal (*Optics, Photog.*). See **focal plane.**

plane-iron (*Carp., etc*). The cutting part of a plane, which actually shapes the work.

plane of saturation (*Civ. Eng.*). The natural level of the *ground water* (q.v.).

plane of section (*Bot.*). The direction in which a plant member is cut, or assumed to be cut, for purposes of elucidating its structure. In radially symmetrical members, the plane may be *transverse* (i.e. at right-angles to the longitudinal axis), *longitudinally radial* (i.e. along one of the radii), or *longitudinally tangential* (i.e. parallel to a tangent to the surface). In a flower, the plane may be *median* or *anterior-posterior* (i.e. passing through the bract and axis), *lateral* (i.e. parallel to the ground), or neither of these, when it is *oblique.*

plane of symmetry (*Crystal.*). In a crystal, an imaginary plane on opposite sides of which faces, edges, or solid angles are found in similar positions. One half of the crystal is hence a mirror image of the other.

plane of the ecliptic (*Astron.*). See **ecliptic.**

plane polarisation (*Radio*). The state of polarisation of an electromagnetic wave when the electric (and magnetic) field at any point does not vary in direction (except for reversal) over a cycle.

plane stock (*Carp., etc.*). The body of a plane, holding the plane-iron in position.

plane surveying (*Surv.*). Surveying applied to areas of small extent, where the effect of the curvature of the earth's surface is negligible and it may be assumed that the mean surface is plane.

plane table (*Surv.*). A drawing-board mounted on a tripod so that the board can be levelled and also rotated about a vertical axis and clamped in position. An alidade completes the essential parts of a plane table.

plane tabling (*Surv.*). A method of surveying in which the fieldwork and plotting are executed simultaneously.

plane-tile (*Build.*). See **crown-tile.**

planer (*Typog.*). A flat piece of wood which is placed on a forme of type and tapped with a mallet to level the surface.

planer tools (*Eng.*). Planing machine cutting-tools, similar to those used for turning, clamped vertically in a block pivoted in the *clapper box* (q.v.) on the head.

planet (*Astron.*). (Greek *planētēs*, wandering.) The name given in antiquity to the seven heavenly bodies, including the sun and moon, which were thought to travel among the fixed stars. The term is now restricted to those bodies, including the Earth, which revolve in elliptic orbits about the sun; in the order of distance they are: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune, and Pluto. The two planets, Mercury and Venus, which revolve within the Earth's orbit are designated *inferior planets.*

plan′etary gear (*Eng.*). Any gear-wheel whose axis describes a circular path round that of another wheel, e.g. the bevel wheels carried by the crown wheel of an automobile *differential gear* (q.v.).

planetary nebulae (*Astron.*). A class of small nebulae of regular shape and outline, so called because they generally show a sensible disc when seen in the telescope.

planetes′imal hypothesis (*Astron.*). A theory of the evolution of our solar system which postulates a non-rotating spherical mass of gas, so affected by the tidal action of a passing star as to emit two opposite jets of matter while also beginning to rotate, the spiral arms so formed condensing into planets by the larger condensations annexing the smaller (called *planetesimals*).

planid′ium (*Zool.*). A larval type of certain *Hymenoptera*, of active habit and possessing chitinised segmental plates and locomotor spines.

planim′eter (*Eng., etc.*). A form of integrator for measuring mechanically the area of a plane surface, e.g. the area of an indicator diagram. A tracing point on an arm is moved round the closed curve, whose area is then given to scale by the revolutions of a small wheel supporting the arm.

planing machine (*Eng.*). A machine for producing large flat surfaces. It consists of a gear-driven reciprocating work-table sliding on a heavy bed, the stationary tool being carried above it by a saddle, which can be traversed across a horizontal rail carried by uprights. See **clapper box, planer tools.**

plank (*Timber*). A piece of timber of thickness 2-6 in. and of width from 11 in. upwards.

plank root (*Bot.*). A root which is very markedly flattened so that it stands out from the base of the stem like a plank set edgeways to the surface of the ground; plank roots give additional support to the plant.

plank truss (*Carp.*). A roof or bridge truss constructed of planks.

plankton (*Ecol.*). Animals and plants floating in the waters of seas, rivers, ponds, and lakes, as distinct from animals which are attached to, or crawl upon, the bottom; especially minute organisms and forms, possessing weak locomotor powers.

plankton-pulse (*Ecol.*). Periodic variation in the abundance of plankton in any particular area, due to various ecological factors.

plan'oblast (*Zool.*). A free-swimming Medusa.

planogam'ete (*Bot., Zool.*). A motile or wandering gamete; a zoogamete.

planogam'ic (*Bot.*). Having motile gametes.

plan'ont (*Zool.*). In some *Neosporidia*, an initial amoebula phase liberated from a spore within the body of the host.

plan'osome (*Cyt.*). An odd chromosome resulting from non-disjunction of a pair during meiosis.

plan'ospore (*Bot.*). See **zoospore.**

planozy'gote (*Bot.*). A motile zygote.

plant (*Bot.*). An organism which has little or no power of dealing with solid food, and which therefore takes in all or most of the material used in nutrition in solution in water.

plant community (*Bot.*). See **community.**

plant formation (*Bot.*). See **association.**

plant indicator (*Bot.*). See **indicator.**

plant pathology (*Bot.*). See **phytopathology.**

plant (*Eng., etc.*). (1) The machines, tools, and other appliances requisite for carrying on a mechanical or constructional business; the term sometimes includes also the buildings and the site, and, in the case of a railway, the rolling stock.—(2) The permanent appliances needed for the equipment of an institution.

plant (*Horol.*). To locate, to set out, e.g. *to plant the train*, to set out the various centres for the pivot holes on the plates.

plant load-factor (*Elec. Eng.*). The ratio of the total number of kWh supplied by a generator or generating station to the total number of kWh which would have been supplied if the generator or generating station had been operated continuously at its maximum continuous rating.

planta (*Zool.*). The sole of the foot in land Vertebrates: the flat apex of a proleg in Insects.—*adj.* **plantar.**

plantation (*Build.*). A slate size, 13 × 11 in.

Planté plate, plahn^{g}-tā (*Elec. Eng.*). See **formed plate.**

planted (*Dec.*). Said of an isolated ornament, etc., applied by partly sinking into a base (wood panel, plaster, etc.).

planted moulding (*Join.*). A moulding cut out of a separate strip of wood of the required section and secured to the surface which it is intended to decorate.

plan'tigrade (*Zool.*). Walking on the soles of the feet, as Man.

planting (*Join.*). The operation of forming a *planted moulding* (q.v.).

plan'tula (*Zool.*). See **pulvillus.**

plan'ula (*Zool.*). A larval form of some Invertebrates, especially *Coelenterata*; it consists of an outer layer of ciliated ectoderm and an inner mass of endoderm cells.

plashing (*Build., Civ. Eng.*). The process of intertwining branches in forming gabions, hurdles, etc.

Plaskett's star (*Astron.*). The star whose catalogue designation is B.O. 6° 1309; first studied by Plaskett; it is remarkable for its high luminosity, which is 30,000 times that of the sun; its absolute magnitude is −6·4.

plasma-, plasmo- (Greek *plasma*, gen. *plasmatos*, anything moulded). A prefix used in the construction of compound terms; e.g. *plasmacytoma.*

plasma (*Min.*). A bright-green translucent variety of cryptocrystalline silica (chalcedony). It is used as a semi-precious gem.

plasma (*Thermionics*). The region in a gaseous discharge where there is no resultant charge, the number of positive ions and negative ions being equal, in addition to unionised molecules.

plasma, plasm (*Zool.*). Protoplasm, especially in compound terms, as *germ-plasm*: a body-fluid such as the fluid part of such tissues as blood and lymph.—*adj.* **plasmatic.**

plasma membrane (*Bot., Zool.*). See **plasmalemma.**

plasmacyto'ma (*Med.*). A tumour appearing in bone and composed of cells closely resembling plasma cells.

plasmalem'ma (*Bot.*). A very thin layer of specialised protoplasm, forming the outer boundary of the protoplast where that is in contact with the cell wall.—(*Zool.*) An extremely thin membrane enclosing the apparently naked protoplasm of forms like *Amoeba.* Also PLASMA (or PLASMATIC) MEMBRANE.

plas'matopa'rous (*Bot.*). Said of a spore which, in the earliest stage of germination, emits its contents as a naked protoplast, which then forms a wall and puts out a germ tube.

plas'mocyte (*Zool.*). See **leucocyte.**

plasmoder'ma (*Bot.*). A very thin specialised layer of protoplasm around a vacuole.

plas'modesm (*Bot.*). An extremely delicate strand of protoplasm passing through a fine perforation in a cell wall, and, with many other plasmodesms, providing a connexion between the protoplasts of contiguous cells.

plasmo'diocarp (*Bot.*). A sporangium, formed by some *Myxomycetes*, which is of irregular or sinuous form.

plas'moditro'phoblast (*Zool.*) In the Mammalian placenta, a syncytium formed by the thickening of the upper part of the trophoblast which is in contact with the uterine wall.

plasmo'dium (*Bot.*). A thallus having the form of a naked multinucleate mass of protoplasm which can creep in amoeboid manner and take in solid food material.—(*Zool.*) A syncytium formed by the union of uninucleate individuals without fusion of their nuclei.—*adj.* **plasmodial.**

plasmog'amy (*Biol.*). Fusion of cytoplasm as distinct from fusion of nucleoplasm (karyogamy); plastogamy.—*adj.* **plasmog'amous.**

plasmol'ysis (*Biol.*). The process of removal of water from a cell by osmotic methods with resultant shrinking.

plasmo'ma (*Med.*). See **plasmacytoma.**

plas'mosome (*Cyt.*). A small cytoplasmic granule: a type of nucleolus which stains with acid dyes and disappears during mitosis without mingling with the chromosomes.

plasmot'omy (*Zool.*). Fission, by division of cytoplasm only, of multinucleate *Protozoa* to form multinucleate offspring.

plaster. A general name for plastic substances which are used for coating wall surfaces, and which set hard after application. See also **acoustic plaster.**

plaster board (*Build.*). A building-board made of plaster with paper facings.

plaster of Paris (*Chem., etc.*). Dehydrated gypsum, $2CaSO_4, H_2O$. When mixed with water, it evolves heat and quickly solidifies, expanding slightly; hence its use for making casts.

plaster slab (*Build.*). A block, frequently perforated, made from plaster of Paris and coarse sand; used in the construction of partitions.

plasterer's putty (*Plast.*). A preparation similar to *fine stuff* (q.v.), made by dissolving pure lime in water and passing it through a fine sieve.

plastic bronze (*Met.*). Bronze containing a high proportion of lead; used for bearings. Composition: 72-84% copper, 5-10% tin, and 8-20% lead plus zinc, nickel, and phosphorus.

plastic clay (*Build.*). See **foul clay.**

plastic deformation (*Met.*). Permanent change in the shape of a piece of metal, or in the constituent crystals, brought about by the application of mechanical force.—(*Geol.*) Also said of certain minerals, e.g. *calcite*, so affected during metamorphism.

plastic effect (*Television*). A fault in a reproduced television image due to phase distortion; it gives an erroneous three-dimensional appearance.

plastic material (*Bot.*). Any substance which is used up in growth processes.

plastic rail-bond (*Elec. Eng.*). A rail-bond made by inserting plastic conducting material between the rail itself and the fishplate.

plastic setting (*Textiles*). The setting of woollen yarn, previously placed under tension, by the influence of moisture at high temperature in order to avoid the curl which tends to develop in certain types.

plastic sulphur (*Chem.*). Formed when sulphur is distilled into water. Unstable and changes to the rhombic form.

plastic surgery (*Surg.*). That branch of surgery which deals with the repair and restoration of damaged or lost parts of the body.

plastici'sers (*Chem*). High-boiling liquids used as ingredients in lacquers; they do not evaporate but preserve the flexibility and adhesive power of the cellulose films. Well-known plasticisers are triphenyl phosphate, tricresyl phosphate, high-boiling glycol esters, etc.

plastics. A generic name for synthetic condensation or polymerisation substances, also for certain natural substances, which under heat and pressure become plastic, and can then be shaped in a mould, extruded as rod, tube, etc, or used in the formation of laminated products. Plastics are *thermoplastic* (q.v.) or *thermosetting* (q.v.). They are marketed under a great many proprietary names, the principal of which are given in their alphabetical position in this work. Plastic products are of wide application in the mechanical, electrical, radio, gramophone, aeroplane, automobile, building, paint and varnish industries, and have manifold domestic uses.

plastid (*Bot.*). Any small dense protoplasmic inclusion in a cell. Plastids are probably special centres of chemical activity, and many of them, when exposed to light, become pigmented and become chloroplasts.

plastids (*Zool.*). Small specialised granules occurring in certain *Protozoa*; concerned with the synthetic functions of the cell.

plas'tidome (*Bot.*). The total outfit of plastids in a cell.

plastin (*Cyt.*). An acidophil substance occurring in masses in the nuclei of cells.—*adj.* **plas'tinoid.**

plastochon'dria (*Zool.*). See **mitochondria.**

plas'tochrone (*Bot.*). The period of time that elapses between the formation of one leaf primordium and the next, on the growing point of a shoot in which there is a stable spiral phyllotaxis.

plas'tocont (*Bot., Zool.*). See **chondriocont.**

plastog'amy (*Zool.*). Union of individual *Protozoa* without fusion of their nuclei.

plastone'ma (*Bot.*). Deeply staining peripheral cytoplasm in sporogenous tissue in mosses.

plas'tosome (*Cyt.*). Lightly staining internal cytoplasm in the cells of sporogenous tissue in mosses.—(*Zool.*) See **mitochondria.**

plastron (*Anat.*). The sternum and the costal cartilages.—(*Zool.*) The ventral part of the bony exoskeleton in *Chelonia*: any similar structure.—*adj.* **plastral.**

platband (*Build.*). (1) An *impost* (q.v.).—(2) A flat projecting moulding, which projects from the general wall surface by an amount less than its own breadth.—(3) A door or window lintel.

plate or platt (*Carp.*). The top horizontal timber of a wall, supporting other parts of the structure.

plate (*Elec. Eng.*). (1) The electrode of an accumulator cell. See **formed plate, pasted plate.**—(2) One of the conducting surfaces of a condenser.

plate (*Photog.*). Glass used as a support for sensitive emulsions during exposure and processing. See **dry-plate, wet-plate process.**

plate (*Print.*). (1) An electrotype or stereotype.—(2) An illustration, especially one that is printed separately from the book which it illustrates.

plate (*Thermionics*). An obsolescent synonym for *anode*.

plate (*Zool.*). See **plax.**

plates (*Furs*). A number of furs sewn together.

plates (*Horol.*). The circular or rectangular plates of brass which form the framework of a watch or clock and which are drilled to receive the pivots of the train, etc.

plate battery (*Elec. Comm.*). Another name for a *B-battery* (q.v.).

plate clutch (*Eng.*) See **disc** (or **plate**) **clutch.**

plate-frame (*Elec. Eng.*). The nickel-plated framework for supporting the perforated steel tubes of the electrode of a nickel-iron accumulator.

plate gauge (*Eng.*). A limit gauge or single external gauge formed by cutting slots of the required gauge width in a steel plate, the surfaces of which are hardened. See **limit gauge.**

plate girder (*Struct.*). A built-up steel girder consisting of a single web-plate along each edge of which is riveted, as a flange, a pair of angles. In the larger sizes, flange-plates are riveted to the angles.

plate glass (*Glass*). Glass of superior quality, originally cast on an iron bed and rolled into sheet form, and afterwards ground and polished. Modern methods have to a large extent superseded this, save for special kinds of glass.

plate glazing (*Paper*). The operation of passing paper and polished metal sheets between heavy rolls, the process being repeated until a sufficiently smooth surface has been imparted to the paper.

plate-group (*Elec. Eng.*). The complete unit, consisting of an accumulator plate or plates, terminal bar and terminal lug, forming the electrode of an accumulator cell. Also called a PLATE-SECTION.

plate-lug (*Elec. Eng.*). A projection on an accumulator plate used for connecting it to a terminal-bar.

plate moulding (*Moulding*). A method of mounting the halves of a split pattern on opposite sides of a wood or metal plate, placed between the cope and drag, thus eliminating the making of the joint faces.

plate proof (*Print.*). A proof taken from a plate.

plate rack (*Build.*). An open frame in a kitchen or scullery, into which plates may be placed vertically so that they may drain after they have been washed.

plate screws (*Surv.*). The screws directly connecting the head of a theodolite or level with its tripod, and serving as a means of adjustment for bringing the head to a level position. Also called FOOT SCREWS.

plate-section (*Elec. Eng.*). See **plate-group.**

plate shelf (*Join.*). A narrow shelf round the walls of a room near the ceiling, often used to carry and exhibit ornamental plates.

plate-support (*Elec. Eng.*). A support from which the plates of an accumulator are suspended, or upon which they rest.

plateau-basalts (*Geol.*). Basic lavas of basaltic composition occurring as thin, widespread flows, forming extensive plateaux (e.g. the Deccan in India).

plateau-building movements (*Geol.*). See **epeirogenic earth movements.**

plateau eruptions (*Geol.*). Volcanic eruptions by which extensive lava-flows are spread in successive sheets over a wide area and eventually build a plateau; as in Idaho. See **fissure eruptions.**

plateau gravel (*Geol.*). Deposits of sandy gravel occurring on hill-tops and plateaux at heights above those normally occupied by river terrace gravels. Originally deposited as continuous sheets, plateau gravel has been raised by earth movements to its present level and deeply dissected. Of Pliocene or early Pleistocene age in the main.

plated carbon (*Illum.*). An arc-lamp carbon upon which a layer of copper has been deposited by electroplating, in order to improve its conductivity and ensure good contact with the holder.

plated fabrics (*Hosiery*). Fabrics produced by arranging two threads in a knitting machine so that one appears on the face of the fabric and the other on the back; e.g. cotton on wool.

plat'en (*Eng.*). The work table of a machine tool, usually slotted for clamping bolts.

platen machine (*Print.*). A printing machine in which the impression is taken with a flat surface not a cylinder. Small commercial work is usually printed on platen machines.

platform (*Carp.*). In halls, etc., a relatively small area of floor raised above the general floor-level.

platform escapement. (*Horol.*). An escapement mounted on an independent plate.

platform gantry (*Build.*). A gantry formed of square timbers strongly braced together to support a platform on which is erected a scaffold used for the handling of materials, for which purpose it bears a crab or winch.

plat'inates (*Chem.*). See **platinic hydroxide.**

plating (*Bind*). The operation of inserting *plates* (see **plate,** *Print.*, 2) in a volume, e.g. by attaching them to guards.

plating (*Elec. Eng.*).
See **barrel—** **close—** **parcel—**
bright— **electro—**

plating generator (*Elec. Eng.*). A d.c. generator designed to give the heavy currents at low voltages required by electroplating cells.

platin'ic hydroxide (*Chem.*). $Pt(OH)_4$. Dissolves in acids to form platinic salts and in bases a series of salts called *platinates.* A type of compound formed by the other members of the platinum group of metals.

platinic oxide (*Chem.*). PtO_2. Dark grey powder formed when platinic hydroxide is heated. Also called PLATINUM DIOXIDE.

platinic salts (*Chem.*). See **platinic hydroxide.**

platinised asbestos (*Chem.*). Asbestos permeated with finely divided platinum.

plat'inite (*Met.*). Alloy containing iron 54-58%, and nickel 42-46%. Has the same coefficient of expansion as platinum, and is used to replace it in electric-light bulbs.

plat'inoid (*Met.*). Alloy containing copper 60%, zinc 24%, nickel 14%, tungsten 2%. Has high electrical resistance and is used for resistances and thermo-couples.

plat'inotype (*Photog*). Obtained by the reduction of a platinum salt to platinum by ferrous oxalate, after the latter has been reduced from ferric oxalate during exposure.

plat'inous hydroxide (*Chem.*). $Pt(OH)_2$. Soluble in the haloid acids (hydrochloric acid, etc.), forming platinous salts.

platinous oxide (*Chem.*). PtO. Formed when platinous hydroxide is gently heated.

plat'inum (*Met.*). A metallic element in the eighth group of the periodic system. Symbol, Pt. At. no. 78, at. wt. 195·23, sp. gr. at 20° C. 21·4, spec. elec. restivity at 20° C. 9·97 microhms per cm. cub., m.p. 1773° C., Brinell hardness 47. Platinum is the most important of a group of six closely related rare metals, the others being osmium, iridium, palladium, rhodium, and ruthenium. It is heavy, soft, and ductile, immune to attack by most chemical reagents and to oxidation at high temperatures.—(*Min.*) Native platinum is usually alloyed with iron, iridium, rhodium, palladium, or osmium, and crystallises in the cubic system. It is rare and the only common ore of platinum, occurring as an accessory mineral in noritic and ultrabasic igneous rocks. The most important district yielding platinum is the Ural Mountains.

platinum ammines (*Chem.*). Compounds of platinum and ammonia. See **ammines.**

platinum black (*Chem*). Platinum precipitated from a solution of the tetrachloride by reducing agents. A velvety-black powder.

platinum chloride (*Chem.*). See **chloroplatinic acid.**

platinum dichloride (*Chem.*). $PtCl_2$. Obtained by heating chloroplatinous acid. Also formed when platinum is exposed at a high temperature in chlorine gas. When heated strongly, decomposes into platinum and chlorine.

platinum dioxide (*Chem.*). See **platinic oxide.**

platinum sponge (*Chem.*). See **spongy platinum.**

platinum tetrachloride (*Chem.*). $PtCl_4$. Formed by dissolving platinum in aqua regia. Similar chlorides are formed with the other platinum metals.

platinum thermometer (*Phys.*). A means of measuring temperature by determining the resistance of a coil of platinum wire enclosed in a protecting tube placed in the enclosure whose temperature is required. Up to 1200° C. temperatures may be measured with an accuracy of a tenth of a degree.

platt (*Carp.*). See **plate.**

platting (*Build.*). The top course of a brick clamp.

plat'y- (Greek *platys*, broad, flat). A prefix used in the construction of compound terms; e.g. *platycephalic* (q.v.).

platyba'sic (*Zool.*). Said of the chondrocranium of developing Vertebrates which has the trabeculae wide apart.

platycephal'ic, platyceph'alus (*Anat.*). Having a flattened or broad head, with a breadth-height index of less than 70.

Platyco'pa (*Zool.*). An order of *Ostracoda* in which the shell lacks an antennal notch, there are four pairs of postoral limbs, and the caudal furcae have styliform or vestigial rami.

Platycte'na (*Zool.*). An order of *Tentaculata* which includes a number of aberrant forms of flattened creeping habit, having much-reduced tentacles.

platydac'tyl (*Zool.*). Having the tips of the digits flattened.

Platyhelmin'thes (*Zool.*). A phylum of bilaterally symmetrical, triploblastic *Metazoa*; usually dorsoventrally flattened; the space between the gut and the integument is occluded by parenchyma; the excretory system consists of ramified canals containing flame-cells; there is no anus, coelom, or haemocoele; the genitalia are usually complex and hermaphrodite. Flat Worms.

plat'yphyl'lous (*Bot.*). (1) Broadly lobed.—(2) Having wide leaves.

platys'ma (*Zool.*). A broad sheet of dermal musculature in the neck region of Mammals.

plat'ysperm (*Bot.*). A seed which is flattened in transverse section.

platytra'bic (*Zool.*). Platybasic.

plauenite, plow'en-it (*Geol.*). A name sometimes applied to the well-known Dresden syenite, consisting essentially of orthoclase, hornblende, some oligoclase, and a little quartz.

plax (*Zool.*). A flat plate-like structure, as a lamella or scale.

play-back (*Acous.*). The immediate reproduction from a wax recording with a very flexible pick-up; used for testing the quality of the reproduced sound before actual records are made, or as a check on other types of recording.

player-type (*Photog.*). The direct printing of normal prints on slow bromide paper, using gas-light and a green-glass filter.

pleasure (*Psychol.*). The feeling-tone which accompanies the emotional satisfaction of any one instinct.

pleasure-pain principle (*Psycho-an.*). According to Freud, the principle dominating instinctual life, in which the activities of the organism are directed entirely towards the seeking of pleasure and the avoidance of pain. Essentially unconscious.

pleated diaphragm loudspeaker (*Acous.*). A loudspeaker in which the radiating element is a pleated diaphragm, the pleats being radial and the rim clamped. It is driven by a pin at the centre.

Plecop'tera (*Zool.*). An order of *Exopterygota* the members of which are usually sombre, sluggish flies having both pairs of wings membranous, the fore wings narrow, the hind wings broad; the antennae are long, and anal cerci usually occur; the mouth-parts are adapted for biting but are feebly developed; the immature stages are aquatic and show many curious adaptations for obtaining a supply of air. Stone-flies.

plec'tenchy'ma (*Bot.*). Pseudoparenchyma formed by the interweaving of hyphae.

plectenchy'matous, plectenchy'mic, plectenchy'moid (*Bot.*). *Adjs.* from *plectenchyma.*

Plectog'nathi (*Zool.*). An order of marine *Neopterygii* having poisonous flesh; the pelvic fins are reduced, the bones of the upper jaw firmly united, and the skeleton incompletely ossified; there is a soft dorsal fin with or without a spinous fin; many species show very grotesque forms. Trigger-fishes, File-fishes, Trunk-fishes, Globe-fishes, Sun-fishes.

plei-, pleio-, pleo-, plio-. Prefix. (Greek *pleiōn*, more.)

Pleiades, The, plē'a-dēz *or* pli— (*Astron.*). The name given to the open cluster in the constellation *Taurus*, of which the seven principal stars, forming a well-known group visible to the naked eye, each have a separate name.

pleian'drous (*Bot.*). Having a large and indefinite number of stamens.

pleiocha'sium (*Bot.*). A cymose inflorescence in which each branch bears more than two lateral branches.

plei'omer'ous (*Bot.*). Having a large number of parts or organs.

pleion, plī'on (*Meteor.*). An area over which some weather element, such as temperature, is above the normal average. The reverse is *antipleion.*

plei'ospo'rous (*Bot.*). Many-spored.

plei'otax'y (*Bot.*). An increase in the number of whorls in a flower.

plei'oto'my (*Bot.*). Multiple apical division with the formation of multiplets.

plei'otropism (*Gen.*). The condition when one factor has an effect simultaneously on more than one character in the offspring.

Pleis'tocene Period (*Geol.*). The period of geological time which followed the Pliocene. It was during this period that an ice-sheet covered the greater part of N. Europe and N. America, hence it has been called the *Great Ice Age.*

plenal'via (*Vet.*). Impaction of the rumen of cattle.

Plenum system (*Build.*). An air-conditioning system in which the air propelled into the building is maintained at a higher pressure than the atmosphere. The conditioned air is usually admitted to rooms from 8 to 10 ft. above floor-level, while the vitiated air is extracted at floor-level on the same side of the room.

Plenus Marls (*Geol.*). Grey marls found in the Lower Chalk of Britain, containing the belemnite *Actinocamax plenus.* They are of Cretaceous age.

pleo-. Prefix. See **plei-.**

pleocho'lia (*Med.*). Excessive formation of bile pigment.

pleochro'ic halos (*Min.*). Dark-coloured zones around small inclusions of radio-active minerals which are found in certain crystals, notably biotite. The colour and pleochroism of the zones are stronger than those of the surrounding mineral, and result from radio-active emanations during the conversion of uranium or thorium into lead. Their characters have been closely studied as providing evidence of the age of the rocks containing them.

pleoch'roism (*Min.*). The property of a mineral by which it exhibits different colours in different crystallographic directions on account of the selective absorption of transmitted light.

pleocyto'sis (*Med.*). An increase in the number of white-blood cells, especially in the cerebrospinal fluid.

ple'omor'phous (*Zool.*). Polymorphic.

ple'on (*Zool.*). In *Crustacea*, the abdominal region. Cf. *pereion.*

ple'onaste (*Min.*). Oxide of magnesium, iron, and aluminium, crystallising in the cubic system. It is a member of the spinel group and may be dark-green, brown, or black in colour. Also called CEYLONITE.

ple'opha'gous (*Bot.*) Said of a parasite which attacks several species of host plant.

ple'opod (*Zool.*). In *Arthropoda* (especially *Crustacea*), an abdominal appendage adapted for swimming.

plerer'gate (*Zool.*) A worker ant which stores, in its distended gaster, liquid food for the community.

plerocer'coid (*Zool.*). A solid elongate metacestode, in which the scolex is directly derived from the onchosphere.

plerocer'cus (*Zool.*). A solid spherical metacestode, in which the scolex is directly derived from the onchosphere.

plerome (*Bot.*). The central region of an apical meristem, from which the stele is ultimately formed.

plessite (*Min.*). A eutectic alloy of iron and nickel occurring in some iron meteorites; appears as dark areas on the polished surface.

pleth'ora (*Med.*). An increase, above normal, in the volume of the blood, with or without an increase in the total number of red cells.

plethys'mograph (*Med.*). An apparatus for measuring variations in the size of bodily parts and in the flow of blood through them.

pleur-, pleuro- (Greek *pleura*, side). A prefix used in the construction of compound terms; e.g. *pleurocerebral*, pertaining to the pleural and cerebral ganglia of *Mollusca.*

pleu'ra (*Zool.*). The serous membrane lining the pulmonary cavity in Vertebrates.—*adj.* **pleural.**

pleurac'rogen'ous (*Bot.*). Produced at the tip and also laterally.

pleural membrane (*Zool.*). In Arthropods, the lateral wall of a somite when it is membranous.

pleurapoph'ysis (*Zool.*). A lateral vertebral process; usually applied to the true ribs.

pleureth'moid (*Zool.*). A bone of some Fish, representing the fused ectethmoid and prefrontal.

pleu'risy (*Med.*). Inflammation of the pleura, which may be either dry or accompanied by effusion of fluid into the pleural cavity.

pleurites (*Zool.*). Chitinous plates forming the lateral wall of a somite, especially a thoracic somite in Insects.

pleuri′tis (*Med.*). Pleurisy.

pleurobranc′hiae (*Zool*). In *Arthropoda* (especially the higher *Crustacea*), gills which arise from the pleura.

pleurocar′pous (*Bot.*). Having the fruit in a lateral position.

pleuroccipital, —ok-sip′— (*Zool.*). Exoccipital.

pleurocen′trum (*Zool.*). A lateral element of the centrum in some of the lower Vertebrates.

pleu′rodont (*Zool.*). Having the teeth fastened to the side of the bone which bears them, as in some Lizards.

pleurodyn′ia (*Med.*). Fibrositis of the muscles between the ribs, or of other muscles attached to the ribs, with pain in the chest on breathing or coughing.

pleurogen′ous, *or* plūr-oj′— (*Bot.*). Borne in a lateral position.

pleurogenous, pleurogen′ic (*Med.*). Having origin in the pleura; e.g. *pleurogenous* cirrhosis of the lung.

pleuron (*Zool.*). In some *Crustacea*, a lateral expansion of the tergite: more generally, in *Arthropoda*, the lateral wall of a somite.—*pl.* **pleura.**—*adj.* **pleural.**

pleu′ropericardi′tis (*Med.*). Concurrent inflammation of the pleura and of the pericardium.

pleuropneumo′nia (*Med.*). Combined inflammation of the pleura and of the lung.—(*Vet.*) A contagious disease of cattle due to infection by a filterable virus; characterised by an exudative fibrinous pneumonia and pleurisy.

pleurop′odite (*Zool*). A basal joint preceding the coxa in some *Crustacea.*

pleurorhi′zal (*Bot.*). Said of an embryo when the radicle is placed against the edges of the cotyledons.

pleurosphe′noid (*Zool.*). Sphenolateral.

pleu′rospo′rous (*Bot.*). Having the spores borne in a lateral position.

pleurothot′onos, pleurothot′onus (*Med.*). Forced bending of the body to one side as a result of muscular spasm, as in tetanus.

Pleurotre′mata (*Zool.*). An order of *Euselachii* characterised by the possession of five or more laterally placed gill clefts, an elongate and rounded body, and the presence of an anal fin. Sharks and Dogfish.

plexi′tis (*Med.*). Inflammation of the components of a nerve plexus.

plexus (*Zool.*). A network: a mass of interwoven fibres; as a *nerve plexus.*—*adj.* **plexiform.**

pli′ca (*Zool.*). A fold of tissue: a fold-like structure.—*adjs.* **plicate, pliciform.**

pli′cate (*Bot.*). Folded in longitudinal plaits.

plicate aestivation (*Bot.*). A type of valvate aestivation in which the perianth segments are plicate.

plinth (*Build.*). (1) The projecting course or courses at the base of a building.—(2) The cuboidal base of a column or pedestal.—(*Furn.*) The base of a bookcase, wardrobe, etc.

plinth block (*Carp.*). An *architrave block* (q.v.).

plinth course (*Masonry*). A projecting course laid at the base of a wall.

plio-. Prefix. See **plei-.**

Pli′ocene Period (*Geol.*). The period of geological time which followed the Miocene and preceded the Pleistocene. Rocks of this age are found in East Anglia and Southern England. See **Red Crag, Weybourne Crag, Coralline Crag, Lenham Beds.**

pliody′natron (*Radio, Thermionics*). A multi-electrode tube for obtaining negative resistance by means of secondary emission: an oscillator circuit using such a tube.

Ploïma, plō-im′a (*Zool.*). An order of *Rotifera*; the adults swim freely; the tail is forked and may be retractile; a lorica may be present or absent.

Plombière's douche, plon^{g}-byăr′ (*Med*). Lavage of the colon by the slow injection of, for example, salt solution, through a soft rubber tube inserted into the rectum.

plot (*Build.*). A ground plan.

plotting (*Surv.*). The operation of drawing on paper from the field notes of the surveyor.

plough or **plow** (*Agric. Mach.*).

See **digger—**
disc—
mouldboard—
tractor—
breast
coulter
landside
share
skim coulter
slade.

plough (*Carp., Join.*). (1) A form of grooving plane which has an adjustable fence and is capable of being fitted with various irons.—(2) To cut a groove.

plough (*Elec. Eng.*). A current-collector used on the conduit system of electric street traction. Also called UNDERGROUND COLLECTOR.

plough carrier (*Elec. Eng.*). The frame under a tram, which carries the plough used in the conduit system. The arrangement is such that the plough can slide laterally, so that it may follow any variations in the relative positions of the conduit and the track rails.

plough groove (*Join.*). A groove cut with the grain of the wood by means of a plough.

plough pit (*Elec. Eng.*). A special pit through which the plough used in the conduit system of a street tramway can be removed.

ploughed-and-tongued joint (*Join.*). A joint formed between the square butting edges of two boards, each having a plough groove into which a common tongue is inserted.

plow. A variant spelling of *plough.*

plucked (*Textiles*). The term used to denote uneven thickness in a top, roving, or yarn, generally caused by excessive draft.

plucked wool (*Textiles*). Wool obtained from a sheep that has been dead a few days; occasionally, wool from slaughtered sheep.

plug (*Build.*). A wooden piece driven into a hole cut in surface brickwork and finished off flush, so as to provide a material to which joinery or fittings may be nailed.

plug (*Elec. Comm.*). See **selector plug, plugging-up.**

plug (*Elec. Eng.*). A device containing two metal contacts arranged for inserting into a socket-outlet in order to provide a connexion to portable electrical apparatus. See **lampholder plug.**

plug (*Geol.*). A roughly cylindrical orifice through which igneous rock is injected. It frequently is filled with igneous rock which constitutes the plug proper.

plug (*Teleph.*). The terminal of a multiple flexible cord, which allows separate contact of its wires with the relevant springs of a jack into which the plug is inserted.

plug adaptor (*Elec. Eng.*). See **lampholder plug.**

plug centre bit (*Carp.*). A form of centre bit in which the projecting central point is replaced by a plug of metal, adapting the bit for use in holes already drilled.

plug cock (*Eng., Plumb.*). A simple valve in which the fluid passage is a hole in a rotatable plug fitted in the valve body. Rotation of the plug through a right-angle stops the flow by opposing to it the undrilled diameter of the plug.

plug fuse (*Elec. Eng.*). A form of fuse in which the fuse-link is contained in a plug which can be inserted into a suitable socket.

plug gauge (*Eng.*). A gauge, made in the form of a plug, used for testing the diameter of a hole; in a *plug limit guage* two plugs are provided, a 'go' and a 'not go.' See **limit gauge.**

plug-in coil (*Radio*). An inductance coil fitted with a system of contact pins on the base, thus enabling it to be fitted into a socket for ease in changing.

plug tap (*Eng.*). (1) The final tap required to finish an internal thread in a blind hole.—(2) A *plug cock* (q.v.).

plug tenon (*Carp., Join.*). A *stub tenon* (q.v.).

plugging (*Build.*). The operation of drilling a hole in the mortar of a brickwork joint, or elsewhere, and driving in a wall plug.

plugging (*Elec. Eng.*). A method which provides for the braking of an electric motor by arranging the connexions so that it tends to run in the reverse direction.

plugging-up (*Teleph.*). The transference of a faulty line from its normal connexions to the test-desk, at which position the test-clerk can apply suitable tests to ascertain the fault and issue instructions for its removal.

plum (*Civ. Eng.*). A large undressed stone embedded with others in mass concrete on large work, such as dams, in order to save concrete.

plu'mae (*Zool.*). Feathers having a stiff shaft and a firm vexillum, and usually possessing hamuli; they appear on the surface of the plumage and determine the contours of the body in addition to forming the remiges and rectrices.—*adjs.* **plumate, plumous, plumose, plumigerous.**

plu'masite (*Geol.*). A very rare rock type consisting essentially of oligoclase and corundum only.

plumb (*Build., Civ. Eng.*). Vertical.

plumb-bob (*Surv.*). A small weight or 'bob,' hanging at the end of a cord, which under the action of the weight takes up a vertical direction. Also called a PLUMMET.

plumb rule (*Build.*). A narrow board used for determining verticals; it has at one end a point of suspension for a plumb-bob, which is free to swing in an egg-shaped hole at the other end of the board.

plumba'go (*Chem.*). *Graphite* (q.v.); used for the making of crucibles because of its refractory qualities. The scaly graphite is used for this purpose, mixed with refractory clay and sand.

plumber's solder (*Plumb.*). A lead-tin alloy of varying ratio from 1 : 1 to 3 : 1 for different classes of work, the melting-points being always considerably lower than that of lead itself.

plumbing (*Build.*). (1) The craft of working lead for structural purposes, or for the installation of domestic water-supply systems, sanitary fittings, etc.—(2) The operation of arranging vertically.

plumbing fork (*Surv.*). An accessory for the plane-table when large-scale work is being done, enabling the point on the paper representing the plane-table station to be located exactly above the corresponding point on the ground. It consists of a U-shaped piece having two long equal limbs, one of which rests on the board to mark, with its end, the point on the paper, while the other passes under the board and carries at its end a plumb line.

plumbism (*Med.*). Lead poisoning.

plumbites (*Chem.*). See **lead hydroxide.**

plumbojar'osite (*Min.*). A basic hydrous sulphate of lead and iron, crystallising in the trigonal system. See **jarosite.**

plumbo-solvency (*Chem.*). A term usually applied to the solvent action of potable water on lead.

plumbum (*Chem.*). See **lead.**

plume (*Bot.*). A light, hairy or feathery appendage on a fruit or seed, serving in wind dispersal.

plume (*Meteor.*). Snow blown over the ridge of a mountain.

plume (*Zool.*). A feather: any feather-like structure.

plumed disseminule (*Bot.*). A fruit or seed bearing a plume.

plu'miped (*Zool.*). A Bird having feathered feet.

plummer block (*Eng.*). A journal bearing for line shafting, etc., consisting of a box-form casting holding the bearing brasses, split horizontally to take up wear; lubrication is usually by an *oiling ring* (q.v.).

Plummer-Vinson syndrome (*Med.*). The association of difficulty in swallowing, chronic inflammation of the tongue, achlorhydria, and anaemia.

plummet (*Surv.*). A plumb-bob.

plummet level (*Masonry, etc.*). An instrument for establishing a vertical direction; it consists of a plumb-bob suspended from one end of a long straightedge and swinging in a hole near the other end, to which is attached a short piece at right-angles.

plu'mose (*Bot., Zool.*). Hairy: feathered.

plumping (*Leather*). The swelling of a pelt, or leather, during the process of manufacture. See **liming.**

plu'mulae (*Zool.*). Feathers having a soft shaft and vane and lacking hamuli; in some cases the shaft is entirely lacking; they form the deep layer of the plumage.—*adjs.* **plumulate, plumula'ceous.**

plu'mule (*Bot.*). The first apical bud on the embryo in the seed; it is the rudimentary shoot.

plunger (*Eng.*). The ram or solid piston of a force-pump.

plunger key (*Teleph.*). A telephone key with spring contacts which are opened or closed by pressing a small plunger in line with the springs. Used in keysenders.

plur-, pluri- (Latin *plus*, gen. *pluris*, more, several). A prefix used in the construction of compound terms; e.g. *pluricellular* (q.v.).

plural gel (*Chem.*). A gel formed from two or more sols.

pluricel'lular (*Biol.*). Composed of two or more cells.

pluriglan'dular (*Med.*). Pertaining to, affected by, or affecting, several (ductless) glands.

pluriloc'ular (*Bot.*). Said of a sporangium or an ovary which is divided by septa into several compartments.

plurispo'rous (*Bot.*). Having two or more spores.

pluriva'lent (*Cyt.*). (In certain types of cell-divisions) said of compound chromatin rods formed of more than two chromosomes.

plus strain (*Bot.*). Often written (+) *strain.* One of the two strains of a heterothallic mould, often distinguished from the corresponding (−) *strain* by its stronger growth.

plush (*Textiles*). A fabric with cut pile on one or both sides of the ground texture. Warp pile is generally made by weaving two cloths together, with a pile warp common to both, which is afterwards cut.

plush copper ore (*Min.*). Chalcotrichite.

plu'teus (*Zool.*). In *Echinoidea* and *Ophiuroidea*, a pelagic larval form, being a modification of the *dipleurula* (q.v.), in which the ciliated band remains continuous, forming only a small preoral lobe, the postanal region is greatly developed and the arms are supported by calcareous rods.

Pluto (*Astron.*). The ninth planet in the solar system in order of distance from the sun, and the most recently discovered. It has not been sufficiently long under observation to have had all its elements determined with certainty, but its sidereal period is known to be 247·7 years, and its mean distance from the sun 39·46 astronomical units, or 3666 million miles.

pluton'ic intrusions (*Geol.*). A term applied to large intrusions which have cooled at great depth beneath the surface of the earth. Cf. *minor intrusions.*

plu′tonites (*Geol.*). A term, of American origin, applicable to all rocks occurring in major (plutonic) intrusions. More precisely restricted to such igneous rocks as fall within the limits of the coarse grain-size group.

Pluvex (*Build.*). A proprietary bituminous material, with a lead lining, used to form damp-proof courses in building construction.

pluviom′eter (*Meteor.*). A *rain-gauge* (q v.).

Plymouth Limestone (*Geol.*). Massive limestone, occurring near Plymouth; of Middle to Upper Devonian age.

Plynlim′on Beds (*Geol.*). The highest division of the Ordovician rocks (of Bala age) in Mid-Wales, lying conformably beneath the Silurian shales and mudstones.

plywood (*Timber*). A board consisting of a number of thin layers of wood glued together so that the grain of each layer is at right-angles to that of its neighbour. See **multi-ply.**

P.M. (*Build.*). Abbreviation for *purpose-made.*

P.M.C. (*Build.*). Abbreviation for *plaster-moulded cornice.*

P.M.X. (*Teleph.*). Abbreviation for *private manual exchange.*

P.M.B.X. (*Teleph.*). Abbreviation for *private manual branch exchange.*

pn (*Chem.*). A symbol for *propylenediamine*, $CH_3\cdot CH(NH_2)\cdot CH_2NH_2$.

pneum-, pneumo-, pneumat-, pneumato-, nū— (Greek *pneuma*, gen. *pneumatos*, breath). Prefix used in the construction of compound terms; e g. *pneumogastric, pneumatocyst* (qq v.).

pneu′mathode (*Bot.*). A more or less open outlet of the ventilating system of a plant, usually some loosely packed cells on the surface of the plant; through it exchange of gases between the air and the interior of the plant is facilitated.

pneumat′ic (*Eng., etc.*). Operated by, or relying on, air-pressure or the force of compressed air. See specific uses below.

pneumatic (*Zool.*). Containing air; as, in physostomous Fish, the *pneumatic duct* leading from the gullet to the air-bladder, and, in Birds, those bones which contain air-cavities.

pneumatic brake (*Eng*) A continuous braking system, used on some railway trains, in which air-pressure is applied simultaneously to brake cylinders throughout the train. See **air brake** (1), **continuous brake.**

pneumatic conveyor (*Eng.*). A system by which loose material is conveyed through tubes by air in motion, the air velocity being created by the expansion of compressed air through nozzles.

pneumatic drill (*Eng.*). A hard rock drill in which compressed air is arranged to reciprocate a loose piston which hammers the shank of the bit or an intermediate piece, or in which the bit is clamped to a piston rod.

pneumatic keys (*Teleg*). The keys which control high-frequency currents in a high-power telegraph radio-transmitter; operated by compressed air to ensure adequate rapidity of operation of contacts in making and breaking heavy currents.

pneumatic motor (*Acous.*). The small bellows which, when air is admitted or exhausted, acts as a driving force against a spring, for the operation of air paths in organs.

pneumatic pick (*Eng.*). A road contractor's tool in which, by mechanism similar to that of a *pneumatic drill* (q.v.), a straight pick is hammered rapidly by a reciprocating piston driven by compressed air.

pneumatic riveter (*Eng.*). A high-speed riveting machine similar in arrangement to a *hydraulic riveter* (q.v.) but in which a rapidly reciprocating piston driven by compressed air delivers 1000-2000 blows per minute.

pneumatic tools (*Eng.*). Hand tools, such as riveters, scaling and chipping hammers, and drills, driven by compressed air. See **pneumatic drill, pneumatic pick, pneumatic riveter.**

pneumatic trough (*Chem.*). A vessel used, in chemical laboratories, for the collection of gases.

pneumatic tube conveyor (*Eng.*). A system in which small objects enclosed in suitable containers are transported along tubes, the container acting as a moving piston which is impelled either by means of pressure or vacuum.

pneumatically operated switch (or **circuit-breaker**) (*Elec. Eng.*). A switch (or circuit-breaker) in which the force for closing is obtained from a piston operated by compressed air. Cf. *motor-operated switch, solenoid-operated switch.*

pneumaticity, —tis′it-i (*Zool.*). The condition of containing air-spaces, as the bones of Birds.

pneumato-, nū-mat′ō *or* nū′ma-to. Prefix. See **pneum-.**

pneumatocele (*Med.*). (1) A hernial protrusion of lung through some defect in the chest wall.—(2) Any air-containing swelling.

pneumatocyst (*Zool.*). (1) Any air-cavity used as a float.—(2) In Fish, the *air-bladder* (q.v.).—(3) The cavity of a pneumatophore.

pneumatol′ysis (*Geol.*). The destructive after-action of the concentrated volatile constituents of a magma, effected after the consolidation of the main body of magma. See **greisenisation, kaolinisation, tourmalinisation.**

pneumatophore (*Bot*) A specialised root which grows vertically upwards into the air from roots embedded in mud, and, being of loose construction, makes possible the access of air to the buried roots.

pneumatophore (*Zool.*). In *Siphonophora*, an apical float containing gas; it possibly represents a modified medusoid.

pneumatopyle (*Zool.*). In certain *Siphonophora*, the aperture by which the cavity of a pneumatophore communicates with the exterior.

pneumatu′ria (*Med.*). The passing of urine containing gas or air.

pneumec′tomy (*Surg.*). See **pneumonectomy.**

pneumo-. Prefix. See **pneum-.**

pneumoconiosis (*Med.*). See **pneumonokoniosis.**

pneumogas′tric (*Zool.*). A term applied to the tenth cranial or *vagus* (q.v.) nerve in Vertebrates because it sends branches to the lungs and stomach.

pneumohae′mopericar′dium (*Med.*). The presence of air and blood in the pericardial sac.

pneumohae′motho′rax (*Med*). The presence of air and blood in the pleural cavity.

pneumohy′dropericar′dium (*Med.*). The presence of air and a clear effusion in the pericardial sac.

pneumohy′drotho′rax (*Med.*). The presence of air and a clear effusion in the pleural cavity.

pneumokoniosis (*Med.*). See **pneumonokoniosis.**

pneu′molith (*Med.*). A concretion in the lung, formed usually as a result of calcification of a chronic tuberculous focus.

pneumol′ysis (*Surg.*). The operation of freeing the outer layer of the pleura from the chest wall (*external pneumolysis*), or of dividing adhesions between the outer layer of the pleura and that covering the lung (*internal pneumolysis*); both measures used for producing or increasing collapse of the lung.

pneumon-, pneu′mono- (Greek *pneumōn*, gen. *pneumonos*, lung). A prefix used in the construction of compound terms; e.g. *pneumonia, pneumonectomy* (qq.v.).

pneumonec′tomy (*Surg.*). Surgical removal of lung tissue.

pneumonia (*Med.*). A term generally applied to any inflammatory condition of the lung accompanied by consolidation of the lung tissue; more especially, *lobar pneumonia*, in which the consolidation affects one or more lobes of the lung.

pneumoni'tis (*Med.*). Pneumonia.

pneumonoko'nio'sis (*Med.*). A term applied to various dust diseases of the lung caused by the inhalation of particles in such occupations as coal-mining, an excess of fibrous tissue usually forming in the lungs round the dust particles.

pneumonomyco'sis (*Med.*). A term applied to disease of the lung caused by any one of a number of various fungi.

pneumo-oil switch (or **circuit-breaker**) (*Elec. Eng*). A switch or circuit-breaker in which the operation is carried out partly by pneumatic means, and partly by hydraulic means using oil as the medium.

pneumopericar'dium (*Med.*). The presence of air in the pericardial sac.

pneumoperitone'um (*Med.*). (1) The presence of air or gas in the peritoneal cavity.—(2) The injection of air into the peritoneal cavity for radiographic purposes.

pneumopy'opericar'dium (*Med.*). The presence of air and pus in the pericardial sac.

pneumopy'otho'rax (*Med.*). The presence of air and pus in the pleural cavity.

pneu'mostome (*Zool.*). In *Pulmonata*, the aperture of the mantle-cavity: in *Arachnida*, the aperture by which the cavity of a lung-book communicates with the exterior.

pneumota'xis (*Biol.*). (1) Response or reaction of an organism to the stimulus of carbon dioxide in solution.—(2) Response to the stimulus of gases generally.—*adj.* **pneumotactic.**

pneumotho'rax (*Med.*). (1) The presence of air or gas in the pleural cavity.—(2) The therapeutic injection of air or gas into the pleural cavity for the purpose of collapsing diseased lung (artificial pneumothorax).

pneumotro'pism (*Biol.*). Pneumotaxis.

Po (*Chem.*). The symbol for *polonium*.

P.O. box (or **bridge**) (*Elec. Eng.*). See **post office box.**

pock (*Med.*). A pustule; any small elevation of the skin, containing pus, occurring in an eruptive disease (especially small-pox).

pocket (*Join.*). The hole in a pulley stile through which the counterpoise weights are passed into the box of a sash and frame.

pocket chisel (*Join.*). A *sash chisel* (q.v.).

pocket chronometer (*Horol*). A pocket watch fitted with the chronometer escapement. On the continent of Europe the term is used for any high-precision pocket watch.

pocket watch (*Horol.*). A watch for carrying in the pocket.

Po'cono Sandstones (*Geol.*). Arenaceous rocks, including quartz conglomerates, occurring in the Lower Mississippian of eastern Pennsylvania; regarded as alluvial fan deposits.

pocu'liform (*Bot.*). Cup-shaped.

pod (*Bot.*). A dry fruit formed from a single carpel, having a single loculus containing one (rarely) to several seeds, and usually opening at maturity by splitting along both ventral and dorsal sutures. The pea-pod is a good example.

pod-auger (*Tools*). An auger having a straight groove cut in its length to hold the chips.

pod-, podo- (Greek *pous*, gen. *podos*, foot). A prefix used in the construction of compound terms; e.g. *podotheca*, a structure covering the foot.

podag'ra (*Med.*). Gout.

po'dal (*Zool.*). Pedal.

Podaxo'nia (*Zool.*). A term formerly used to denote a phylum of aquatic animals distinguished by lack of segmentation, sedentary habit, approximation of mouth and anus, U-shaped gut, and a *lophophore* (q.v.); it included the *Sipunculoidea, Phoronidea, Polyzoa*, and *Brachiopoda*, which are now classed as separate phyla.

po'deon (*Zool.*). See **petiole.**

pode'tium (*Bot.*). A stalk-like, cup-like, or much-branched erect thallus formed by some lichens.

po'dex (*Zool.*). The anal region.—*adj.* **podical.**

po'dical plates (*Zool.*). In *Insecta*, a pair of small sclerites in the anal region, representing the eleventh abdominal somite.

po'dite (*Zool.*). A walking leg of *Crustacea*.

po'dium (*Arch.*). A continuous low wall under a row of columns.

podium (*Zool.*). (1) In land Vertebrates, the third or distal region of the limb; manus or pes; hand or foot.—(2) Any foot-like structure, as the locomotor processes or tube-feet of Echinoderms. —*pl.* **podia.**—*adj.* **podial.**

podobran'chiae (*Zool*). In *Crustacea*, gills arising from the coxopodites of the legs.

po'docarp (*Bot.*). A stalk to a carpel.

Podoc'opa (*Zool.*). An order of *Ostracoda*; the shell lacks an antennal notch, there are five pairs of posteral limbs, and the caudal furcae have styliform or vestigial rami.

po'doderm (*Zool.*). The dermal layer of a hoof lying within the keratinous layers.

pododermati'tis (*Vet*). Laminitis.

Podogona (*Zool*). See **Ricinulei.**

po'domere (*Zool.*). In *Arthropoda*, a limb segment

podophthal'mite (*Zool.*). In *Crustacea*, the distal segment of the eye-stalk: the eye-stalk itself.

podoso'ma (*Zool.*). In *Acarina*, the region of the body composed of leg-bearing segments.

poecilitic (*Geol.*). *Poikilitic* (q v).

poecilogeny, pē-sil-oj'en-i (*Zool.*). Larval polymorphism, as in some *Diptera* (*Oligarces, Miastor*).

Poggendorff cell (*Elec. Eng.*). A single-fluid form of the bichromate cell.

Poggendorff compensation method (*Chem*). A method of measuring an unknown e m.f. by finding the point at which it just opposes the steady fall of potential along a wire.

poikil-, poikilo- (Greek *poikilos*, many-coloured). A prefix used in the construction of compound terms; e.g. *poikilocyte* (q.v.).

poikilit'ic (*Geol.*). Said of a texture in igneous rocks in which small crystals of one mineral are irregularly scattered in larger crystals of another—e.g. small olivines embedded in larger pyroxenes, as in some peridotites. The term has also been applied to the Permian System of rocks.

poikiloblas'tic (*Geol.*). A textural term applicable to metamorphic rocks in which small crystals of one mineral are embedded in large crystals of another. The texture is comparable with the *poikilitic* of igneous rocks.

poi'kilocyte (*Med.*). A malformed red blood cell.

poikilocyto'sis (*Med.*). Presence of malformed red cells in the blood, e.g. in severe anaemia.

poikilother'mal (*Zool.*). Cold-blooded.

Poilite (*Build.*). A weather-proof, fire-safe form of asbestos-cement sheeting, made from British Portland cement and mineral flax, and marketed in the form of sheets and tiles.

point (*Elec. Eng.*). In electric-wiring installations, a termination of the wiring for attachment to a lighting fitting socket-outlet or other current-consuming device.

point (*Typog.*). The unit of measurement for type and materials; 72 points are approximately 1 inch. The old type names have been largely discarded, and sizes previously known as *nonpareil, brevier, pica*, etc., have as their approximate equivalents 6-point, 8-point, 12-point, etc. See also **points** below.

points (*Print.*). (1) The general term for all punctuation marks.—(2) See **machine points.**

points (*Rail.*). See Supplement.

points (*Textiles*). The parts of a lace machine which carry the twists of bobbin and warp threads to the position where the lace is actually made.

point bar (*Lace*). A horizontal bar which supports the points at the back and front of a lace machine; it has a motion related to the swing of the carriages.

point d'esprit, pwan^{g} des-prē′ (*Lace*). A narrow spotted traverse net.

point draft (*Textiles*). An order for the drawing-in of warp threads, e.g. from shafts 1 to 8 and then from 8 to 1.

point-gap (*Elec. Eng.*). See **needle-point gap.**

point holes (*Print.*). Punctures made in the printed sheet by the spurs of the register points.

point net (*Lace*). A twisted thread net used as ground for tambour lace.

point paper or **design paper** (*Textiles*). Ruled paper upon which the interlacing of the threads in a fabric is shown. The paper has lines ruled both vertically and horizontally. The space between two vertical lines represents a warp thread, that between horizontal lines a weft thread. Small squares are formed by the vertical and horizontal rulings, in which a mark may be placed to indicate warp over weft, or vice versa.

point-plate rectifier (*Elec. Eng.*). A high-voltage rectifier making use of the fact that the breakdown voltage of a gap between a needle point and a flat plate depends on the polarity of the needle.

point screws (*Print.*). Screws for fastening *machine points* (q.v.) on the feedboard of a printing machine.

point source (*Acous.*). The hypothesis that sound is radiated from a point. This cannot occur in practice, but is approximated to when the size of the source is small in comparison with any distance from which it is observed.

point tie (*Textiles*). An arrangement of the harness in a jacquard machine, in which one section is tied up from left to right, or from right to left, and the next section conversely.

pointal (*Carp.*). A king-post.

pointed arch (*Build.*). An arch which rises on each side from the springing to a central apex.

pointed ashlar (*Masonry*). A block of stone whose face-markings have been done with a pointed tool.

pointer (*Build.*). A tool used for raking out old mortar from brickwork joints prior to pointing.

Pointers (*Astron.*). The name used in popular language for the two stars of the Great Bear, α and β Ursae Majoris; they are roughly in line with the Pole Star and so help to identify it.

pointilliste, pwan^{g}-tē-yēst′ (*Photog.*). A French system of painting in which colours are obtained by the juxtaposition of the requisite number of dots of the primary colours.

pointing (*Build., Civ. Eng.*). The process of raking out the exposed jointing of brickwork and refilling with, preferably, cement mortar.

pointing (*Furs*). The adding of silver or white hairs to self-coloured furs to imitate natural pointed fur.

Point'olite (*Illum.*). Trade-name for an incandescent lamp in which a knob of tungsten is heated by an arc originated by temporary ionisation by a heated wire. The light is designed to have a very small light source, in order to be suitable for projection purposes.

poise (*Chem.*). To maintain the oxidation-reduction potential of a solution constant by the addition of a suitable compound.

poise (*Horol.*). Equilibrium. A balance is said to be *in poise* when, supported horizontally by its pivots on knife edges, it has no tendency to rotate, or if rotated, no tendency to take up any set position.

poise (*Lubricants*). The unit of absolute viscosity of a fluid, signifying that a force of one gram will maintain unit rate of shear of a film of unit thickness between surfaces of unit area. Otherwise one dyne-second per sq. cm. (Named from the physicist Poiseuille). See **viscosity.**

Poiseuille's formula, pwa-zé′ē (*Phys.*). An expression for the volume of liquid, Q, which flows per second through a capillary tube of length L and radius R, under a pressure P, the viscosity of the liquid being η:

$$Q=\frac{\pi PR^4}{8L\eta}.$$

poising callipers (*Horol.*). See **callipers (poising).**

poising tool (*Horol.*). A tool with adjustable knife edges, for testing poise, e.g. of a balance.

poison. Any substance or matter which, introduced into the body in any way, is capable of destroying life. Poisons include products of decomposition or of bacterial organisms, and the viruses of contagious diseases. Generally classified as *irritants* (e.g. cantharides) and *corrosives* (e.g. strong mineral acids, caustic alkalis); *narcotics* (e.g. opium, alcohol, henbane); *narcotic-irritants* (e.g. nux vomica, hemlock). Among gases, carbonic acid, carbonic oxide, sulphuretted hydrogen, sulphide of ammonium and numerous others are of significance in industry. See also **war gas*.**

Poisson's ratio, pwa-son^{g}′ (*Phys.*) One of the elastic constants of a material. It is defined as the ratio of the lateral contraction per unit breadth to the longitudinal extension per unit length, when a piece of the material is stretched. For most substances its value lies between 0.2 and 0·4. The following is the relation between Poisson's ratio σ, Young's modulus E, and the rigidity n:

$$\sigma=\frac{E}{2n}-1.$$

poi'trail (*Carp.*). A petrail.

pol (*Cyt.*). The pole of a resting nucleus which lies nearest to the centrosome. Cf. *gegenpol.*

polar. *Adj.* from *pole.* See Supplement.

polar axis (*Astron.*). That diameter of a sphere which passes through the poles of the sphere: the axis of the earth about which it rotates: the axis of the celestial sphere about which it appears to rotate.

polar axis (*Crystal.*). A crystal or symmetry axis to which no two- or four-fold axes are normal; thus the arrangements of faces at the two ends of such an axis may be dissimilar. The principal axis of tourmaline is a polar axis of three-fold symmetry, the top of the crystal being terminated by pyramid faces, the bottom end by a single plane in some cases.

polar body (*Biol.*). One of two small cells detached from the ovum during the maturation divisions.

polar bond (*Chem.*). See **electrovalence.**

polar cap (*Cyt.*). A group of fine plasmatic strands formed early in division at the pole of a dividing nucleus and contributing to the formation of the spindle.

polar caps (*Astron.*). The two white regions round the poles of the planet Mars; visible in a telescope and presumably analogous to the ice and snow surrounding the poles of the earth.

polar curve (*Illum.*). A curve, drawn in polar co-ordinates, showing the light distribution around a light source.

polar diagram (*Radio*). A diagram showing the relative effectiveness of transmission or reception of an antenna system in different directions. It may be considered as a contour of equal field strength around a transmitting antenna; or, in the case of a receiving antenna, a contour path of a mobile transmitter producing a constant signal at the receiver.

polar distance (*Astron.*). A term (generally preceded by *North* or *South*, and written initially —N.P.D., S.P.D.) denoting the angular distance of a heavenly body from the pole of the celestial sphere; hence it is equal to the complement of the body's declination.

polar field (*Zool.*). See **polar plate.**

polar fusion nucleus (*Bot.*). The nucleus formed in the embryo sac by the union of the two polar nuclei; later it unites with a male nucleus and gives the first endosperm nucleus.

polar molecule (*Diel.*). A molecule having an electric moment. Polar molecules affect the dielectric constant and loss, there being a marked peak of both at a certain frequency at any given temperature.

polar nuclei (*Bot.*). Two nuclei in the embryo sac which unite to give the polar fusion nucleus.

polar plate (*Zool.*). In *Ctenophora*, one of two ciliated areas forming part of the aboral sense-organ.

polar pyrenoid (*Bot.*). A pyrenoid which is not wholly enveloped in a sheath of starch grains.

polar response (*Acous.*). The response of a microphone or loudspeaker when measured at a single frequency for all directions round a circle.

polar response curve (*Acous.*). The curve which indicates the distribution of the radiated energy from a sound reproducer for a specified frequency. Also the relative response curve of a microphone for various angles of incidence of a sound-wave for a given frequency. Generally plotted on a radial decibel scale.

polar sequence (*Astron.*). The name given to the adopted scale for determining photographic stellar magnitudes. It consists of a number of stars near the North Pole which are used as a standard of comparison; they range from Polaris to the faintest observable.

polar siderostat (*Astron.*). See **siderostat.**

polar'iloc'ular spore (*Bot.*). A two-celled spore with a very thick median septum traversed by a canal.

polarim'eter (*Chem.*). An instrument in which the optical activity of a liquid is determined by inserting Nicol prisms in the path of a ray of light before and after traversing the liquid.

polarim'etry (*Chem.*). The measurement of optical activity, especially in the analysis of solutions of sugars.

polarinu'cleate (*Bot.*). Said of a spore which has an oil drop (*nucleus*) at each end.

Polar'is (*Astron.*). The name given to the star α Ursae Minoris, near enough to the north celestial pole to mark it for rough observations, its North Polar Distance being less than 2°.

polarisation (*Chem.*). The separation of the positive and negative charges of a molecule.

polarisation (*Diel.*). See **displacement.**

polarisation (*Elec. Eng.*). A phenomenon, occurring in primary cells, by virtue of which a reduction takes place in the e.m.f. after current has been flowing for some time, owing to the collection of certain products of electrolysis on the electrodes. The effect can be minimised by the use of a depolariser.

polarisation (*Radio*). The direction of inclination of the components of an electromagnetic wave.

See **circular—** **plane—**
elliptic— **vertical—**
horizontal—

polarisation error (*Radio*). Error in determining the direction of arrival of radio-waves by a direction-finder when the desired wave is accompanied by downcoming components which are out of phase. Formerly termed NIGHT ERROR (or EFFECT).

polar'iscope (*Light*). An instrument for showing phenomena connected with polarised light. It may consist of a polariser and an analyser, with facilities for placing transparent specimens between them. The analyser is usually a Nicol prism. The polariser may be also a Nicol prism or a *pile of plates* (q.v.).

polarised light. In plane-polarised light the vibrations in the light-waves are confined to a single direction or plane. Polarised light may be obtained by reflecting ordinary light from a plane surface at the angle of polarisation, or by passing the light through a *Nicol prism* (q.v.). See **Brewster's law, circular polarisation, quarter-wave plate.**

polarised relay (*Elec. Comm.*). A relay in which there is a permanent flux, generally sustained by a permanent magnet, which makes the operation depend on the direction of the current and on its magnitude.

polarised waves (*Radio*). Although all electromagnetic waves are polarised in some manner, the term is generally applied to plane-polarised waves.

polariser (*Light*). A device for producing polarised light. It may be a pile of plates, a Nicol prism, or a 'Pola' disc or plate of Polaroid.

polar'ity (*Elec.*). The distinction between the north and south poles of a magnet, or between the north and south poles of an electric machine or circuit. Precisely, a pole is the location where a flux leaves or enters a surface of discontinuity.

polarity (*Zool.*). Existence of a definite axis.

polarity indicator (*Elec. Eng.*). An instrument for determining the polarity of one or more electric terminals.

polar'ogram (*Chem.*). A current-voltage curve obtained with a polarograph. The height of a current 'wave' is proportional to the concentration of a substance, and the corresponding voltage indicates its nature.

polar'ograph (*Chem.*). An apparatus for the automatic electroanalysis of a solution by means of the dropping mercury cathode.

polder (*Civ. Eng.*). A piece of low-lying land reclaimed from the water.

pole (Greek *polos*, hinge, axis). Generally, the axis or pivot on which anything turns: one of the ends of the axis of a sphere, especially of the earth.

pole (*Astron.*). See **celestial— terrestrial—**

pole (*Zool.*). Point: apex: an opposite point (as *aboral pole*): axis.

pole (*Bot.*). One end of an elongated spore.—(*Cyt.*) One end of the achromatic spindle, where the spindle fibres come together.

pole (*Carp.*). A long piece of timber of circular section and small in diameter.

pole (*Elec. Eng., etc.*). A wooden, steel, or concrete column for supporting the conductors of an overhead transmission or telephone line.

See **A-type—** **H-type—**
anchor— **terminal—**

pole plate (*Carp.*). A horizontal member supporting the feet of the common rafters and carried upon the tie-beams of the trusses.

pole-top switch (*Elec. Eng.*). A switch which may be mounted at the top of a transmission-line pole; arranged for hand-operation by some mechanical device.

pole (*Elec.*). (1) The part of a magnet, usually near the end, towards which the lines of magnetic flux apparently converge or from which they diverge, the former being called a *south pole* and the latter a *north pole.* See **unit pole.**—(2) That part of an electric machine which carries one of the exciting windings. See **salient pole.**—(3) A term sometimes used to denote one of the terminals of a d.c. generator, battery, or electric circuit, e.g. *negative pole, positive pole*.—(4) The term sometimes used in connexion with an electric arc to denote the extremity of either of the electrodes between which the arc burns.

pole arc (*Elec. Eng.*). The length of the pole face of an electric machine measured circumferentially around the armature surface.

pole bevel (*Elec. Eng.*). A portion of the pole face of an electric machine, near the pole tip, which is made to slope away from the armature surface instead of being concentric with it, the object being to obtain a more satisfactory shape of flux wave.

pole-changing control (*Elec. Eng.*). A method of obtaining two or more speeds from an induction motor, the connexions of the stator winding being altered so that it sets up different numbers of poles.

pole core (*Elec. Eng.*). See **pole shank.**

pole end-plate (*Elec. Eng.*). A thick plate placed at each end of the laminations of a laminated pole.

pole face (*Elec. Eng.*). That surface of the pole piece of an electric machine which faces the armature.

pole-face loss (*Elec. Eng.*). Iron losses which occur in the iron of the pole face of an electric machine on account of the periodic flux variations caused by the armature teeth.

pole-finding paper (*Elec. Eng.*). A paper prepared with a chemical solution, which, when placed across the two poles of an electric circuit, causes a red mark to be made where it touches the positive pole.

pole horn (*Elec. Eng.*). The portion of the pole shoe of an electric machine which projects circumferentially beyond the pole shank.

See **leading— trailing—**

pole piece (*Elec. Eng.*). A specially shaped piece of magnetic material forming an extension to a magnet, e.g. the salient poles of a generator or motor.

pole pitch (*Elec. Eng.*). The distance between the centre-lines of two adjacent poles on an electric machine; it is measured circumferentially around the surface of the armature of the machine.

pole-shading (*Elec. Eng.*). See **shaded-pole.**

pole shank (*Elec. Eng.*). The part of a pole piece around which the exciting winding is placed. Cf. *pole shoe.*

pole shim (*Elec. Eng.*). See **shim.**

pole shoe (*Elec. Eng.*). That portion of the pole piece of an electric machine which faces the armature; it is frequently detachable from the pole shank.

pole strength (*Elec. Eng.*). The force, in dynes, exerted by a particular magnet pole upon a unit pole supposed situated at a unit distance away from it. The term is used in theoretical work on magnetism.

pole tip (*Elec. Eng.*). The edge of the pole face of an electric machine which runs parallel to the axis of the machine. Hence *leading pole tip, trailing pole tip.*

polecat (*Furs*). See **fitch.**

Po'lian vesicle (*Zool.*). In some *Echinodermata*, a small stalked sac attached to the water-vascular ring.

po'lianite (*Min.*). Dioxide of manganese, crystallising in the tetragonal system. It is distinguished from *pyrolusite* (q.v,) by its hardness and anhydrous character.

poling (*Met.*). In the fire-refining of copper, the impurities are eliminated by oxidation and the oxygen is in turn removed by the reducing gases produced when logs (*poles*) are burned in the molten metal. If the final oxygen content is too high the metal is *underpoled*, if too low *overpoled*, and if just right *tough pitch* (q.v.).

poling boards (*Civ. Eng.*). Rough vertical planks used to support the sides of narrow trenches after excavation; placed in pairs on opposite sides of the trench at intervals along its length, each pair being wedged apart by wooden struts.

polio- (Greek *polios*, grey). A prefix used in the construction of compound terms; e.g. *poliomyelitis* (q.v.).

po'lioencephali'tis (*Med.*). Inflammation of the grey matter of the brain.

po'lioenceph'alomyeli'tis (*Med.*). Inflammation of the grey matter both of the brain and of the spinal cord.

po'liomyeli'tis (*Med.*). Inflammation of the grey matter of the spinal cord. Often used as a synonym for *acute anterior poliomyelitis*, or *infantile paralysis*, due to infection, chiefly of the motor cells of the spinal cord, with a filter-passing virus; characterised by fever and by variable paralysis and wasting of muscles.

po'lioplasm (*Biol.*). Granular protoplasm.

polished face (*Civ. Eng.*). A fine surface finish produced on granite by rubbing down a sawn face with iron sand, fine grit, and polishing powder in turn.

polished plate (*Build.*). A good quality sheet-glass over $\frac{3}{16}$ in. thick, much used for shop-window glazing.

polishing (*Cinema.*). The cleaning of negative film after a number of positives have been printed, during which process particles of dust, taken up by electrostatic attraction, are removed.

polishing lathe (or head) (*Eng.*). A headstock and spindle carrying a polishing wheel or mop rotated at high speed by belt drive or built-in motor; used for buffing and polishing.

polishing stake (*Horol.*). A flat polished piece of steel on which materials for polishing are mixed. It should be kept in a container to exclude dust.

polishing stick (*Eng.*). A stick of wood, one end of which is charged with emery or rouge, used for finishing small surfaces. It is twisted in the hands or held in the chuck of a drilling machine.

polishing wheel (*Eng.*). See **polishing lathe.**

polissoir, po-lē-swar' (*Glass*). A polishing pad used in polishing plate glass after the grinding process.

polit'zerisa'tion (*Med.*). Inflation of the middle ear by means of a special bag devised by Politzer.

polje, pol'jē (*Geol.*). The name applied to a large depression found in some limestone areas, due in part to subsidence following underground solution.

poll (*Tools*). The blunt end of a hammer or axe.

poll-adze (*Tools*). An adze having a blunt head opposite to the cutting edge.

poll-evil (*Vet.*). Inflammation of the bursa of the ligamentary nuchae of the horse.

Pollard's theorem (*Elec. Comm.*). An alternative name for *Thévénin's theorem.*

pollen (*Bot.*). The dusty or sticky material produced in anthers; it consists of many pollen grains each of which ultimately contains two male nuclei which are equivalent to male gametes.

pollen chamber (*Bot.*). The cavity formed in the apex of the nucellus in Gymnosperms, in which pollen grains lodge after pollination has occurred. The pollen grains slowly develop there and ultimately bring about fertilisation.

pollen flower (*Bot.*). A flower which produces no nectar, but liberates large amounts of pollen, which attracts insects.

pollen sac (*Bot.*). A cavity in an anther in which pollen is formed.

pollen tube (*Bot.*). A tubular outgrowth from the pollen grain, which grows to and into the embryo sac and conveys the male nuclei to the neighbour of the egg nucleus.

pollex (*Zool.*). The innermost digit of the anterior limb in *Tetrapoda*.

pollination (*Bot*). The transfer of pollen from an anther to a stigma; the process is a preliminary to fertilisation.

pollin'ium (*Bot.*). A mass of pollen grains united by a sticky or other substance and transported as a whole in pollination.

pollino'dium (*Bot.*). An old name for an *antheridium*.

Pollopas (*Plastics*). A proprietary thermosetting plastic of the urea-thiourea-formaldehyde type; sp. gr. 1·48-1·55, moulding temp. 300-360° F., tensile strength 4000-7000 lb. per sq. in.

pollu'cite (*Min.*). A rare alumino-silicate of caesium, occurring as clear colourless cubic crystals in Maine, U.S A.; used as a gemstone.

pollution carpet (*Ecol*). In stagnant and polluted waters, a slimy layer occurring on the bottom; it consists mainly of bacteria, detritus-feeding protozoa and fungi.

polly (*Cinema.*). An undesired echo on the sound stage in sound-film production.

po'locyte (*Zool.*). Polar body.

polo'nium (*Chem.*). Symbol, Po. A radioactive element in the sixth group of the periodic system, with a half-life of 136·5 days. It is identical with RaF. At. no. 84, at. wt. 210. Polonium is the last stage element before the formation of lead in the radioactive disintegration of radium.

poly- (Greek *polys*, many). A prefix used in the construction of compound terms; e.g. *polythalamous*, many-chambered (as Shells).

poly- (*Chem.*). Containing several atoms, groups, etc.

polyadel'phous (*Bot.*). Said of an androecium in which the stamens are joined by their filaments into several separate bundles.

polyan'dry (*Bot.*). The condition of having a large and indefinite number of stamens.

polyandry (*Zool.*). The practice of a female animal consorting with more than one male.—*adj.* **polyandrous.**

pol'yarch, —ark (*Bot.*). Said of a stele having many protoxylem strands.

polyarthri'tis (*Med.*). Inflammation affecting several joints at the same time

polyas'ter (*Zool.*). A complex mitotic figure formed in an ovum after polyspermy.

polyax'on (*Zool.*). Having many axes; said of Sponge spicules.

polyba'sic acids (*Chem.*). Acids containing two or more replaceable hydrogen atoms in the molecule.

polyba'site (*Min.*). Sulphide of silver and antimony, crystallising in the monoclinic system. It is found in many silver veins.

pol'yblast (*Zool.*). A type of phagocytic cell.

pol'ycarp (*Zool.*). In some *Urochorda*, a form of gonad occurring on the inner surface of the mantle.

polycarpel'lary (*Bot.*). Consisting of many carpels.

polycar'pic (*Bot.*). Able to fruit many times in succession.

polycar'pous (*Bot.*). Having an apocarpous gynaeceum.

polycer'coid (*Zool.*). See **echinococcus.**

polycer'cous (*Zool.*). Having many tails or scolices, as an *echinococcus* (q.v.).

Polychaeta, —kē'ta (*Zool.*). A class of *Annelida* of marine habit, having locomotor appendages (parapodia) bearing numerous setae; there is usually a distinct head; the perivisceral cavity is subdivided by septa; the sexes are generally separate, with numerous gonads; and development is by metamorphosis. Marine Bristle-worms.

polycha'sium (*Bot.*). A cymose inflorescence in which the branches arise in sets of three or more at each node.

polychlamyd'eous chimaera (*Bot.*). A periclinal chimaera in which the skin is more than two layers of cells in thickness.

polychroma'sia (*Med.*). The diffuse bluish staining of the young immature red blood corpuscles with eosin and methylene blue. Also called POLYCHROMATOPHILIA.

Polyclad'ida (*Zool.*). An order of marine *Turbellaria* in which the gut has many branches which may ramify or anastomose.

polycli'nal chimaera (*Bot.*). A chimaera which is made up of more than two components.

polycor'mic (*Bot.*). Said of a woody plant having several strong vertical trunks.

polycotyle'donous (*Bot.*). Having more than two cotyledons.

polycy'clic (*Bot.*). Said of a stele in which there are two or more concentric rings of vascular strands.

polycyclic (*Chem.*). Containing more than one ring of atoms in the molecule.

polycyclic (*Zool.*). Said of Shells having numerous whorls.

polycys'tic (*Med.*). Containing many cysts; e.g. a *polycystic* kidney.

polycythae'mia, polycythe'mia (*Med.*). An increase in the number of red corpuscles per unit of circulating blood. See also **erythraemia.**

polydac'tylism, polydac'tyly (*Med.*, *Zool.*). Having more than the normal number of digits.—*adj.* **polydactylous.**

polydip'sia (*Med*). Excessive thirst.

pol'ydisc strobilisation (*Zool*). The production of more than one ephyra at a time by a scyphozoan hydratuba.

polyem'bryony (*Bot.*). The production of more than one embryo in one ovule; consequently, the presence of more than one embryo in a seed.—(*Zool.*) The production of more than one embryo from a single fertilised ovum.

polyener'gid (*Biol.*). Coenocytic.

polyenergid nucleus (*Cyt.*). A nucleus possessing several sets of chromosomes.

polyg'amous *or* pol'i-gam'us (*Bot.*). Said of a species which has staminate, pistillate, and hermaphrodite flowers on the same and on distinct individual plants.—(*Zool.*) Said of an animal which mates with more than one of the opposite sex during the same breeding season.—*n.* **polygamy.**

polygas'tric (*Zool.*). Having several gastric cavities, as a Siphonophoran colony.

polygenet'ic (*Chem.*). Producing two or more shades with different mordants.

polygon of forces (*Mech.*). If several forces are in equilibrium at a point and a polygon is drawn with sides parallel to the directions of the forces (the directions being cyclic round the polygon), the lengths of the sides of the polygon are proportional to the corresponding forces.

polyg'onal roof (*Build.*). A roof which in plan forms a figure bounded by more than four straight lines.

polygonal rubble (*Masonry*). A form of rag-work in which the rubble wall is built up of stones having polygonal faces.

pol'ygoneu'tic (*Zool.*). Having several broods in a year.

polygy'nous, *or* —lij'en-us (*Bot.*). Said of a flower having several distinct styles.

polygynous (*Zool.*). Said of a male animal which consorts with more than one female.

polyhy'dric (*Chem.*). Containing a number of hydroxyl groups in the molecule; e.g. *polyhydric alcohols*, alcohols with three, four, or more hydroxyl groups; *polyhydric acids*, acids containing a number of hydroxyl groups in the molecule, apart from the carboxyl group.

polymas'tia, polymas'tism (*Med.*, *Zool.*). The presence of supernumerary breasts.

Polymastigi′na (*Zool.*). An order of *Zoomastigina* the members of which have usually more than three flagella.

polymas′tigote (*Zool.*). Having a tuft of flagella.

polymas′tism. See **polymastia.**

polyme′lus (*Med.*). A foetal monster with more than the normal number of limbs.

polym′eric (*Gen.*). Said of factors which are not allelomorphic but which affect the same character in the offspring and cause it to develop in the same way.

polymerisa′tion (*Chem.*). The combination of several molecules to form a more complex molecule having the same empirical formula as the simpler ones. It is often a reversible process.

pol′ymery (*Bot*). The condition when a whorl consists of many members.

polymeth′ylene derivatives (*Chem.*). Cyclic compounds containing three or more methylene groups in the ring.

polymor′phic (*Zool.*). Showing a tendency to division of labour among the members of a colony. See also **polymorphism.**

polymorphic transformation (*Met.*). A change in a pure metal from one form to another, e.g. the change from gamma to alpha iron.

polymor′phism (*Min.*). The property possessed by certain chemical compounds of crystallising in several forms which are genetically distinct: thus TiO_2 occurs as the mineral species *anatase*, *brookite*, and *rutile*.

polymorphism (*Zool.*). The occurrence of different structural forms at different stages in the life-cycle of an individual: the occurrence of morphologically different types of individuals within the same species.—*adjs.* **polymorphic, polymorphous.**

polymor′phonu′clear leucocyte (*Physiol.*). See **neutrophil.**

polymyosi′tis haemorrha′gica (*Med.*). A form of *dermatomyositis* (q.v.) in which haemorrhages occur in and between the muscles.

polyneuri′tis (*Med.*). Multiple neuritis. A widespread affection of many peripheral nerves with flaccid paralysis of muscles and/or loss of skin sensibility, due to infection or poisoning with various agents, such as lead, alcohol, arsenic, diphtheria toxin, etc.

polynu′cleate (*Biol.*). Multinucleate; having many nuclei.

polyoestrous, pol-i-ēs′trus (*Zool.*). Exhibiting several oestrous cycles during the breeding season. Cf. *monoestrous.*

polyoi′cous (*Bot.*). Said of *Bryophyta* in which antheridia and archegonia may occur on the same plant or on separate plants.

pol′yorrhomeni′tis (*Med.*). Concato's disease.

pol′yoses (*Chem.*). Polysaccharoses.

polyox′ybion′tic (*Ecol.*). Requiring a copious oxygen supply.

polyp (*Zool.*). An individual of a colonial animal.

polypep′tides (*Chem.*). Protein derivatives obtained by the condensation of amino acids.

Polypet′alae (*Bot.*). A group of dicotyledons in which the corolla consists of separate petals.

polypet′alous (*Bot.*). Said of a corolla made up of distinct petals.

pol′ypha′gous, *or* pol-if′— (*Bot.*). Said of a fungal parasite which attacks several host cells at the same time.—(*Zool.*) Feeding on many different kinds of food; as *Sporozoa* which exist in several different cells during one life-cycle, or phytophagous Insects with many food-plants.

pol′yphase (*Elec. Eng.*). Said of a.c. systems or pieces of apparatus in which there are two or more circuits containing voltages displaced from one another in phase, usually by approximately equal portions of a period. See **single phase, two phase, three phase.**

polyphase motor (*Elec. Eng.*). An electric motor designed to operate from a polyphase supply.

polyphylet′ic (*Gen*). Descended from diverse ancestors: showing characters derived from several ancestral types: convergent.

pol′yphyl′lous (*Bot.*). Consisting of members which are separate from one another.

pol′yphy′ly (*Gen.*). Presumed descent from several distinct sources.

polyphy′odont (*Zool.*). Having more than two successive dentitions.

pol′ypide (*Zool.*). A polyp: an individual of a colonial animal: in *Polyzoa*, that part of an individual excluding the zooecium or body-wall. Also POLYPITE.

Pol′yplacoph′ora (*Zool*). A subclass of *Amphineura* in which the foot occupies the whole ventral surface of the body, the shell consists of eight transverse dorsal plates, and the branchiae form a row on each side between the mantle and the foot; sluggish marine animals living among rocks and stones and feeding on algae; mainly shallow-water forms but a few are bathic. Coat-of-Mail Shells.

pol′yploid (*Cyt.*). Having more than twice the normal haploid number of chromosomes.

polypneu′stic (*Zool.*). Having many respiratory apertures; as in certain dipterous larvae.

pol′ypod (*Zool*). Said of a phase in the development of larval Insects in which the abdomen is completely segmented and bears the full number of appendages.

polypo′sis (*Med.*). The development of many polypi in a part, as in the intestine.

polypro′todont (*Zool.*). Having numerous pairs of small subequal incisor teeth: pertaining to the *Polyprotodontia.* Cf. *diprotodont.*

pol′ypus (*Med.*). A smooth, soft, pedunculated tumour growing from mucous membrane.

polysac′charoses (*Chem.*). Polyoses; a group of complex carbohydrates such as starch, cellulose, etc. They may be regarded as derived from x monose molecules by the elimination of x molecules of water. Polysaccharoses can be hydrolysed step by step, ultimately yielding a monose.

polysap′robe (*Biol.*). An organism able to live in heavily contaminated water.

polysep′alous (*Bot.*). Said of a calyx consisting of separate sepals.

polyserosi′tis (*Med.*). Concato's disease.

polysi′phonous (*Bot.*). Said of an algal thallus consisting of a central row of elongated cells surrounded by one or more layers of peripheral cells.

polysper′mous (*Bot.*). Containing many seeds.

pol′ysper′my (*Zool.*). Penetration of an ovum by several sperms.

pol′yspon′dyly (*Zool.*). The condition of having more than two vertebral centra corresponding to a single myotome.—*adjs.* **polyspon′dylic, polyspon′dylous.**

pol′yspore (*Bot.*). A multicellular spore.

pol′yspo′ry (*Bot.*). The formation of more than the normal number of spores.

pol′ystele (*Bot.*). See **dictyostele.**

polyste′lic (*Bot.*). Having more than one stele.

polystem′onous (*Bot.*). Polyandrous.

polystichous, —stik′us (*Bot.*). Arranged in several to many rows.

polysto′matous (*Zool.*). Having many apertures, as *Porifera*: having more than one mouth-opening, as certain *Discomedusae.*

polysty′renes (*Plastics*). See **styrene resins.**

polythal′amous (*Zool.*). In *Protozoa*, said of a shell or test which has two or more chambers.

polythe′lia (*Med.*). The occurrence of supernumerary nipples.

polyto'kous (*Zool.*). Bringing forth many young at a birth; prolific; fecund.—*n.* **polytoky.**

polyto'mous (*Bot.*). Having several branches arising at the same level.

polytro'phic (*Zool.*). In *Insecta*, said of ovarioles in which nutritive cells alternate with the oöcytes: more generally, obtaining food from several sources.

polyu'ria (*Med.*). Excessive secretion of urine.

polyva'lent (*Chem.*). Having a valency greater than unity.

polyvi'nyl resins (*Plastics*). See **vinyl resins.**

Polyzo'a (*Zool.*). A phylum of small non-metameric aquatic *Coelomata* of colonial habit; they have a simple circular or U-shaped lophophore; there is no vascular system; the anus is dorsal and close to the mouth; asexual reproduction by budding usually occurs at some stage of the life-history.

polyzo'ic (*Zool.*). Having many zooids, as a hydroid colony: containing many sporozoites, as a spore.

pome (*Bot.*). A compound fleshy fruit containing a number of seeds inside a papery core formed from the inner walls of the united carpels; e.g. an apple.

pommel (*Build.*). (1) An ornament in the shape of a ball, e.g. a ball finial.—(2) A *punner* (q.v.).

pom'miform (*Bot.*). Apple-shaped.

pomol'ogy (*Bot.*). The study of cultivated fruits and fruit trees.

pom-pom (*Artillery*). A colloquialism applied to various types of gun. Particularly, a multi-barrelled small-shell gun firing a spread of shells; used as an anti-aircraft weapon.

pomum Adami (*Zool.*). Adam's apple.

Ponceaux, pon-sō (*Chem.*). A group of dyestuffs prepared by the interaction of various diazo-salts with naphthol-sulphonic acids.

Pon'celet wheel (*Eng.*). An undershot water-wheel with curved vanes; of higher efficiency than the flat-vane type. See **undershot wheel.**

pond (*Hyd. Eng.*). A reach or level stretch of water between canal locks. Also called a POUND.

pongee' (*Textiles*). A fine cotton cloth, generally dyed and mercerised; made for Eastern markets. Originally made from silk.

pons (*Zool.*). A bridge-like or connecting structure: a junction.—*pl.* **pontes.**—*adj.* **pontal.**

pons Varo'lii (*Zool.*). In Mammals, a mass of transversely coursing fibres joining the cerebellar hemispheres.

Pont Erwyd Beds (*Geol.*). A group of dark shales found in Central Wales, of Lower Silurian age. See **Plynlimon Beds.**

pontal flexure (*Zool.*). The flexure of the brain occurring in the same plane as the cerebellum; it bends in the reverse direction to the primary and nuchal flexures and tends to counteract them.

Pontesford'ian Series (*Geol.*). A series of volcanic rocks of Pre-Cambrian age which form Pontesford Hill in Shropshire. See **Uriconian Rocks.**

Pon'tiac Series (*Geol.*). See **Timiskaming Group.**

pontie, pontil (*Glass*). See **punty.**

pontoon (*Civ. Eng.*). A floating vessel for the support of plant, materials, and men; used in constructional work at sea or in rivers.

pontoon bridge (*Civ. Eng.*). A temporary bridge thrown across a river and carried on numerous floating supports, or *pontoons*, resembling small boats.

pony girder (*Struct.*). A secondary girder carried across side-by-side cantilevers.

pony motor (*Elec. Eng.*). A name sometimes given to an auxiliary motor used to bring synchronous machinery up to speed before synchronising.

poor lime (*Build.*). Lime in which the proportion of impurities insoluble in acids is in excess of 15%.

P.O.P. (*Photog.*). Abbrev. for *printing-out paper*, i.e. any photographic paper, for normal printing, which does not require development.

pop valve (*Eng.*). A boiler safety-valve in which the head of the wing valve is so shaped as to cause the steam to accelerate the rate of lift when a small lift occurs, giving rapid pressure release.

poplin (*Textiles*). A cotton fabric of plain weave, with fine lines or cords running across the piece (due to the ends per inch greatly exceeding the picks per inch); usually mercerised. Used for shirtings, pyjamas, and dresses. Formerly, poplin fabrics were made from a combination of silk, worsted, and cotton.

poplite'al (*Zool.*). In *Tetrapoda*, pertaining to the region above the cruro-femoral articulation.

poppet valve (*I.C. Engs.*). The mushroom or tulip-shaped valve, made of heat-resisting steel, commonly used for inlet and exhaust valves. It consists of a circular head with a conical face which registers with a corresponding seating round the port, and a guided stem by which it is lifted from its seating by the rocker or tappet. See **valve inserts, valve spring, mushroom valve, stellited valves.**

poppets (*Ship Constr.*). Temporary structures erected beneath a ship's hull to transfer the weight to the sliding ways, prior to and during launching.

popping (*Plast.*). A defect in plasterwork resulting from the use of a lime which has not been properly slaked.

popping-back (*I.C. Engs.*). An explosion through the inlet pipe and carburettor of a petrol engine, due to a weak, slow-burning mixture.

poradeni'tis vene'rea (*Med.*). See **lymphogranuloma inguinale.**

poran'drous (*Bot.*). Said of stamens which open by pores, not by slits.

por'celain (*Pot.*). Fine pottery with a hard, close-grained, translucent or semi-translucent body. The true hard-paste porcelain is composed of china stone and china clay; artificial, or soft-paste, porcelain has a body composed of glass or frit and white clay.—(*Diel.*) For dielectrical uses porcelain is made from china clay (aluminium silicate) with quartz as filler and feldspar as flux. Hard porcelain only is used, the proportions being two of china clay, one of quartz, and one of feldspar.

porcelain insulator (*Elec. Eng.*). An insulator for supporting high-voltage electric conductors; and made of a hard quality of *porcelain* (q.v.).

See **bushing—** **post—**
pin— **suspension—**

Porcel'la (*Paint.*). A trade-name for a paint having fire-resisting qualities.

porch (*Build.*). An exterior entrance to a building, covered with a separate roof.

porcupine roller (*Lace*). A roller, covered with wire carding, which draws the lace fabric over the facing bar on to the work roller.

porcupine system of drawing (*Textiles*). A method of producing worsted roving in a rounded form without twisting; effected by passing the sliver between oscillating rubbing leathers. Also known as CONTINENTAL (or FRENCH) SYSTEM.

pore (*Bot.*). (1) The aperture of a stoma.—(2) The ostiole in *Pyrenomycetes*.—(3) One of the tubular cavities lined by basidia in the pore-bearing fungi.—(*Zool.*) A small aperture.—*adjs.* **porif'erous, porous, poriform.**

pore plate (*Zool.*). The perforated portion of the central capsule in certain *Radiolaria*: the madreporite of *Echinodermata*.

porenceph'aly, poren'cepha'lia (*Med.*). The presence, in the substance of the brain, of cysts or cavities containing colourless fluid; due to a defect in development.

porici′dal (*Bot.*). Said of anthers which open by pores.

Porif′era (*Zool.*). A phylum of *Parazoa* composed of sessile and aquatic animals with a single cavity in the body lined in part or in whole by choanocytes; water enters the cavity by numerous pores in the body-wall and leaves it by one or more larger openings. Sponges.

por′ocyte (*Zool.*). In *Porifera*, a conical cell extending through from the dermal layer to the paragaster and pierced from base to apex by a tube through which water passes to the paragaster.

po′rogam′y (*Bot.*). The entry of the pollen tube through the micropyle in early stages of fertilisation.

poroid (*Bot.*). Having more or less obvious pores.

porom′eter (*Bot.*). An instrument for measuring the rate at which air can be drawn through a portion of a leaf; it is a means of measuring the degree to which the stomata are open.

porose (*Bot.*). Said of cell walls which are pierced by pores.

poros′ity (*Build.*). The percentage of pore space in a material.

porosity (*Diel.*). (Of a solid sheet—usually paper) the ease with which air or liquids can pass through the sheet.

porosity (*Geol.*). (Of rocks) the ratio, usually expressed as a percentage, of the volume of the pore space to the total volume of the rock.

porous dehiscence (*Bot.*). The liberation of pollen from anthers, and of seeds from fruits, by means of pores in the wall of the containing structure.

porous pot (*Elec. Eng.*). An unglazed earthenware pot serving as a diaphragm in a two-fluid cell.

porous screen (*Cinema.*). A perforated screen (see **screen**).

por′pezite (*Min.*). A variety of gold which contains up to 10% of palladium.

por′phyrite (*Geol.*). An unsatisfactory term, though widely used, for microdiorite or porphyritic *microdiorite* (q.v.).

porphyrit′ic texture (*Geol.*). The term applied to the texture of igneous rocks which contain isolated euhedral crystals larger than those which constitute the groundmass in which they are set.

porphyroblas′tic (*Geol.*). A textural term applicable to metamorphic rocks containing conspicuous crystals in a finer groundmass, the former being analogous with the phenocrysts in a normal igneous rock, but having developed in the solid.

por′phyry (*Geol.*). A general term used rather loosely for igneous rocks which contain relatively large isolated crystals set in a fine-grained groundmass; e.g. *granite-porphyry*. It is better used as a textural qualifier combined with a specific rock name; e.g. *porphyritic microgranite*, a medium- to fine-grained rock of granitic composition with porphyritic texture.

por′poising (*Aero.*). Recurring movements of a seaplane, flying-boat, or amphibian, when taxiing: instability on the water, as distinct from instability under air-borne conditions.

porrect′ (*Bot.*). Extending forwards.

port (*Cinema.*). An observation window for the recordist or control engineer in a sound-film studio.

port (*Eng.*). An opening, generally valve-controlled, by which a fluid enters or leaves the cylinder of an engine, pump, etc.

See **piston valve** **sleeve valve**
poppet do. **slide** do.

Port Ewen Limestone (*Geol.*). See **Oriskany Stage.**

porta (*Zool.*). Any gate-like structure.—*adj.* **portal.**

portable accumulator (*Elec. Eng.*). An accumulator mounted in a box with a handle for carrying, with suitable arrangements to prevent the acid from spilling.

portable electrometer (*Elec. Eng.*). A portable form of the absolute attracted-disc type of electrometer.

portable engine (*Eng.*). A steam or I.C. engine carried on road wheels but not self-propelled thereby.

portable instrument (*Elec. Eng.*). An electrical measuring instrument specially designed for carrying about for testing purposes. Cf. *switchboard instrument, substandard instrument.*

portable lamp (*Illum.*). See **hand-lamp.**

portable photometer (*Illum.*). A photometer which can be easily carried about; used for measuring illumination values.

portable substation (*Elec. Eng.*). A substation comprising the converting or transforming plant and the necessary switch and protective gear, mounted on a railway truck or other vehicle in order that it can be quickly moved to any site for dealing with special loads or other emergency conditions.

Portage Group (*Geol.*). Marine strata of Upper Devonian age typically exposed at Portage, N.Y., where they comprise grey and black shales capped by sandstones; equivalent to the non-marine *Oneonta Group* (q.v.) in western New York.

portal (*Build., Civ. Eng.*). (1) A structural frame consisting essentially of two uprights connected across the top by a third member.—(2) An arch spanning a doorway or gateway.

portal jib crane (*Eng., etc.*). A jib crane mounted on a fixed or movable structure which permits the passage of wagons, etc., through an opening directly under the crane.

portal system (or **circulation**) (*Zool.*). A vein which breaks up at both ends into sinusoids or capillaries; as (in Vertebrates) the *hepatic portal system*, in which the hepatic portal vein collects from the capillaries of the alimentary canal and passes the blood into the sinusoids and capillaries of the liver.

porte-lumière, —lūm-yăr′ (*Surv.*). A simpler form of *heliostat* (q.v.), worked by hand.

porter (*Brew.*). A beer partaking of the character of mild ale and stout; usually it has a sweet flavour.

porter (*Textiles*). A basic measure in linen manufacture. The *porter* consists of 20 splits or openings, and the reed may be gauged by the number of porters in a width of 37 in. Cf. *beer.*

Porter governor (*Eng.*). A pendulum-type governor in which, usually, the ends of two arms are pivoted to the spindle and sleeve respectively, and carry heavy balls at their pivoted joints. The sleeve carries an additional weight. See **pendulum governor.**

portico (*Build.*). A colonnade at one side of a building (usually the entrance side).

Portland Beds, Portlandian Stage (*Geol.*). A group of sands (below) and limestones (above) found in the Upper Jurassic rocks of southern England. It includes the famous Portland Stone (an oölitic freestone), much used for building purposes.

Portland blast-furnace cement (*Build., Civ. Eng.*). A cement differing from a Portland cement in that it contains a proportion (usually not exceeding 65%) of blast-furnace slag.

Portland cement (*Build., Civ. Eng.*). A much-used cement made by intimately mixing clay and chalk in proportions varying between 3 : 7 and 1 : 4, and afterwards burning the mixture in a kiln.

port′landite (*Min.*). Calcium hydroxide, $Ca(OH)_2$, occurring as hexagonal plates in the Chalk-dolerite contact-zone at Scawt Hill, Co. Antrim. Occurs also in Portland cement, hence the name.

Portmad′oc Beds (*Geol.*). A series of thick feldspathic slates found in N. Wales; of Upper Cambrian age.

Portscath′o Beds (*Geol.*). A series of slates of

Devonian age found in Cornwall. They are almost unfossiliferous and are known as *killas* by the miners. Now combined with the Grampound Beds as the *Gramscatho Group*.

position (*Teleph.*). The location of an operator such that she has full control of a telephone call passing through her section of the switchboard. See **A—**
B—
call-indicator—
filter-record—
monitor—
phonogram—
special control—
testing—
trunk—
trunk-record—
A-position keysending
B-position do.

position, adjusted for (*Horol.*). A watch is said to be *adjusted for position* when it has been so regulated as to give the best performance in the different positions.

position angle (*Astron.*). A measure of the orientation of a point on the limb of a heavenly body referred to a fixed meridian through the body; as of the sun's axis of rotation referred to the north point of the limb: (of double stars) the angle between the line joining them and the declination circle through the principal star.

position, circle of (*Astron.*). A small circle on the earth's surface obtained by any single observation of the altitude of a known star as the locus of the observer's position; the radius of the circle in nautical miles being the zenith distance of the body in minutes of arc, and its centre the substellar point.

position-finding (*Radio*). The determination of the location of a transmitting station (e.g. an aeroplane) by taking a number of bearings by direction-finders which receive a signal from the transmitter. The location of the transmitter is transmitted back to the operator.

position head (*Hyd.*). See **elevation head.**

position meter (*Teleph.*). A meter, which counts the calls handled at an operator's position; operated manually or automatically.

position tests (*Horol.*). Tests used to determine the performance of a watch in different positions, i.e. *horizontal tests*: dial up, dial down; *vertical tests*: pendant up, pendant right, pendant left.

positional astronomy (*Astron.*). The branch of astronomy that is concerned with the position of the heavenly bodies regarded as points on the observer's celestial sphere. It is the oldest form of the science, being essentially geocentric in outlook, even in modern times. It comprises all diurnal and seasonal phenomena and the precise assignment of co-ordinates to the heavenly bodies. Also called SPHERICAL ASTRONOMY.

positive (*Elec.*). A particular point or electrode is said to be *positive* with respect to another point when it is at a higher electric potential than the other point.

positive (*Photog.*). An image in the same scale of contrast as the original, i.e. black for black and white for white, as contrasted with a *negative* (q.v.), where the scale is reversed, i.e. white for black and black for white, with intervening gradations.

positive (*Weaving*). Said of movement in any part of a loom that is due to mechanical means; *negative* movement is that achieved by using springs or weights.

positive after-image (*Optics*). The continued image perceived after visual fatigue in the retina, when the object is replaced by a dark surface or the eye is closed.

positive cyanotype (*Photog.*). A positive blue-printing process in which the iron is included in a viscous sensitising liquid, while the ferrocyanide is provided in the developer.

positive electricity (*Elec.*). A body is said to possess positive electricity when it gives rise to certain well-recognised phenomena, this state arising from a deficiency of electrons on the body. Cf. *negative electricity*.

positive emulsion (*Photog.*). Fine-grain emulsion of the ortho-type used for printing positives and for registering photographic sound-tracks; not required to be specially sensitive to a variety of coloured rays.

positive feeder (*Elec. Eng.*). A feeder connected to the positive terminal of a d.c. supply.

positive film stock (*Cinema.*). The unexposed film on which positive rush and release prints are made. It is also used in sound-cameras for exposing for the sound-track negative, because of its fine grain as compared with the pan stock used in the picture-cameras.

positive ion (*Thermionics*). A molecule or atom of gas which has become positively charged through the loss of one or more electrons.

positive mineral (*Crystal.*). A mineral in which the ordinary ray velocity is greater than that of the extraordinary ray; that is, μ_0 is less than μ_e. Quartz is a positive mineral for which $\mu_0 = 1{\cdot}544$ and $\mu_e = 1{\cdot}553$. See **optical sign.**

positive phase sequence, positive phase-sequence component (*Elec. Eng.*). See **phase sequence.**

positive rays (*Phys.*). Streams of positively charged atoms or molecules which take part in the electrical discharge in a rarefied gas; they have been studied by allowing them to pass through a perforated cathode on to a photographic plate, being deflected by magnetic and electrostatic fields (*Thomson's parabola method*), and by means of Aston's *mass spectrograph* (q.v.). Sometimes called CANAL RAYS.

positive ray parabolas (*Phys.*). See **parabolas (positive ray).**

positive reaction (*Bot.*). A tactism or tropism in which the plant moves, or the plant member grows, from a region where the stimulus is weaker to one where it is stronger.

positive stagger (*Aero.*). See **stagger.**

positive video signal (*Television*). A video signal in which increasing amplitude corresponds to increasing light-value in the transmitted image. White is regarded as 100%, and the black level made about 30% of the maximum amplitude in the signal.

positive wire (*Elec. Eng., etc.*). Any wire in a circuit which is connected to the positive, or earthed, end of the battery.

positivism. The conception which regards natural phenomena as being the only reality demonstrable by experiment, without reference to the human mind—apart from the human senses which are necessary to observe such phenomena as are available. The opposite of *idealism*. See also **empiricism.**

positron (*Phys.*). The positive electron, discovered by Anderson. The mass and charge are of the same magnitude as for the electron, but the charge is positive.

post (*Build.*). (1) An upright member in a frame.—(2) A column or pillar.

post and pan (or pane), post and petrail (*Build.*). A term applied to half timbering formed with brickwork or lath and plaster panels.

post-head (*Elec. Eng.*). A post or pillar at which cables supplying a third-rail traction system may be terminated and connexion made to the conductor-rail.

post insulator (*Elec. Eng.*). A porcelain insulator built in the form of a post; used for supporting bus-bars, etc. in a high-voltage outdoor substation.

post (*Paper*). A standard size of printing paper, 15½ × 19 in.

postcard (*Paper*). A standard size of cut card, 3½ × 5½ in.

post office box (or **bridge**) (*Elec. Eng.*). A Wheatstone bridge in which the resistances making up the arms are contained in a box and varied by means of plugs. Frequently abbreviated to P.O. BOX (or BRIDGE).

post- (Latin *post*, after). A prefix used in the construction of compound terms; e.g. *posthepatic*, posterior to the liver.

postabdomen (*Zool.*). In Scorpions, the narrow posterior part of the abdomen; metasoma.

postal (*Paper*). A standard board size, 22½ × 28½ in.

postcar'dinal (*Zool.*). Posterior to the heart; as the *postcardinal* sinus of *Selachii*.

postca'val vein (*Zool.*). In higher Vertebrates, the posterior vena cava conveying blood from the hind parts of the body and viscera to the heart. Also called INFERIOR VENA CAVA.

postclav'icle, postclavic'ula (*Zool.*). See **postcleithrum.**

postcleithrum, —klīth'rum (*Zool.*). A bone of the pectoral girdle in Fish, situated behind the cleithrum. Also called POSTCLAVICLE, POSTCLAVICULA.

poster (*Print.*). A large sign printed on paper, for advertisement or propaganda purposes; generally in colour and pictorial in nature. Posters are usually printed by lithography, offset or direct, very large ones being executed in convenient sections.

poster stick (*Typog.*). A long wooden composing stick adapted for setting up the large letters, usually wooden, used in type-set poster work.

posterior (*Bot.*). (1) Inserted on the back of another organ.—(2) The part of the flower nearest to the axis.—(3) The rear.—(*Zool.*) In a bilaterally symmetrical animal, further away from the head region; behind. Cf. *anterior.*

postern (*Build.*). A private door or gate, generally at the back or side of a building.

postfertilisation stages (*Bot.*). The developmental processes which go on between the union of the gametic nuclei in the embryo sac and the maturity of the seed.

post-floral movement (*Bot.*). A change in position of the flower stalk or inflorescence stalk after fertilisation has occurred, bringing the young fruits into a more favourable position for development, or placing the seeds in good conditions for germination.

postfrontal (*Zool.*). In some Vertebrates, a paired lateral membrane bone of the skull.

postganglion'ic fibre (*Zool.*). An *excitor* (q.v.) neurone.

posthet'erokine'sis (*Cyt.*). A form of reduction division in which the sex-chromosome passes undivided to one pole in the second spermatocyte division.

posthitis, pos-thī'tis (*Med.*). Inflammation of the prepuce.

pos'tical (*Bot.*). Relating to or belonging to the back or lower part of a leaf or stem.

pos'ticous (*Bot.*). Outward or behind.—(*Zool.*) Extrorse.

postmeiot'ic division (*Cyt.*). The first nuclear division after meiosis has been completed.

postmin'imus (*Zool.*). A rudimentary extra digit of some Vertebrates.

postno'tum (*Zool.*). In the wing-bearing segments of adult Insects, a narrow sclerite behind the notum arising in the intersegmental membrane.

postorbi'tal (*Zool.*). In some Vertebrates, a paired lateral membrane bone of the orbital region of the skull.

postpari'etal (*Zool.*). In some Vertebrates, a paired membrane bone of the skull, lying between the parietal and the interparietal.

post-partum (*Med.*). Occurring after childbirth; e.g. *post-partum* haemorrhage.

postpata'gium (*Zool.*). In Birds, a cutaneous expansion between the upper arm and the trunk.—*adj.* **postpatagial.**

postreduction (*Cyt.*). Disjunction in the homotype division; postheterokinesis.

post-scoring (*Cinema.*). In motion-picture production, the recording of sound, such as a musical accompaniment or special noise effects, after the cinematograph pictures have been made.

postscutel'lum (*Zool.*). See **postnotum.**

post-synchronisation (*Cinema.*). The addition of a sound-track to a photographed motion-picture, the latter generally being projected in front of the conductor of the musicians whose sounds are being recorded.

Post-Tertiary (*Geol.*). The name assigned to geological events which took place after the close of the Tertiary era; i.e. during Pleistocene and Recent times.

post-tremat'ic (*Zool.*). Posterior to an aperture; as, in *Selachii*, that branch of the ninth cranial nerve which passes posterior to the first gill-cleft.

postventit'ious (*Bot., Zool.*). Delayed in development.

postzy'gapoph'ysis (*Zool.*). A facet or process on the posterior face of the neurapophysis of a vertebra, for articulation with the vertebra next behind. Cf. *prezygapophysis.*

pot annealing (*Met.*). See **close annealing.**

pot furnaces (*Glass*). Furnaces in which are set a number of *pots*. They may be: (*a*) direct-fired from below, as with the Frisbie feed; (*b*) gas-fired from below through a central opening in the circular siege, using the recuperative principle; (*c*) fired through ports in the siege or in the walls, the waste gases escaping through similar openings. In the last-named process, which holds generally for non-circular furnaces, the regenerative principle may be employed.

pot still (*Chem.*). A still consisting of a boiling vessel with condenser attached. The use of a fractionating column is optional. Pot stills are only suitable for batch distillation.

pot'sherds (*Glass*). The remains of old glass-melting pots which are ground and added to the new clay used in the making of new pots.

potstone (*Min.*). A massive variety of *talc* (q.v.), more or less impure.

po'table. Suitable for drinking purposes.

pot'amoplank'ton (*Ecol.*). The plankton of rivers and streams.

pot'amous (*Ecol.*). Living in rivers and streams.

potash alum (*Chem.*). See **alums.**

potash, caustic (*Chem.*). See **caustic potash.**

potash feldspar (*Min.*). Silicate of aluminium and potassium, $KAlSi_3O_8$, occurring in two distinct crystalline forms—*orthoclase* (monoclinic) and *microcline* (triclinic). Both are widely distributed in acid and intermediate rocks, especially in granites and syenites and the fine-grained equivalents. See **feldspar, glassy feldspar, sanidine.**

potash mica (*Min.*). See **muscovite, sericite.**

potash-syenite (*Geol.*). A syenitic rock characterised by a large excess of potash-feldspar or feldspathoid over soda-feldspar.

potas'sium (*Chem.*). Symbol, K. At. wt. 39·096, at. no. 19. A very reactive alkali metal, m.p. 62·5°, b.p. 762° C. In the form of the element it has little practical use, although its salts are used extensively. In combination with other elements it is found widely in nature.

potassium alum (*Min.*). A hydrous sulphate of aluminium and potassium, crystallising in the cubic system. It is found in connexion with volcanoes and also as a result of the action of ascending acid waters.

potassium amalgams (*Chem.*). Potassium appears to form a number of compounds or amalgams with mercury, frequently with the development of heat.

potassium antimonyl tartrate (*Chem.*). See **tartar emetic.**

potassium bicarbonate (*Chem.*). $KHCO_3$.

potassium bromide (*Chem.*). KBr. Used in medicine and photography.

potassium carbonate (*Chem.*). K_2CO_3. Solution alkaline. Gives off carbon dioxide when treated with an acid. Anhydrous.

potassium chlorate (*Chem.*). $KClO_3$. Detonates with heat; used in the manufacture of matches, fireworks, and explosives, and in the laboratory as a source of oxygen.

potassium chloride (*Chem.*). KCl. Occurs extensively in nature With sodium chloride, it is extracted on a commercial scale from the waters of the Dead Sea.

potassium chloroplatinate (*Chem.*). K_2PtCl_6. Results from the reaction of chloroplatinic acid and potassium chloride.

potassium cyanide (*Chem.*). KCN. In the fused condition is a powerful reducing agent. Used in chemical analysis and in metallurgy.

potassium dichromate (*Chem*). $K_2Cr_2O_7$. Used in analytical chemistry. Mixed with sulphuric acid it is used as a cleanser of laboratory vessels, particularly after contamination with organic matter.

potassium ferricyanide (*Chem.*). $K_3Fe(CN)_6$. Used in chemical analysis. Gives characteristic colour reactions.

potassium halides (*Chem.*). Compounds of potassium with the halogens—potassium chloride, bromide, iodide.

potassium hydride (*Chem.*). KH. Formed when potassium is heated in hydrogen.

potassium hydrogen fluoride (*Chem.*). KHF_2. A double salt. Formed when potassium fluoride is dissolved in hydrofluoric acid and the solution evaporated.

potassium iodate (*Chem.*). KIO_3. Potassium salt of iodic acid.

potassium iodide (*Chem.*). KI. Used in chemical analysis.

potassium monoxide (*Chem.*). K_2O. Combines readily with water, with evolution of heat, to form the hydroxide.

potassium nitrate (*Chem.*). KNO_3. Salt of potassium and nitric acid. Strong oxidising agent. Known also as NITRE, SALTPETRE.

potassium oxalate (*Chem.*). The normal salt, $K_2C_2O_4 \cdot H_2O$, is soluble in water. The acid salt, KHC_2O_4, is less soluble and occurs in many plants. A compound of these two, potassium quadroxalate, $K_3HC_4O_8 \cdot 2H_2O$, known as *salts of sorrel*, is used for removing ink-stains and iron-moulds.

potassium permanganate (*Chem.*). $KMnO_4$. Strong oxidising agent. Used in analytical chemistry and as a disinfectant.

potassium titanate (*Chem.*). K_2TiO_3. Formed by the fusion of potassium hydroxide and titanium dioxide.

potato-stone (*Geol.*). An old term for rounded secretions in igneous rocks (usually called *geodes*), often partly filled with well-crystallised minerals.

potcher (*Paper*). A mixing or washing machine used for circulating the fluid pulp without modifying it in any mechanical way.

potence (*Horol.*). An inverted cock; a bracket for supporting the lower pivot.

potential (*Zool.*). Latent.

potential (*Elec.*). When a point is said to be 'at a certain potential,' the meaning is that there is a potential difference of that amount between the point and earth.

potential attenuator (*Elec. Comm.*). An attenuating potentiometer arranged with steps which correspond to known voltage attenuations, as contrasted with power attenuations in normal attenuators.

potential difference (*Elec.*). A difference in the electrical states existing at two points, which causes a current to tend to flow between them. It is measured by the work done in transferring a unit charge of electricity from one point to the other.

potential divider (*Elec. Eng.*). See **voltage divider.**

potential energy (*Phys.*). Energy possessed by a body in virtue of its position. A body of mass *m* at a height *h* above the ground possesses potential energy *mgh*, since this is the amount of work it would do in falling to the ground. A body in a state of tension or compression (e.g. a coiled spring) also possesses potential energy. See **energy.**

potential fuse (*Elec. Eng.*). A fuse used to protect the voltage circuit of a measuring instrument or similar device.

potential galvanometer (*Elec. Eng.*). A galvanometer having a resistance sufficiently high to enable it to be used as a voltmeter.

potential gradient (*Elec. Eng.*). The potential difference per unit length along a conductor or through a dielectric. It is equal to the slope of the curve relating potential and distance.

potential-indicator (*Elec. Eng.*). An instrument serving to show whether a conductor is alive. Also called a CHARGE-INDICATOR.

potential mediator (*Chem.*). A substance which is added to an oxidation-reduction system in order to accelerate the establishment of a definite potential.

potential temperature (*Heat*). The temperature which a specimen of air would have if it were brought to standard pressure adiabatically. The potential temperature is given by the expression:

$$\theta = T\left(\frac{P_0}{P}\right)^{\frac{\gamma-1}{\gamma}}$$

where T is the absolute temperature and P the pressure of the air, P_0 is the standard pressure, and γ is the ratio of the specific heats (=1·40 for air).

potential transformer (*Elec. Eng.*). See **voltage transformer.**

potentiom'eter (*Elec. Eng.*). An instrument for the accurate measurement of potential differences. The potential difference to be measured is balanced against that produced by a current passing through a resistance.

potentiometer-braking (*Elec. Eng.*). A braking method used for series motors; the series field and a rheostat are connected in series across the supply, and the armature is connected across the field and a variable proportion of the rheostat.

potentiometer-braking controller (*Elec. Eng.*). A controller making the necessary connexions for potentiometer-braking of a series motor.

potentiometer-type field rheostat (*Elec. Eng.*). A field rheostat which is connected across the supply, the field winding being connected between one pole of the supply and a variable tapping on the rheostat. See **reversible—.**

potentiomet'ric analysis (*Chem.*). See **electrometric titration.**

potette' (*Glass*). A hood shaped like a pot, but with no bottom, which is placed in a tank furnace so that it reaches below the glass level. It protects the man gathering glass on his pipe or iron from furnace gases; also, the glass here is somewhat cooler than that in the main part of the furnace, where melting is taking place.

Potier construction, pō-tyā (*Elec. Eng.*). A graphical construction for determining the reactance, armature reaction, and regulation of a synchronous generator from the open-circuit, short-circuit, and zero-power factor characteristics.

Potier reactance (*Elec. Eng.*). The reactance of a synchronous machine as determined by the Potier construction.

Poto'mac Beds (*Geol.*). Strata occurring in the Cretaceous trough east of the Appalachians, containing fossil plants and reptilian remains; equivalent to the English Wealden rocks.

potom'eter (*Bot.*). An instrument for measuring the rate at which a plant takes in water.

Potsdam Sandstone (*Geol.*). The basal member of the Croixian Series, consisting of sand, derived from the Pre-Cambrian, redeposited by the waters of the Upper Cambrian seas in the interior of the U.S.A. and in Canada.

pott (*Paper*). A size of paper, 12½ × 15 in.

Pott's disease (*Med.*). Spinal caries. Tuberculous infection of the spinal column.

Pott's fracture (*Surg.*). Fracture-dislocation of the ankle-joint, the lower parts of the tibia and of the fibula being broken.

potters' clay. See **ball clay.**

potter's wheel (*Pot.*). A rotating circular table, mounted on a vertical pillar, on which hollow-ware is made by the thrower.

pottery. (1) A branch of the ceramics industry.—(2) Articles of burnt clay, other than porcelain.

Pottsville Series (*Geol.*). A thick formation of sandstone and quartz-conglomerate, of torrential origin and containing coal-seams, which occurs at the base of the Pennsylvanian in the Appalachian region and in Virginia. Locally reaches a thickness of 15,000 ft. See also **Kanawha Series.**

pouce (*Linen*). The name applied in the linen trade to particles of cortex formed in roughing the flax.

pouch (*Zool.*). Any sac-like or pouch-like structure; as the abdominal *brood-pouch* of marsupial Mammals.

Poulsen arc (*Radio*). An arc discharge maintained between electrodes of carbon and water-cooled copper enclosed in an atmosphere of hydrogen, and situated in a powerful magnetic field. Used for the generation of continuous waves.

pound (*Civ. Eng., Mining*). See **tamp.**

pound (*Hyd. Eng.*). See **pond.**

pound. The unit of mass in the British and American system of units. Defined as the mass of the *imperial standard pound*, a platinum cylinder kept at the Board of Trade Standards Office. 1 lb. = 453·592 gm. Abbrev. **lb.**

pound-calorie (*Eng.*). An engineering heat unit, often now called *Centigrade heat unit* (C.H.U.). Defined as 1/100 part of the heat required to raise the temperature of 1 lb. of water from 0° C. to 100° C. (= approx. 1·8 B.Th.U.). Abbrev. **lb.-cal.**

poundal (*Mech.*). The unit of force in the foot-pound-second system of units. It is that force which will produce an acceleration of 1 foot per sec. per sec. in a mass of 1 lb. on which it acts. 32·2 poundals = 1 pound-weight.

pous'sieroid (*Cyt.*). Said of a stage of meiotic division, prior to prophase, in which the chromatin is distributed as dust.

powder-down feather (*Zool.*). A down-feather the end of which readily breaks off, forming a fine dust.

powder method (*Min.*). A method of X-ray analysis of minerals in which powder is used instead of a single crystal. It is a useful method for any type of crystalline substance, though the results are difficult to interpret.

powder of Algaroth (*Chem.*). An old name for antimony oxychloride when used in medicine.

powder process (*Photog.*). A printing process which depends on the differential hardening of sticky material on exposure to light; an image can be produced by subsequent dusting with powdered pigment, which adheres in proportion to non-exposure. See **dusting-on process.**

Powell-Wood process (*Build.*). A timber-preserving process involving impregnation of the timber with a saccharine compound.

power (*Mech.*). Rate of doing work. The foot-pound-second unit of power is the *horse-power*, which is a rate of working equal to 550 ft.-lb. per second. The electrical power unit, the *watt*, is equal to 10^7 c.g.s. units, that is 10^7 ergs per sec. or 1 joule per sec. 1 horse-power is equivalent to 746 watts.

power amplifier, power unit (*Elec. Comm.*). The thermionic stage designed to deliver the output power of an amplifier. It may be separate from other parts of the same amplifier, and may contain its own power-supply unit. Designed to give the required power output with a specified degree of non-linear distortion, gain not being considered, which may in some cases be negative as far as voltage is concerned.

power circuit (*Elec. Eng.*). That portion of the wiring of an electrical installation which is used to supply apparatus other than lighting.

power component (*Elec. Eng.*). See **active component.**

power dive (*Aero.*). See **dive (terminal nose).**

power drag line (*Eng.*). An excavator comprising a large scraper pan or bucket which is dragged through the material towards the machine and below its level.

power factor (*Acous.*). See **acoustic power factor.**

power factor (*Elec. Eng.*). The ratio of the total power (in watts) flowing in an electric circuit to the total equivalent volt-amperes flowing in that circuit. In single- and balanced three-phase systems it is equal to cos ϕ, where ϕ is the phase angle between the voltage and current in a single-phase circuit, or between the phase voltage and phase current in a balanced three-phase circuit.—(*Diel.*) In normal dielectrics it is exactly equal to $G/\sqrt{G^2+\omega^2C^2}$ (for G and C see **capacitance** and **conductance**), and thus nearly equal to $G/\omega C$.

power-factor meter (or **indicator**) (*Elec. Eng.*). An instrument for measuring the phase angle between the voltage and current in an electric circuit; it is usually calibrated in power factor cos ϕ. Also called PHASE METER INDICATOR.

power gas (*Fuels*). See **producer gas.**

power hammer (*Eng.*). Any type of hammer which is operated, either continuously or intermittently, by power; e.g. by directly coupling the hammer to a steam or pneumatic cylinder.

power level (*Elec. Comm.*). The same as *transmission level.* See also Supplement.

power level diagram (*Elec. Comm.*). A diagram indicating how the maximum power levels vary at different points of a transmission channel, and thereby indicating how various losses are neutralised by appropriate gains.

power line (*Elec. Eng.*). See **bus-line.**

power loading (*Aero.*). The maximum flying weight of an aeroplane divided by the rated horse-power of the engines.

power navvy (*Eng.*). See **power shovel.**

power of lens (*Photog.*). The relative focusing power of a lens, measured in dioptres, which is the reciprocal of the focal-length in metres.

power pack (*Elec. Comm.*). The power-supply unit for an amplifier, e.g. in a radio or television receiver, wherein the requisite steady voltages are obtained by rectifiers from a.c. mains. The word is sometimes held to include the last or power stage of an amplifier when this is integral with the power supply proper.

power ringing (*Teleph.*). The generation of ringing current by a machine (as in an exchange), as contrasted with the hand-operated magneto generator.

power shovel (or **navvy**) (*Eng.*). An excavator consisting of a jib carrying a radial arm to the end of which a large bucket or scoop is attached. The bucket makes a radial cut, digging above the level of the excavator. Used for making cuttings for roads and railways.

power unit (*Elec. Comm.*). See **power amplifier.**

power valve (*Radio*). See **output valve.**

pox (*Med.*) *Pl.* of *pock* (q.v.); hence popular names for diseases characterised by pustules, *chickenpox*, *smallpox*: specifically (vulgar), syphilis.

pox (*Vet.*). Variola. A febrile infectious disease, characterised by an eruption of papules and vesicles on the skin and mucous membranes, due to infection by a filterable virus.

Poynting's theorem (*Radio*). A theorem which shows that the rate of flow of energy, in ergs per second per square centimetre, through a surface is equal to the Poynting's vector formed by the components of field lying in the plane of the surface. Used for calculating the power radiated from an antenna.

Poynting's vector (*Radio*). The vector formed by the product of the mutually perpendicular components of the electric and magnetic fields at any point, multiplied by $C/4\pi$, where C is the velocity of light in centimetres per second.

pozzuolan'a, pozzolan'a, pot'swo—, pot'so— (*Civ. Eng.*, *Geol.*). A volcanic dust, first discovered at Pozzuoli in Italy, which has the effect, when mixed with mortar, of enabling the latter to harden anywhere—in air or under water.*

P.P.C. (*Build.*). Abbrev. for *plain plaster cornice.*

p.p.m. (*Chem.*). An abbrev. for *parts per million.*

PPQ bar (*Zool.*). See **pterygo-palato-quadrate bar.**

Pr (*Chem.*). (1) The symbol for *praseodymium.*—(2) The propyl radical C_3H_7—.

prae-. Prefix. See **pre-.**

For	**prae-abdomen**	see	**pre-abdomen**
	praemaxilla		**premaxilla**
	praemorse		**premorse**
	praepubic		**prepubic**
	praepuce, praeputium		**prepuce**
	praetarsus		**pretarsus.**

praeco'ces (*Zool.*). Birds which when hatched have a complete covering of down and are able at once to follow the mother on land or into water to seek their own food. Cf. *altrices.*

praetar'sus (*Zool.*). A terminal outgrowth of the tarsus in some Insects.

prase (*Min.*). A translucent and dull leek-green variety of *chalcedony* (q.v.).

pra'seodym'ium (*Chem.*). Symbol, Pr. A metallic element, a member of the rare earth group. At. no. 59, at. wt. 140·9, sp. gr. 6·475, m.p. 940° C. It closely resembles neodymium and occurs in the same minerals.

Pratt truss (*Struct.*). See **Whipple-Murphy truss.**

pre-, prae- (Latin *prae*, before). A prefix used in the construction of compound terms; e.g. *prehepatic*, anterior to the liver. See also under **prae-.**

pre-abdomen (*Zool.*). In Scorpions, the broad anterior part of the abdomen. Cf. *post-abdomen.*

pre-amplifier (*Acous.*). An amplifier, of one or two thermionic stages, immediately following the output of a high-quality microphone, and sometimes integral with it. The output power-level of high-quality microphones is too low to be transmitted over a line, or to be mixed with other channels, induced noise or clicks being liable to occur. See **P.E.C. amplifier.**

Pre-Cambrian (*Geol.*). The era of geological time which preceded the Cambrian age, being the oldest yet defined. Also ARCHAEAN, EOZOIC.

pre-cast (*Civ. Eng.*). Said of concrete blocks, etc. which are cast separately before they are fixed in position.

pre-cast stone (*Civ. Eng.*). *Reconstructed stone* (q.v.).

pre-combustion chamber (or **antechamber**) (*I.C. Engs.*). A small chamber formed in the cylinder-head of some compression-ignition engines into which the oil fuel is injected at the end of the compression stroke. The high pressure caused by the partial combustion of the fuel expels the rich mixture through a neck or perforated throat plate into the engine cylinder, where combustion is completed. Derived from the original oil engine of Akroyd Stuart (1892).

pre-conscious (*Psycho-an.*). (1) That part of the mind containing mental processes of which the individual is not actually aware at a given moment, but which can be brought into consciousness by mental effort.—(2) That part of the mind which is in contact with reality and obeys the reality principle.

pre-distorting network (*Elec. Comm.*). A network which anticipates subsequent frequency distortion in the transmission path, as along a line, so that the line distortion has not entirely to be compensated at the receiving end.

pre-distortion (*Elec. Comm.*). The principle of altering the response of a circuit to compensate, fully or partially, anticipated distortion; the aim is to make transmission as high as practicable above the anticipated noise-level, e.g. on a programme circuit.

pre-echo (*Acous.*). A defect which occurs in gramophone-record manufacture because of surface-flow of matrices during pressing, this causing one track to modulate slightly an adjacent track. It may arise also from the flow of the surface of the original wax in the act of cutting.

pre-ignition (*I.C. Engs.*). The ignition of the charge in a petrol-engine cylinder before normal ignition by the spark; caused by overheated plug-points, the presence of incandescent carbon, etc.

pre-scoring (*Cinema.*). In motion-picture production, the use of previously recorded sound, such as a musical sequence, for cueing the action of dancers or singers.

pre-selection (*Radio*). The use of selective circuits in the early stages of a super-heterodyne receiver, prior to the frequency changer, to reduce second channel interference and cross-modulation.

pre-selector gear box (*Automobiles*). A gear box, generally epicyclic, in which the gear ratio is selected, before it is actually required, by a small lever, being afterwards engaged by pressure on a pedal.

pre-synchronisation (*Cinema.*). The recording of a sound-track for use in cueing artists motion-pictures of whom are to be fitted to the sound-track during the process of editing.

preadaptation (*Zool.*). Change of structure preceding appropriate change of habit.

preamble (*Civ. Eng.*). The introductory clauses to a bill of quantities, embodying any necessary instructions and references to the obligations intended to be imposed by the documents on which the tender is to be based.

préavis call, prā-a-vē' (*Teleph.*). In international telephony, previous notice to the telephone service that a call is desired to a distant subscriber, who is notified.

preca'val vein (*Zool.*). The anterior vena cava conveying blood from the head and neck to the right auricle.

precession (*Cyt.*). The tendency sometimes shown by the sex-chromosomes to pass to the poles of the meiotic spindle before the autosomes.

precession of the equinoxes (*Astron.*). A phenomenon (discovered by Hipparchus in 160 B.C., but first mathematically explained by Newton as due to the equatorial bulge of the earth) characterised by the fact that the earth's axis slowly revolves in a small circle about the pole of the ecliptic in a period of 25,800 years, causing the equinoctial points to move retrograde in the ecliptic by an annual amount of 50″·26, thus altering the co-ordinates of stars in various ways.

prechor'dal (*Zool.*). Anterior to the notochord or to the spinal cord.

precipitation (*Chem.*). The formation of an insoluble solid by a reaction which takes place in solution. It is widely employed for the separation and identification of substances in chemical processes and analyses.—*n.* and *v.* **precip'itate.**

precipitation (*Meteor.*). Moisture falling on the earth's surface from clouds; it may be in the form of rain, hail, or snow.

precipitation (*Sewage*). The process of assisting the settlement of suspended matters in sewage by the addition of chemicals to the sewage before admission to the sedimentation tanks.

precipitation hardening (*Met.*). The phenomenon which results in an increase in hardness with time at atmospheric or elevated temperature. The increase is due to a change in structure associated with precipitation of a constituent from solid solution. See **ageing, temper-hardening.**

precip'itin (*Chem., Med.*). An antibody substance analogous to *agglutinin* (q.v.), its action, however, being characterised by clouding and precipitation.

precipitin'ogen (*Chem., Med.*). The substance which, introduced into the blood plasma, calls forth the specific precipitin.

precise levelling (*Surv.*). Particularly accurate levelling in which the allowable discrepancy between two determinations of the level difference between two bench marks M miles apart is very low—of the order of 0 012 $\sqrt{M}$ feet or less.

precision grinding (*Eng.*).
See **centreless grinding** **thread grinding**
form do. **grinding machine**
internal do. **surface grinding**
profile do. **machine.**

precision instrument (*Elec. Eng.*). An instrument having a high degree of accuracy, used for testing work.

precor'acoid (*Zool.*). An anterior ventral bone of the pectoral girdle in Amphibians and Reptiles, corresponding to the epicoracoid of Monotremes.

precor'dial (*Anat.*). Situated or occurring in front of the heart.

precox'a (*Zool.*). See **pleuropodite.**

predaz'zite, pencatite, brucite-marble (*Geol.*). Mixtures of brucite, calcite, periclase, and hydromagnesite, found originally at Predazzo, Italy; formed from magnesian limestone by contact-metamorphism. See separate articles at **brucite-marble** and **pencatite.**

predictor (*Armaments*). A complicated device used in anti-aircraft defence; it mechanically interprets data, such as the height, speed, and direction of aircraft, into elevation and direction for the anti-aircraft gun, and indicates the timing of the fuse or detonator, which information is transmitted automatically to the gun crew.

Preece's formula (*Elec. Eng.*). A formula stating that the fusing current of a wire is proportional to the 1·5 power of the current.

preen gland (*Zool.*). See **oil gland.**

preferential mating (*Zool.*). The theory, postulated by Darwin, that if there are two or more rival males unequally endowed, the female will exercise the prerogative of selection.

preferential motions of stars (*Astron.*). See **star streaming.**

preferred orientation (*Met.*). During slip, metal crystals change their orientation; when a sufficient amount of deformation has been performed, the random orientation of the original crystals is converted into an arrangement in which a certain direction in all the crystals is parallel to the direction of deformation.

prefloration (*Bot.*). Aestivation.

prefoliation (*Bot.*). Vernation.

pre'form (*Plastics*). A piece of moulding composition a little larger than the finished moulding and of approximately the same shape.

prefron'tal (*Zool.*). In some Vertebrates, a paired lateral membrane bone of the orbital region of the skull.

preganglion'ic fibre (*Zool.*). See **association neurone.**

pregnancy (*Med.*). Gestation. The state of being with child.

prehal'lux (*Zool.*). In *Amphibia* and *Mammalia*, a rudimentary additional digit of the hind limb.

prehal'teres (*Zool.*). See **squama.**

prehensile (*Zool.*). Adapted for grasping.

prehet'erokine'sis (*Cyt.*). A form of reduction division in which the sex-chromosome passes undivided to one pole in the first spermatocyte division. Cf. *postheterokinesis.*

prehnite, prā'nit (*Min.*). A pale-green and usually fibrous acid orthosilicate of calcium and aluminium, crystallising in the orthorhombic system. It occurs, with zeolites, in geodes in altered igneous rocks.

preischiopodite, prē'isk-i-op'ō-dit (*Zool.*). The distal one of two joints into which the basipodite of *Crustacea* is sometimes divided.

prelacte'al (*Zool.*). In Mammals, said of teeth developed prior to the formation of the milk dentition.

preliminary matter (*Typog.*). The pages of a book preceding the actual text. The order should be half-title, frontispiece or 'advertisement,' title (at the back of this number of editions, imprint, etc.), dedication, preface, contents, list of illustrations, introduction. Frequently abbrev. to PRELIMS.

Preller's leather (*Leather*). A name formerly used for *crown leather.*

premaxil'lary (*Zool.*). A paired membrane bone of the Vertebrate skull which forms the anterior part of the upper jaw: anterior to the maxilla. Also PREMAXILLA.

premeiot'ic mitosis (*Cyt.*). The nuclear division immediately preceding the organisation of nuclei which will divide by meiosis.

premo'lars (*Zool.*). In Mammals, the anterior grinding or cheek teeth, which are represented in the milk dentition.

premorse' (*Bot.*). Looking as if the end had been bitten off.

prena'sal (*Zool.*). A small bone at the tip of the nose in Pigs and a few other forms.

preoper'culum (*Zool.*). In Fish, an anterior membrane bone forming part of the gill-cover.

preorbi'tal (*Zool.*). In some Fish, a membrane bone situated in front of the orbit: anterior to the orbit.

prepared (*Lace*). Said of bobbin yarn which has been passed, in a hank, between rollers.

prepata'gium (*Zool.*). In Birds, a cutaneous expansion between the forearm and the upper arm.—*adj.* **prepatagial.**

prepayment meter (*Elec. Eng., etc.*). A meter used in connexion with electricity or gas supplies. It is designed so that the insertion of a coin or coins operates a switch or other device, and allows a certain predetermined quantity of electrical energy or gas to be used.
See **load-rate—** **step-rate—**
minimum two-part— **two-circuit—**
single-rate— **two part—**
two-part step-rate—
two-rate two-part—

prepol'lex (*Zool.*). In some Vertebrates (*Amphibia, Mammalia*), a rudimentary extra digit of the fore limb.

prepo'tency (*Bot.*). The ability of some pollen to bring about fertilisation more readily than other pollen.—(*Zool.*) The capacity of one parent to transmit more characteristics to the offspring than the other parent.—*adj.* **prepotent.**

prepu'bic (*Zool.*). Pertaining to the anterior part of the pubis: in front of the pubis; as bony processes in some Marsupials and Rodents.

prepu'bis (*Zool.*). In some Fish, an anterolateral process of the pubis.

pre'puce (*Zool.*). In Mammals, the loose flap of skin which protects the glans penis.—*adj.* **preputial.**

prepu'pa (*Zool.*). In Insects, an instar intervening between the last larval and the pupal stadia; characterised by various structural changes and by a period of quiescence.

pre'reduction (*Cyt.*). Disjunction in the heterotype division: preheterokinesis.

pres'byope (*Med.*). One suffering from presbyopia.

presbyo'pia (*Med.*). Long-sightedness and impairment of vision due to loss of accommodation of the eye in advancing years.

prescu'tum (*Zool.*) In Insects, the most anterior of three sclerites into which the notum is typically subdivided.

Presdwood (*Build.*). Trade-name for a strong building-board having water-resisting properties.

presentation (*Med.*). The relation which the long axis of the foetus bears to that of the mother; various presentations are defined in terms of the presenting part, as *shoulder presentation, breech presentation*, etc.

presentation time (*Biol.*). The shortest period during which an organism must be exposed to a stimulus in order that response may subsequently occur.

preservatives (*Foods*). Substances added to food-stuffs to inhibit decay, legislation has greatly restricted their use.

Presotim (*Build.*). Trade-name for a wood preservative.

presphe'noid (*Zool.*). A medium cartilage bone of the Vertebrate skull forming part of the floor of the brain-case in front of the basisphenoid.

press (*Eng.*). See **hydraulic press.**

press (*Print.*). (1) A hand machine used for proofing or printing small jobs. It may be of the platen type (as the Albion press), or of the cylinder type, in which the impression is made by a heavy cylinder rolled by hand.—(2) A general term for the printing stage of a job; exemplified in such phrases as 'going to press,' 'in the press.'

press-and-blow machines (*Glass*). Machines in which the *parison* (q.v.) is formed by the pressing action of a plunger forced into a mass of plastic glass dropped in a parison mould; the parison is then blown to the shape of the finished ware in another mould.

pressboard (*Diel.*). Compressed paper in thick sheets. See **Elephantide pressboard.**

press proof (*Print.*). The last proof checked over before going to press.

press rolls (*Paper*). Heavy cylinders of the paper-making machine which press out moisture from the wet web. Before the last pressing, the web is reversed in order to remove felt-marks.

presswork (*Print.*). Work done on the hand press, including proofing and the printing of small jobs.

presse-pâte (*Paper*). A machine which converts half-stuff into a web of pulp, so that the material can be handled more conveniently.

pressed amber (*Min.*). See **ambroid.**

pressed brick (*Build.*). A high-quality brick moulded under pressure, as a result of which it has sharp arrises and a smooth face, making it especially suitable for exposed surface work.

pressel-switch (*Elec. Eng.*). See **pendant switch.**

pressing (*Acous.*). A disc record formed by pressure, with or without heat; the negative of the recording on a stamper is transferred to a large number of *pressings* for distribution. See also **cold pressing, hot pressing.**

pressing (*Pot.*). A process by which bats or lumps of clay are pressed by hand or machinery into moulds.

pressing (*Textiles*). The final process in finishing woollen and worsted fabrics, the object being to consolidate fabrics and enhance their lustre. The work is done by various types of presses heated by steam or electricity.—(*Lace*) The process of compression and pressure-steaming to which brass bobbins are subjected as soon as they are wound.

pressing boards (*Print.*). Glazed boards used for removing the impression from printed sheets.

pressing machine (*Glass*). A machine in which the whole forming operation is carried out by pressing the plastic glass by a plunger forced into a die or mould. The machine may be operated by hand or it may be fully automatic.

pressor (*Zool.*). Causing a rise of arterial pressure.

Presspahn (*Elec. Eng.*). A fibrous insulating material made from wood-pulp; used, in thin sheets, for the insulation of electrical equipment; an early variety of pressboard.

pressure (*Acous.*).

See **acoustic—** **radiation—**
excess— **sound—**

pressure, atmospheric (*Phys.*). See **atmosphere (pressure of).**

pressure, barometric (*Meteor.*). The pressure of the atmosphere as read by a barometer. It is usually expressed as the barometric height, that is, so many centimetres or inches of mercury.

pressure cable (*Cables*). Ordinary 'solid' cable is put in steel pipes and a hydrostatic pressure of 180-220 lb. per sq. in. is applied by means of nitrogen. This causes a diminution of ionisation, so that a normal 33 kV cable can be used at 66 kV.

pressure capsule (*Eng.*). See **sylphon bellows.**

pressure circuit (*Elec. Eng.*). A voltage circuit.

pressure diecasting (*Met.*). A process by means of which precision castings of various alloys are made by squirting liquid metal under pressure into a metal die. See **diecasting.**

pressure drag (*Aero.*). See **form drag.**

pressure forging (*Eng.*). See **drop forging.**

pressure-gauge. A flattened tube bent to a curve, which tends to straighten under internal pressure, thus indicating, by the movement of an indicator over a circular scale, the fluid pressure applied to it. Also called BOURDON GAUGE.

pressure governor (*Gas Fittings*). A gas governor which operates so as to supply gas at a constant pressure.

pressure-gradient microphone (*Acous.*). A microphone which offers so little obstruction to the passage of a sound-wave that the diaphragm, in practice a ribbon, is acted on by the difference in the excess pressures on the two sides, and therefore tends to move with the particle velocity in the wave.

pressure head (*Aero.*). A combination of a static and a Pitot tube which is connected to opposite sides of a differential pressure-gauge, for giving a visual reading corresponding to the speed of an air current.

pressure head (*Hyd.*). The energy possessed per unit weight of a fluid, due to its pressure. If at a given point the pressure is p lb. per square foot, the pressure head at this point is $\frac{p}{w}$, w being the weight per cubic foot of the fluid.

pressure microphone (*Acous.*). Any type of microphone which is operated by the excess pressure in a sound-wave, as distinct from a *pressure-gradient microphone*.

pressure pad (*Photog.*). The device which keeps the film in a gate so that it remains exactly in focus.

pressure tube, static (*Aero.*). A tube with openings cut laterally, so that when the air is moving past it the pressure inside shall be static and equal to the pressure of the air outside.

prester'num (*Zool.*). In *Anura*, an anterior element of the sternum, of paired origin and doubtful homologies: the reduced sternum of whalebone whales: the anterior part of the sternum.

presystol'ic (*Med.*). Pertaining to, or occurring just before, the beginning of the systole of the heart; e.g. *presystolic* murmur.

pretar'sus (*Zool.*). In some Insects, a terminal outgrowth of the tarsus.

pretremat'ic (*Zool.*). Anterior to an aperture, as (in *Selachii*) that branch of the ninth cranial nerve which passes anterior to the first gill-cleft.

pre'ventit'ious bud (*Bot.*). A dormant bud which may, if conditions allow, produce an epicormic branch.

preventive choke-coil (*Elec. Eng.*) A choking coil connected between the two halves of the moving-contact used in varying the tapping of a transformer or battery; its purpose is to reduce the circulating current which flows owing to the short-circuiting of the turns or cells between adjacent tappings by the moving-contact as it travels from one fixed-contact to the next.

preventive resistance (*Elec. Eng.*). A resistance connected between the two halves of the moving-contact used in varying the tapping of a transformer or battery; its purpose is to reduce the circulating current which flows owing to the short-circuiting of the turns or cells between adjacent tappings as the moving-contact travels from one fixed-contact to the next.

prever'nal (*Bot.*). Flowering early in the year.

prevernal aspect (*Bot.*). The condition of the vegetation of a community very early in the year.

prevo'mer (*Zool.*). In Monotremes, a median dumb-bell-shaped membrane bone of uncertain homologies lying in the floor of the nasal cavities. Also called DUMB-BELL BONE, PARADOXICAL BONE.

prezy'gapoph'ysis (*Zool.*). A facet or process on the anterior face of the neurapophysis of a vertebra, for articulation with the vertebra next in front. Cf. *postzygapophysis*.

pri'apism (*Med.*). Abnormally persistent erection of the penis unaccompanied by sexual desire; due either to a lesion of the penis or to nervous disorder.

Priap'uloi'dea (*Zool.*). A phylum of non-metameric worm-like animals having a very primitive nervous system not separate from the ectoderm; the mouth is anterior and terminal, the anus posterior and terminal; the sexes are separate; the relationships of the group are obscure; marine forms, living in sand and mud.

Price's guard-wire (*Elec. Eng.*). A conductor placed around the edge of a piece of insulating material under test; it is arranged to be at the same potential as the surface of the material in order to prevent leakage current from the surface to earth.

prick (*Vet.*). An injury of the sensitive portion of the horse's foot by misdirected nails during shoeing.

prick post (*Carp.*). An intermediate post in a framework.

prick punch (*Horol.*). A punch used to locate the centre of holes in a plate prior to drilling.

pricking-up (*Plast.*). The operation of scoring the surface of the first coat to provide a key for the next: the whole operation of laying and scoring such a coat.

prickle (*Bot.*). A hard epidermal appendage resembling a thorn but not containing woody tissue.

prickle cells (*Zool.*). In stratified epithelium, the cells of the deeper layers, which are connected to one another by inter-cellular fibrils giving them a prickly appearance.

prickly heat (*Med.*). See **miliaria.**

pri'ma (*Print.*). The first word of the page (or sheet) next to the one being read. [Now rare.]

primary (*Bot., Zool.*). Original, first-formed; as *primary meristem, primary body-cavity*: principal, most important; as *primary feathers, primary axis.*

primary (*Chem.*). A substance which is obtained directly, by extraction and purification, from natural raw material; e.g. benzene, phenol, anthracene are coal-tar *primaries.* Cf. *intermediate.*

primary (*Elec. Eng.*). See **primary winding.**

Primary (*Geol.*). An obsolete synonym for *Palaeozoic.*

primaries (*Zool.*). In Birds, the remiges attached to the manus.

primary acids (*Chem.*). Acids in which the carboxyl group is attached to the end carbon atom of a chain, i.e. to a $-CH_3$ group.

primary alcohols (*Chem.*). Alcohols containing the group $-CH_2{\cdot}OH$. On oxidation they form aldehydes and then acids containing the same number of carbon atoms as the alcohol.

primary amines (*Chem.*). Amines containing the amino group $-NH_2$. Primary amines are converted into the corresponding alcohol by the action of nitrous acid, nitrogen being eliminated.

primary axis (*Bot.*). (1) The main shoot of a plant.—(2) The main stalk of an inflorescence.

primary body (*Bot.*). That part of the plant body formed directly from cells cut off from the apical meristems.

primary body cavity (*Zool.*). The blastocoele or segmentation cavity formed during cleavage, or that part of it which is not subsequently obliterated by mesenchyme.

primary bow (*Meteor.*). See **rainbow.**

primary cell (*Elec.*). A voltaic cell in which the chemical energy of the constituents is changed to electrical energy when an electric circuit is connected to its terminals so that current is permitted to flow. A primary cell cannot be recharged electrically because of the irreversibility of the chemical reaction occurring therein. Cf. *secondary cell.*

primary cell wall (*Bot.*). The cell wall that surrounds the protoplast until that is approximately mature. It is thin, usually non-stratified, contains much pectin material and not so much cellulose, and later persists as the middle lamella.

primary coil (*Elec. Eng.*). A coil, forming part of an electrical machine or piece of apparatus, in which flows a current setting up the magnetic flux necessary for the operation of the machine or apparatus.

primary colours (*Paint.*). These are, for pigments, red, yellow, and blue.—(*Photog.*) The red, green, and blue which are selected as forming the basis, by addition by lumination (not pigments), of all colours. They are suggested by the spectral response of the eye, and form the basis of perfected colour photography.

primary constant (*Elec. Comm.*). The inductance, resistance, capacitance, or leakance of unit-length (one mile) of a uniform transmission line.

primary constriction (*Cyt.*). The place where a chromosome is attached to the spindle.

primary current (*Elec. Eng.*). The current in the primary winding of a transformer or induction motor.

primary current (*Thermionics*). The current carried by primary electrons.

primary electrons (*Thermionics*). A term used to distinguish the electrons incident on a body from the secondary electrons emitted therefrom by the bombardment.

primary flexure (*Zool.*). The flexure of the mid-brain by which, in Vertebrates, the fore-brain and its derivatives are bent at a right-angle to the axis of the rest of the brain.

primary gneissic banding (*Geol.*). This is exhibited by certain igneous rocks of heterogeneous composition produced by the admixture of two magmas only partly miscible; or, in other cases, by magma intimately admixed with country-rock into which it has been injected, along bedding or foliation planes.

primary increase (*Bot.*). Increase in the size of a stem or root not brought about by the addition of cells from a cambium.

primary lamella (*Bot.*). The first-formed layer of the wall of a spore.

primary luminous standard (*Illum.*). A standard of luminous intensity which is reproducible from a given specification.

primary medullary ray (*Bot.*). A vascular ray passing radially from the pith to the cortex.

primary meristem (*Bot.*). A meristem derived immediately from a promeristem and giving rise to cells which build up the primary body of the plant.

primary nitro-compounds (*Chem.*). Nitro-compounds containing the group $-CH_2{\cdot}NO_2$.

primary node (*Bot.*). The node at which the cotyledons are inserted.

primary phloem (*Bot.*). The phloem formed from a procambial strand and present in a primary vascular bundle. It consists of protophloem and metaphloem.

primary sere (*Bot.*). A plant succession beginning on land which has never borne vegetation in recent geological time.

primary solid solution (*Met.*). A constituent of alloys that is formed when atoms of an element *B* are incorporated in the crystals of a metal *A*. In most cases solution involves the substitution of *B* atoms for some *A* atoms in the crystal structure of *A*, but in a few instances the *B* atoms are situated in the interstices between the *A* atoms.

primary standard. A standard agreed upon as representing some unit (e g. length, mass, e.m.f.) and carefully preserved at a national laboratory. Cf. *secondary standard.*

primary succession (*Bot.*). A succession starting from bare soil.

primary thickening (*Bot.*). The first layers of wall material to be laid down on the very young cell wall, often rich in pectin materials.

primary tissue (*Bot.*). Tissue formed from cells derived from primary meristems.

primary trisomic (*Bot.*). A plant which has the ordinary diploid chromosome complement, together with one extra chromosome.

primary valve (*Eng.*). A valve fitted on the suction side of a pump to assist in priming.

primary vascular bundle (*Bot.*). A vascular bundle formed from a procambial strand.

primary voltage (*Elec. Eng.*). The voltage applied to the primary winding of a transformer or induction motor.

primary winding (*Elec. Eng.*). (1) The winding of a transformer which is on the input side.—(2) The input winding, usually on the stator, of an induction motor. Sometimes called **PRIMARY**.

primary wood (or **xylem**) (*Bot.*). The xylem formed from a procambial strand and present in a primary vascular bundle. It consists of protoxylem and metaxylem.

Primates, prī-mā̆'tēz (*Zool.*). The highest order of *Mammalia*; plantigrade, usually pentadactyl, forms with complete dentition, including two pairs of incisors in each jaw; the orbit is closed behind by the union of the frontal and jugal; collarbones are always present; the brain is exceptionally highly developed. Lemurs, Monkeys, Apes, and Man.

prime cost (*Civ. Eng.*). The net sum entered in a bill of quantities by the engineer as the sum provided to cover the cost of, or to be paid by the contractor to merchants or others for, specific articles or materials to be supplied or work to be done, after deducting all trade discounts and any discount for cash in excess of 2½%.

prime mover (*Eng.*). An engine or other device by which a natural source of energy is converted into mechanical power.

See **gas engine**
internal-combustion engine
oil engines
petrol engine
steam engine
steam turbine
water turbine.

prime vertical (*Astron.*). The great circle passing through the zenith and cutting the observer's horizon in the east and west points.

primer (*Ammunition*). Used for igniting the propellant in a cartridge case. It is usually filled with gunpowder and fired by means of a cap. See **detonator.**

pri'migrav'ida (*Med.*). A woman who is pregnant for the first time.

pri'mine (*Bot.*). The outer integument of an ovule.

priming (*Eng.*). (1) The delivery by a boiler of steam containing water in suspension, due to violent ebullition or frothing.—(2) The operation of filling a pump intake with fluid to expel the air.—(3) The operation of injecting petrol into an engine cylinder to assist starting.

priming (*Paint.*). The first coat of paint, consisting usually of a mixture of red-lead and white-lead ground in linseed oil; applied to woodwork to fill the pores of the wood and form a hard, opaque surface.

priming illumination (*Photo-electric Cells*). A steady illumination applied to a photo-cell in order to bring it to the most sensitive condition.

primip'ara (*Med.*). A woman who gives, or has given, birth to a child for the first time.

primitive (*Bot.*, *Zool.*). Original, first-formed, of early origin; as the *primitive streak.*

primitive groove (*Zool.*). A shallow groove running along the median line of the primitive streak.

primitive knot (*Zool.*). A small elevation in front of the primitive pit representing the dorsal lip of the blastopore.

primitive pit (*Zool.*). A small depression at the front end of the primitive streak.

primitive streak (*Zool.*). In developing Birds and Reptiles, a thickening of the upper layer of the blastoderm along the axis of the future embryo; represents the fused lateral lips of the blastopore.

primor'dial (*Bot.*, *Zool.*). Primitive.

primordial cell (*Bot.*). A cell which has not yet formed a cell wall.

primordial germ cells (*Zool.*). In the early embryo, cells which will later give rise to the gonads.

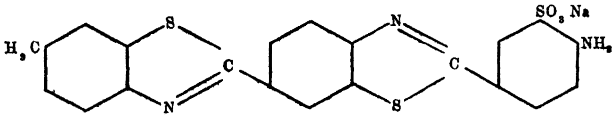
primordial leaf (*Bot.*). (1) The next leaf formed after the cotyledons.—(2) The very small protuberance from which a leaf starts its development.

primordial meristem (*Bot.*). See **promeristem.**

primordial utricle (*Bot.*). In a mature cell, the peripheral layer of protoplasm, and the vacuole which it encloses.

primor'dium (*Bot., Zool.*). The earliest recognisable rudiment of an organ or structure in development; also called ANLAGE.—*adj.* **primordial.**

prim'uline (*Chem.*). A thiazole colouring-matter, obtained by heating sulphur with *p*-toluidine, which dyes cotton directly in primrose-yellow shades. Its formula is:



On being diazotised and coupled with β-naphthol, it yields primuline red.

primuline process (*Photog.*), See **diazotype.**

princess (*Build.*). A slate size, 24 × 14 in.

princess posts (*Carp.*). Additional vertical ties on each side of the queen-posts, introduced to give extra support to the tie-beam in roofs of greater span than about 45 ft.

principal (*Build., Civ. Eng.*). See **roof truss.**

principal axis of a lens (*Light*). A straight line passing through the centres of curvature of the faces of a lens.

principal focus (*Light*). See **focus.**

principal planes of a lens (*Light*). Planes drawn through the principal points, at right-angles to the principal axis.

principal points of a lens (*Light*). Two points on the principal axis of a lens or system of lenses such that, if the object distance u be measured from one of them, and the image distance v from the other, the simple lens formula $\frac{1}{f}=\frac{1}{v}-\frac{1}{u}$ may be used to give the equivalent focal-length f of the lens. See **nodal points.**

principal rafter (*Build., Civ. Eng.*). A rafter forming part of the roof truss proper and supporting the purlins.

principle of least action (*Phys.*). See **least action (principle of).**

principle of least time (*Light*). See **Fermat's principle of least time.**

principle of Le Chatelier and Braun (*Chem.*). See **Le Chatelier-Braun principle.**

principle of the equipartition of energy (*Chem.*). The total energy of a molecule in the normal state is divided up equally between its different capacities for holding energy, or degrees of freedom.

print (*Pattern-making*). See **core-prints.**

print (*Photog.*). The positive obtained by exposing a negative image—either by contact or by projection in an enlarger—on film, or paper, or glass (for preparing lantern slides), with subsequent development.

See **answer— release—**
contact— step—
duped— balancing.

printer or **Burnley printer** (*Cotton Weaving*). A plain grey cloth made in various qualities, subsequently printed and shipped to Eastern markets.

printer light (*Cinema.*). The light source in a cinematograph printer, the intensity of which is regulated by holes punched on the side of the negative film, so that each strip of negative which has been exposed on different occasions is given suitable exposures.

printer plate (*Photog.*). The support for an emulsion which is exposed, and differentially hardened with special developers, while it is being formed into a matrix for three-colour printing.

printer's ream (*Paper*). 516 sheets, the extra allowance being for spoilage and make-ready. The printer is thus enabled to deliver 500 perfect sheets of printed matter to the ream.

printing. Any process of producing copies of designs or lettering by transferring ink or pigment to paper (or other material) from a printing surface. Printing is divided into three classes according to the method of the application of the ink to the printing surface: (1) *relief*, or *letterpress*, printing surfaces have the ink-carrying parts in relief, so that rollers deposit ink on these parts only, as in printer's type; (2) *surface*, or *planographic*, printing surfaces are prepared so that parts accept the ink from the rollers and other parts reject it, though there is no difference in level; the ink parts may be greasy and the rest moist, utilising the mutual repulsion of grease and water, as in lithography; (3) *intaglio* printing surfaces have the ink-carrying portions hollowed out; the whole surface is covered with ink and then cleaned off, leaving the hollows filled with ink, which is lifted out when the paper is pressed into contact. Relief and surface methods deposit an even layer of ink; intaglio gives a layer which varies as the depth of the hollows. All classes can be adapted for use with a cylindrical printing surface which can be printed at high speed by continuous rotation against another cylinder, with the paper to be printed running between them. Flat printing surfaces are more adaptable and are generally used, but they necessitate a reciprocating motion, which limits the speed of the output.

printing (*Photog.*). The exposing of a negative image on sensitive emulsion (with subsequent development), either by hand manipulation in a frame, or in an automatic machine for cinematograph film.

See **blue— heads-and-feet—**
carbon— intermittent—
contact— optical—
continuous— phosphate—
double—

printing ink. A mixture of carbon black, or colouring matter, and mineral oil or linseed oil, etc. Drying is partly by penetration into the paper, and partly by oxidation.

printing-out paper (*Photog.*). See **P.O.P.**

printing papers. The numerous types and grades of paper used in printing. For letterpress printing, the most common are M.F. (*machine-finish*), S.C. (*supercalendered*), and featherweight papers; for newspaper and certain magazine work, *newsprint* (q.v.) is used. Commonly abbreviated to PRINTINGS.

printing telegraph (*Teleg.*). A telegraph system in which the received signals are translated and operate a printing machine, giving a readable message. See **multiplex printing.**

pri'sere (*Bot.*). A primary succession.

prism (*Crystal.*). A hollow (open) crystal form consisting of three or more faces parallel to a crystal axis.

prism (*Light, etc.*). Triangular prisms made of glass and other transparent materials are used in a number of optical instruments. Equilateral prisms are used at minimum deviation in spectroscopes for forming spectra, 90° prisms are used for totally reflecting a ray through a right-angle in binoculars, periscopes, and range-finders.

See **block— double-image—**
comparison— objective—
Cornu— angle of minimum
direct-vision— deviation.

prism drum (*Television*). A mechanical scanning device comprising a series of prisms mounted on a rotating drum.

prism light (*Build.*). A pavement light in which the glass blocks are prisms, in order to refract the light.

prism square (*Surv.*). A form of *optical square* (q.v.) in which the fixed angle of 90° between the lines of sight is obtained by reflection from the surfaces of a suitably shaped prism.

Prisma process (*Photog.*). A two-colour subtractive colour film system, in which alternate frames are allocated to the two selected colours by rotating filters, the film being exposed twice the normal number of frames per second.

prismat'ic. Prism-shaped; composed of prisms.

prismatic astrolabe (*Surv.*). An instrument for observing stars at an altitude of 60° (in some instruments, 45°) at different azimuths around the horizon, these observations being made as a basis for the computation of latitude and local time.

prismatic camera (*Astron.*). See **objective prism.**

prismatic compass (*Surv.*). A hand form of surveyor's compass in which the eye vane carries a prism reflecting, to an eye placed opposite the sighting slit, a view of a graduated ring, attached to and moving round with the compass needle.

prismatic layer (*Zool.*). In a Molluscan shell, a layer formed of minute prisms of calcium carbonate separated by thin layers of conchiolin, lying between the periostracum and the mother-of-pearl layer.

prismatic spectrum (*Optics*). A spectrum formed by refraction in a prism, as contrasted with a *grating spectrum* formed by diffraction.

prismatic sulphur (*Chem.*). The crystalline form of sulphur obtained when sulphur which has been melted is allowed to cool. Unstable and changes to the rhombic form.

prismatic system (*Crystal.*). See **orthorhombic system.**

prismoid. A body which has plane parallel ends and is bounded by plane sides.

prismoidal formula (*Civ. Eng.*). A formula used in the calculation of earthwork quantities. It states that the volume of any prismoid is equal to one-sixth its length multiplied by the sum of the two end-areas plus four times the mid-area.

prison ashlar (*Masonry*). A block of stone dressed so that the faces are wrought into holes.

privacy equipment (*Teleph.*). See **secrecy system.**

private automatic branch exchange (*Teleph.*). A small automatic exchange on a subscriber's premises, for internal telephone connexions, with extensions over the public telephone system through lines to the local exchange. Abbrev. **P.A.B.X.**

private automatic exchange (*Teleph.*). An automatic exchange on private premises; not connectable with the public telephone system. Abbrev. **P.A.X.**

private branch exchange (*Teleph.*). An automatic or manual exchange on a subscriber's premises which is used for internal connexions, with extension through the local exchange to the public telephone system. Abbrev. **P.B.X.**

private branch exchange final selector (*Auto. Teleph.*). See **P.B.X. final selector.**

private exchange (*Teleph.*). An exchange in a private establishment, which is not connected in any way with the public telephone service. Abbrev. **P.X.**

private manual branch exchange (*Teleph.*). A small manually operated exchange on a subscriber's premises for establishing internal connexions and extensions, and external connexions over lines to the local exchange. Abbrev. **P.M.B.X.**

private manual exchange (*Teleph.*). A manually operated exchange, not connected with the public telephone service. Abbrev. **P.M.X.**

private wire (*Auto. Teleph.*). See **P-wire.**

pro- (Greek and Latin *pro*, before in time or place). A prefix used in the construction of compound terms, in the senses of 'earlier,' 'more primitive,' 'placed before,' and 'pertaining to the prothorax of *Insecta*'; e.g. *propupa*, a stage in the development of an Insect preceding the pupa stage; *promitosis*, a primitive type of mitosis; *prosternum*, the sternum of the prothorax in Insects.

proam'nion (*Zool.*). In the embryos of higher Vertebrates, an area of blastoderm in front of the head, formed of ectoderm and endoderm only.

proat'las (*Zool.*). In *Sphenodon*, Crocodiles, and Chameleons, a median bone intercalated between the occipital region of the skull and the atlas vertebra.

probable error. The small fraction r of a measurement, such that the residual accidental error in making the measurement gives a result which is equally likely to be within or without the range $\pm r$. If $x_1, x_2, x_3 \ldots x_n$ are n observations of a quantity, all corrected for known errors, whose mean is y, then the probable error is defined as

$$r = 0{\cdot}6745\sqrt{\frac{\Sigma(x-y)^2}{n-1}}.$$

probasip'odite (*Zool.*). The proximal one of two joints into which the basipodite of *Crustacea* is sometimes divided.

probe (*Surg.*). A surgical instrument, with a blunt end, used for exploring wounds, sinuses, and cavities.

pro'bertite (*Min.*). Hydrated oxide of sodium, calcium, and boron, crystallising in the monoclinic system.

Proboscidea, —sid'ē-a (*Zool.*). An order of large eutherian Mammals having a long prehensile proboscis with the nostrils at the tip, large lophodont molars, and a pair of incisors of the upper jaw enormously developed as tusks; semi-plantigrade; forest-living herbivorous forms of Africa and India. Elephants.

probos'cis (*Zool.*). An anterior trunk-like process: in *Turbellaria* and *Polychaeta*, the protrusible pharynx: in *Nemertinea*, a long protrusible muscular organ lying above the mouth: in some *Insecta*, the suctorial mouth-parts: in *Hemichorda*, a hollow club-shaped or shield-shaped structure in front of the mouth: in *Proboscidea*, the long flexible prehensile nose.—*adj.* **proboscid'iform.**

pro'buds (*Zool.*). In *Cyclomyaria*, reproductive bodies (blastozooids) which break free from the stolon and migrate across the body of the parent to become attached to the cadophore.

procam'bial strand (*Bot.*). An elongated group of meristematic cells, derived from an apical meristem, and by division giving rise to the xylem and phloem of a vascular bundle; if the whole of the strand is used up in this way, the bundle contains no cambium, and is closed; if a thin strip of cambium remains between xylem and phloem, the bundle is open.

pro'carp (*Bot.*). The multicellular female organ of the *Rhodophyta*, consisting of an archicarp and a trichogyne.

procar'tilage (*Zool.*). An early stage in the formation of cartilage in which the cells are still angular in form and undergoing constant division; embryonic cartilage.

Pro'cellarifor'mes (*Zool.*). An order of *Colymbomorphae* having powerful wings and well-developed flight feathers; the palate is schizognathous; the feet are webbed, the hallux being reduced or absent; wandering ocean forms with great powers of flight; cosmopolitan. Petrels and Albatrosses.

procer'coid (*Zool.*). A larval stage of some *Cestoda*, occurring in the secondary host.

process (*Bot.*, *Zool.*). A general term for an extension or projection.

process block (*Print.*). A metal plate prepared by some photo-mechanical process and mounted to type-height.

processing (*Photog.*). The chemical sequences involved from the exposing of the negative in the camera to the obtaining of the final positive for use.

prochlo'rite (*Min.*). A silicate of magnesium and aluminium with chemically combined water, crystallising in the monoclinic system. It occurs in metamorphic rocks.

prociden'tia (*Med.*). A falling down or prolapse, the term is strictly applied to complete prolapse of the uterus outside the pelvis.

procoelous, —sē'lus (*Zool*). Concave anteriorly and convex posteriorly; said of vertebral centra.

proct-, procto- (Greek *proktos*, anus). A prefix used in the construction of compound terms; e.g. *proctalgia* (q.v.).

proctal (*Zool.*). Anal.

proctal'gia (*Med.*). Neuralgic pain in the rectum.

proctec'tomy (*Surg.*). Surgical removal of the rectum.

procti'tis (*Med.*). Inflammation of the rectum.

proctoc'lysis (*Med.*). The slow injection of large amounts of fluid into the rectum (the Murphy drip method).

proctodae'um (*Zool.*). That part of the alimentary canal which arises in the embryo as a posterior invagination of ectoderm; cf. *stomodaeum*, *mid-gut*.—*adj.* **proctodae'al.**

proctodyn'ia (*Med.*). Pain in or around the anus.

proc'toscope (*Med.*). An instrument for inspecting the mucous membrane of the rectum.

proc'tosigmoidi'tis (*Med.*). Inflammation of the rectum and of the sigmoid flexure of the colon.

proctot'omy (*Surg.*). Surgical incision of the anus or rectum for the relief of stricture.

procum'bent (*Bot.*). Said of a stem which lies on the ground for all or most of its length.

Prodorite (*Build.*). A material and method for rendering all kinds of industrial structures acid-proof.

prod'romal (*Med.*). Premonitory of disease.

prods (*Foundry*). See **dabbers.**

producer-gas (*Fuels*). A low-grade gas made by the partial combustion of coal, coke, or anthracite, in a mixed air-steam blast. Combustible constituents are (per cent.) CO 24 to 30, H_2 10 to 14, CH_4 0·2 to 3·5; balance, CO_2 3 to 5, N_2 50 to 53. Calorific value 135 to 155 B.Th.U. per cu. ft. Used chiefly for furnaces and production of power.

Proell governor, prŏ'el (*Eng.*). A *pendulum governor* (q.v.) of the Porter type in which the balls are attached to upward prolongations of the sleeve links, instead of to the pivoted connexion between these and the upper links.

proem'bryo (*Bot.*). The group of cells, few in number, formed as the zygote begins to divide, and from one or some of which the embryo proper is organised.

proen'zyme (*Bot.*, *Zool.*). See **zymogen.**

proepip'odite (*Zool.*). In *Crustacea*, an epipodite borne upon the pleuropodite.

profile (*Surv.*). A longitudinal section, usually along the centre line of a proposed work such as a railway.

profile drag (*Aero.*). The two-dimensional drag of any lifting surface; the sum of the surface-friction and form (or pressure) drag.

profile grinding (*Eng.*). The grinding of cylindrical work without traversing the wheel, whose periphery is profiled to the form required and extends over the full length of the work.

profile paper (*Civ. Eng.*). A drawing paper ruled with horizontal and vertical lines spaced according to certain scales; used for plotting profiles of proposed engineering works.

profile position (*Bot.*). A position assumed by chloroplasts and by leaves when the edge of the structure is turned towards the position from which the brightest light is coming.

profilom'eter (*Civ. Eng.*). See **roughness integrator.**

profun'dus (*Zool.*). In Vertebrates, a cranial nerve representing the dorsal root of the first somite, and corresponding to the oculomotor ventrally.

progametan'gium (*Bot.*). A fungal hypha from which a gametangium is subsequently cut off by a transverse septum.

proge'ria (*Med.*). Premature old age. Occurring in children, the condition is characterised by dwarfism, falling out of hair, wrinkling of the skin, and senile appearance, due, it is believed, to a destructive lesion of the pituitary gland.

proglot'tis (*Zool*). One of the reproductive segments forming the body in *Cestoda*; produced by strobilisation from the back of the scolex.

progna'thous (*Zool.*). Having protruding jaws: having the mouth-parts directed forwards.

progno'sis (*Med.*). A forecast of the probable course of an illness: the art of making such a forecast.

progo'nal (*Zool*). Said of that anterior portion of the genital ridge which does not contribute to the gonad.

programme (or **program**) **line** (*Elec. Comm.*). A transmission line, of superior propagation characteristics, for relaying broadcasting programmes between a studio and transmitters, or between control points of broadcasting administrations.

programme repeater (*Elec. Comm.*). An amplifier which is of sufficiently high-grade performance for insertion into programme lines for relaying broadcasting programmes, with or without automatic means for reversing its direction of operation.

progress certificate (*Build.*, *Civ. Eng.*). A certificate made out by the engineer or architect during the progress of works on a contract, to enable the contractor to obtain payment on account from the employer.

progress chart (*Build.*, *Civ. Eng.*). A chart forming a continuous record, which is kept up to date, of the amount of work done by the various trades during the course of constructional work.

progression (*Surv.*). See **traversing.**

progressive metamorphism (*Geol.*). The progressive changes in mineral composition and texture observed in rocks within the aureole of contact metamorphism round igneous intrusions; also in rocks which have experienced regional metamorphism of varying degrees of intensity. The particular degree of metamorphism in the latter case is indicated by the 'metamorphic grade' of the rock.

progressive proofs (*Print.*). In colour-printing, a set of proofs supplied to the printer as a guide to colour and registration, each colour being shown both separately and imposed on the preceding ones.

progressive provisioning (*Zool.*). In Insects and Spiders, the supply of food by the parent to the larva or young form at regular intervals throughout its development. Cf. *mass provisioning*.

progressive stain (*Micros.*). A stain which cannot be modified by a differentiating reagent and with which, therefore, care must be taken not to overstain. Cf. *regressive stain*.

projected-scale instrument (*Elec. Eng.*). An instrument in which an image of the scale or the pointer is projected on to a screen.

projection (*Cinema.*). The use of a positive cinematograph print in a projection machine to obtain the final picture on the screen.

projection (*Maths.*). One figure is the projection of another when there is a (*1, 1*) correspondence between the lines and points in the two figures.—(*Geog.*) See Supplement.

projection (*Psycho-an.*). The process whereby we ascribe to other people and to the outside world mental factors and attributes really in ourselves.

projection booth (*Cinema.*). The sound-proof, but ventilated, booth from which *back-projection* (q.v.) motion-pictures are projected on a paper or ground-glass screen.

projection distance (*Cinema.*). The distance between the projector and the screen in a cinema.

projection lamp (*Cinema.*). The source of illumination for projecting the image of a cinematographic film on to the screen.

projection lantern (*Light*). A 'two-lens' optical system for projecting on to a screen a magnified image of a transparency or 'lantern slide.' The condenser, a lens whose function is to illuminate the slide evenly, forms an image of the source of light on the projection lens, the slide being placed in the converging beam of light between the two lenses in such a position that the projection lens forms on the screen a real inverted image of it.

projection lens (*Cinema.*). The objective lens in a cinema projector, which projects the image on the film in the gate on to the screen.

projection period (*Cinema.*). That fraction of the complete time-cycle, expressed in degrees, during which the frame is effectively projected on to the screen. See **period.**

projection room, projection box (*Cinema.*). The enclosure containing cinematograph projectors in a cinema or studio; from it motion-pictures are projected through windows.

projectionist (*Cinema.*). One who operates the projector and the sound-reproducing equipment in a cinema.

projector (*Cinema.*). The machine which projects the motion-picture on the screen and reproduces the recorded sound from the sound-track. See **continuous projector.**

projector (*Illum.*). A special form of reflector designed to throw a strong beam of light in a particular direction.

See **floodlight— searchlight—**

projector-type filament-lamp (*Illum.*). An electric filament-lamp in which the filament is arranged in a concentrated form, so that it can be focused for projection purposes.

prolam'ines (*Chem.*). A group of alcohol-soluble proteins which are insoluble in water and in strong alcohol but soluble in 70-90% alcohol.

prolapse (*Med.*). The falling out of place or sinking of an organ or part of the body.

prolate (*Bot.*). Somewhat globular, but flattened equatorially.

pro'leg (*Zool.*). One of several pairs of fleshy conical retractile projections borne by the abdomen in lepidopterous larvae; used in locomotion.

proletarian (*Bot.*). A plant having little or no reserves of food material.

proleu'cocytes (*Zool.*). Cells which will develop into leucocytes.

proliferation, prolification (*Bot.*). (1) A renewal of growth in a mature organ after a period of inactivity.—(2) The production of vegetative shoots from a reproductive structure.—(3) The formation of a sporangium inside the empty walls of a previously discharged sporangium.—(4) The production of offshoots, which may become detached and established as new plants.—(*Med.*) Growth or extension by the multiplication of cells.

prolif'erous (*Bot.*). (1) Bearing offshoots.—(2) Producing abnormal or supernumerary outgrowths.—(3) Producing progeny by means of offshoots.—(4) Showing excessive development in some respect.

prolification (*Bot.*). The development of buds in the axils of sepals and petals. See also under **proliferation.**

pro'line (*Chem.*). Pyrrolidine-2-carboxylic acid, a cleavage product of certain proteins.

prolonged (*Bot.*). Drawn out into a long point which is not hollowed along its sides.

promenade deck (*Ship Constr.*). On a passenger ship, the upper deck on which passengers walk.

promenade tile (*Build.*). See **quarry tile.**

promer'istem (*Bot.*). The meristem in an embryo and at the growing points.

prominences (*Astron.*). Huge tongues of flame standing out from the sun's disc, sometimes reaching to a height of thousands of miles; first discovered during total solar eclipses, but now observable at any time by means of the spectroscope.

promito'sis (*Zool.*). See under **pro-.**

promontory (*Zool.*). A projecting structure: a small ridge or eminence.

promoter (*Chem.*). A substance which increases the activity of a catalyst.

prompt side. The side of a stage, behind the proscenium, from which prompting is done. Usually to the right of the audience, but sometimes on the other side, if the stage controls (scenery and lighting) are on that side.

promyce'lium (*Bot.*). A short germ tube, put out by some fungal spores, on which other spores of different type are developed.

pronation (*Zool.*). In some higher Vertebrates, movement of the hand and forearm by which the palm of the hand is turned downwards and the radius and ulna brought into a crossed position; cf. *supination.*—*adj.* **pronate.**

prona'tor (*Zool.*). A muscle which by its contraction brings about pronation.

proneph'ros (*Zool.*). In *Craniata*, the anterior portion of the kidney, functional in the embryo but functionless and often absent in the adult. Also called FORE-KIDNEY, HEAD-KIDNEY.—*adj.* **pronephric.**

prono'tum (*Zool.*). The notum of the prothorax in Insects.—*adj.* **pronotal.**

Pron'tosil (*Chem.*). Trade-name for certain of the sulphonamide drugs. See **sulphonamides*.**

pronu'cleus (*Zool.*). The nucleus of a germ cell after the maturation divisions.

Pro'ny brake (*Eng.*). An absorption dynamometer consisting of a pair of friction blocks bolted together across a brake drum, the torque absorbed being balanced by weights at the end of a torque arm attached to the blocks.

pro-oestrus, —ēs'trus (*Zool.*). In Mammals, the coming on of heat in the oestrus cycle.

proof. In alcoholometry, a designation (*proof-spirit*) for spirituous liquid containing 49·28 per cent. of real alcohol by weight, 57·10 per cent. by volume, with sp. gr. of 0·920 at 15·6° C. *

proof (*Typog.*). Impression taken from type matter or blocks for checking and correction only, not as representative of the finished appearance and quality of the work.

proof corrections (*Typog.*). Additions or emendations to a proof. They should be made in ink, and clearly indicated in the margin. A certain amount of correcting is usually allowed for in the estimated price, corrections in excess of this being charged separately.

proof plane (*Elec. Eng.*). A piece of conducting material, mounted on an insulating handle, which may be used for receiving or removing charges in electrostatic experiments.

proof reader (*Typog.*). See **reader.**

proof stress (*Met.*). The stress required to produce a certain amount of extension in metals which do not exhibit a sudden yield point. Usually it is the stress producing an extension of 0·1 or 0·5%. It is frequently called the *yield point* (q v.).

proofed tape (*Cables*). Cotton cloth coated with a rubber compound, wrapped round rubber-insulated cables.

pro-o'tic (*Zool.*). An anterior bone of the auditory capsule of the Vertebrate skull.

prop (*Build.*). A post, usually relatively short and made of timber, used as a strut.

prop drawer (*Mining*). One who removes props from under the roof of a coal seam, to allow the roof to settle down.

prop root (*Bot.*). A root formed from the stem, usually close to the ground; it helps to hold the stem erect.

propagation (*Bot.*). Increase in the number of plants by vegetative means.

propagation constant (*Elec. Comm*). The measure of the diminution in magnitude and retardation in phase experienced by a current of specified frequency in passing along unit section (one mile) of a transmission line. See **attenuation constant, phase constant, decibel, néper.**

propag'ulum (*Bot*). A small vegetative outgrowth which becomes detached from the parent and grows into a new plant.

pro'pane (*Chem.*). C_3H_8, a paraffin hydrocarbon, a colourless gas, b.p. −45° C.; found in crude petroleum. It burns in air to carbon dioxide and water.

pro'panol (*Chem.*). *n*-Propyl alcohol.

propar'gyl alcohol (*Chem.*). $HC \vdots C{\cdot}CH_2{\cdot}OH$, propinyl alcohol, a monohydric unsaturated alcohol, a mobile liquid of agreeable odour, lighter than water, b p. 114° C.

propargyl'ic acid (*Chem.*). See **propiolic acid.**

propellant (*Ammunition*). The term used for the filling of all cartridges. It includes gunpowder, ballistite, cordite, etc. See **cartridge.**

propeller. See **airscrew, marine screw propeller.**

propeller fan (*Eng.*). A fan consisting of an impeller or rotor carrying several blades of air-screw form, working in a cylindrical casing sometimes provided with fixed blades; usually driven by a direct-coupled motor.

propeller shaft (*Automobiles*). The driving shaft which conveys the engine power from the gearbox to the rear axle of a motor vehicle. It is usually connected through universal joints to permit vertical displacement of the rear axle on the springs.

propeller-type water turbine (*Eng.*). A water turbine having a runner similar to a four-bladed ship's propeller. It gives a high specific speed under low heads, thus reducing the size of a direct-coupled generator. See **Kaplan water turbine.**

pro'peltid'ium (*Zool.*). The conspicuously swollen head of *Solifugae*.

propene (*Chem.*). Propylene.

pro'penol (*Chem.*). Allyl alcohol.

proper exciple (*Bot.*). A hyphal layer around the fructification of a lichen which contains no algal cells.

proper motion (*Astron.*). That component of a star's own motion in space which is at right-angles to the line of sight, so that it constitutes the apparent change of position of the star on the celestial sphere.

pro'phase (*Cyt.*). The preliminary stages of mitosis or meiosis leading up to the formation of the astroid.

prophylac'tic (*Med.*). Tending to prevent or to protect against disease, especially infectious disease: any agent which does this.

prophylax'is (*Med.*). The preventive treatment of disease.

pro'phyll (*Bot.*). A bracteole.

pro'pine (*Chem.*). Allylene, $CH_3{\cdot}C \vdots CH$.

propiol'ic acid (*Chem.*). $CH \vdots C{\cdot}COOH$, acetylene-carboxylic acid; also called PROPARGYLIC ACID or PROPINE ACID; silky crystals, m p. 6° C., b p. 144° C., soluble in water and alcohol; it forms an explosive silver salt.

propion'ic acid (*Chem.*). $CH_3{\cdot}CH_2{\cdot}COOH$, a monobasic fatty acid, a colourless liquid, m.p. −36° C, b p. 141° C. The acid is a constituent of pyroligneous acid; it is formed in certain fermentations.

pro'pionyl group (*Chem.*). The monovalent radical $CH_3{\cdot}CH_2{\cdot}CO-$.

proplas'tid (*Bot.*). A minute inclusion in the cytoplasm from which a plastid may develop.

propneus'tic (*Zool.*). (Of *Insecta*) having the prothoracic spiracles only open, as in pupal *Culicidae*.

propo'deum, propo'deon (*Zool.*). In certain *Hymenoptera*, the first somite of the abdomen which becomes fused with the metathorax; epinotum.

pro'podite (*Zool.*) In some *Crustacea*, the fourth joint of the endopodite of the walking-legs or maxillipeds.

propo'dium (*Zool.*). In *Gastropoda*, the anterior part of the foot projecting beneath the head.

propo'doso'ma (*Zool.*). In *Acarina*, the segments of the first and second pairs of legs.

pro'priocep'tor (*Zool.*). A sensory nerve-ending receptive to internal stimuli; interoceptor.—*adj.* **proprioceptive.**

pro'priospi'nal (*Zool.*). Arising within and confined to the spinal cord; said of certain endogenous fibres of the dorsal and ventrolateral columns of the spinal cord which are derived from cells in the grey matter of the cord itself.

propterygium, prō-pter-ij'i-um (*Zool.*). In *Selachii*, the outermost or most anterior of the three basal cartilages of the pectoral fin.

propto'sis (*Med.*). Displacement forwards or protrusion of a part of the body, especially of the eye.

propu'pa (*Zool.*). See **prepupa.**

propygid'ium (*Zool.*). In some Insects, a sclerite anterior to the pygidium.

pro'pyl alcohol (*Chem.*). $C_3H_7{\cdot}OH$, a monohydric aliphatic alcohol, existing in two isomers: (*a*) *n*-propyl alcohol, $CH_3{\cdot}CH_2{\cdot}CH_2{\cdot}OH$, b.p. 97° C, sp. gr. 0·804, obtained from fusel oil, miscible with water in all proportions; (*b*) *iso*propyl alcohol, $CH_3{\cdot}CH(OH){\cdot}CH_3$, b.p. 81° C., sp. gr. 0·789, which can be prepared by the reduction of acetone with sodium amalgam, or by the hydrolysis of propylene sulphate obtained by the absorption of propylene in sulphuric acid.

pro'pylene (*Chem.*). Propene. C_3H_6, $CH_2{:}CH{\cdot}CH_3$, an olefine hydrocarbon, a gas, b.p. −48° C.

pros- (*Chem.*). Containing a condensed double aromatic nucleus substituted in the 2.3 positions.

proscap'ula (*Zool.*). See **clavicle.**

prosce'nium (*Build.*). The stage frame in a theatre, fitted with curtains and a steel safety-curtain to cut off the stage from the auditorium in case of fire.

proscenium lights (*Illum.*). Rows of incandescent lamps for illuminating the stage of a theatre; they are placed around the back of the proscenium arch.

prosco'lex (*Zool.*). See **bladderworm.**

prosector (*Med.*). One who dissects dead bodies for the purpose of anatomical demonstration and teaching.

prosenceph'alon (*Zool.*). In *Craniata*, that part of the fore brain which gives rise to the cerebral hemispheres and the olfactory lobes.

prosenchy'ma (*Bot.*). A tissue composed of elongated cells with pointed ends; the cells are often empty, and are concerned with affording support and with conducting material.—*adj.* **prosenchy'matous.**

prosi'phon (*Zool.*). In some decapod *Mollusca* with a spiral chambered shell, a tube passing through the initial chamber.

prosocoele, prŏ'sō-sēl (*Zool*). In *Craniata,* the cavity of the fore brain or first brain-vesicle in the embryo; fore ventricle.

prosodet'ic (*Zool.*). Anterior to the beak (in Bivalves).

proso'dus (*Zool.*). In *Porifera,* a canal leading from an incurrent canal to the flagellated chamber.

proso'ma (*Zool.*). In *Arachnida,* the region of the body comprising all the segments in front of the segment bearing the genital pore: in *Acarina,* the gnathosoma together with the podosoma.

pro'soplec'tenchy'ma (*Bot.*). A false tissue of elongated fungal hyphae.

proso'pothor'acop'agus (*Med*). A monstrosity in which twin foetuses are joined at the faces, necks, and chests.

pro'sopyle (*Zool.*). In *Porifera,* a pore or aperture opening from an incurrent canal into a flagellated chamber.

prospo'ry (*Bot.*). The formation of sporangia on very young plants.

pros'tate (*Zool.*). In *Oligochaeta,* said of glands of unknown function associated with the male genitalia: in *Cephalopoda,* said of a gland of the male genital system associated with the formation of spermatophores: in eutherian Mammals (except *Edentata* and *Cetacea*), said of a gland associated with the male urogenital canal.—*adj.* **prostatic.**

prostatec'tomy (*Surg.*). Surgical removal of the prostate gland.

pros'tatism (*Med.*). The concurrence of mental irritability, eroticism, and frequent micturition in elderly men, usually indicative of abnormal enlargement of the prostate gland.

prostati'tis (*Med.*). Inflammation of the prostate gland.

pros'tatorrhoe'a, prostatorrhea (*Med.*). Chronic gleety or mucous discharge from the prostate.

prosternum (*Zool.*). See under **pro-.**

pros'thesis (*Surg.*). The supplying of an artificial bodily part in place of one which is deficient or absent: the artificial part supplied.—*adj.* **prosthetic.** See also **dentistry.**

prosthet'ica (*Surg.*). That branch of surgical science concerned with prosthesis.

pros'thomere (*Zool.*). A pre-oral somite.

prosto'mium (*Zool.*). In annelid Worms, that part of the head region anterior to the mouth.—*adj.* **prostomial.**

prostrate (*Bot.*). Procumbent.

protae'sthesis (*Zool.*). A hypothetical primitive generalised sensilla from which the various sense-organs of Insects might have been derived.

pro'tamines (*Chem.*). The simplest proteins, e.g. salmine, sturine, etc. They are only found, in combination with nucleic acid, in fish testicles. Strong bases, they can be precipitated by alcohol from their sulphuric acid solution. They are not coagulated by heat, but can be precipitated with NaCl or with ammonium sulphate. They are laevo-rotatory.

protan'drous (*Bot., Zool.*). Said of organisms in which the male germ-cells ripen before the female germ-cells. Cf. *protogynous.*

protease, prŏ'tē-āz (*Chem.*). A term for any protein-splitting enzyme. Proteases include pepsin, trypsin, erepsin, rennin, and several plant proteases, e.g. papain and bromelin.

protected-type (*Elec. Eng.*). Said of electrical machinery or other apparatus in which any internal rotating or live parts are protected against accidental mechanical contact in such a way as not to impede ventilation. See **screen-protected motor.**

protection cap (*Elec. Eng.*). See **fender.**

protective coating (*Chem.*). A layer of a relatively inert substance, on the surface of another, which diminishes chemical attack of the latter.

protective colloid (*Chem.*). A lyophilic colloid whose presence in small amounts stabilises a lyophobic solution.

protective device or **protector** (*Elec. Eng, Teleph., etc.*). A device designed to protect a piece of electrical equipment against some abnormal condition (e.g. excess current, excess voltage, lightning).

protective gap (*Elec. Eng.*). A spark gap arranged between an electric circuit and earth, or across a piece of apparatus, so adjusted that should the voltage across the gap exceed a certain safe value the gap breaks down, thereby limiting the voltage appearing across the part of the circuit being protected to the breakdown voltage of the gap.

protective gear (*Elec. Eng.*). The apparatus associated with a protective system, e.g. relays, instrument transformers, pilots, etc.

protective layer (*Bot.*). A layer of suberised cells lying across the place where a leaf comes away at leaf fall; it checks both loss of water from within the plant and also the entry of parasites.

protective system (*Elec. Eng.*). An arrangement of apparatus designed to isolate a piece of electrical apparatus should a fault occur on it.

See **balanced—**
discriminating—
impedance—
leakage—
overload—

proteg'ulum (*Zool.*). Embryonic shell (Brachiopods).

pro'teins (*Chem.*). Complex nitrogenous substances composed mainly of α-amino-acid residues joined by the 'peptide linkage' which is formed when water is eliminated from the carboxyl group of one amino-acid molecule and the amino group of another. Proteins have molecular weights which tend to be approximate multiples of 17,600. Most form colloidal solutions in water or dilute salt solutions. They are odourless, tasteless, difficultly crystallisable, decomposed by heat without definite melting points, hydrolysable by acids, alkalis, or certain enzymes. Some are conjugated—i.e. contain a relatively simple group such as haematin in haemoglobin, or nucleic acid in nucleoprotein. They are essential constituents of the living cell, and must be provided in the food to make good tissue wastage and allow of growth.

proteolyt'ic, proteoclas'tic (*Zool.*). Said of enzymes which cause the breakdown of proteins into simpler substances; e g. trypsin.

pro'teoses (*Chem.*). Protein derivatives, soluble in water, not coagulated by heat, but precipitated by saturation with ammonium or zinc sulphate.

proter-, protero- (Greek *proteros,* before, former). A prefix used in the construction of compound terms; e.g. *proteroglyph* (q.v.).

pro'teran'dry, pro'teran'drous (*Bot., Zool.*). See **protandry, protandrous.**

pro'teroglyph (*Zool.*). Having specialised canine teeth in the upper jaw.

pro'terogy'ny, pro'terogy'nous (*Bot.*). See **protogyny, protogynous.**

pro'teroso'ma (*Zool.*). In *Acarina,* the region of the body comprising the gnathosoma and the propodosoma.

Proterozo'ic (*Geol.*). A division of the Pre-Cambrian comprising the less ancient rocks of that system, and lying above the Archaeozoic.

Protex (*Build.*). Trade-name for an emulsion used for damp-proofing.

prothal'lial cell (*Bot.*). A small cell present in pollen grain of Gymnosperms, representing a last reminiscence of a male prothallus.

prothal'lus, prothal'lium (*Bot.*). (1) A small plant derived from a spore, and bearing the antheridia and archegonia, occurring in the life-cycles of ferns and related plants. The zygote and young spore-bearing plant develop at the expense of the prothallus, which dies as the spore-bearing plant enlarges. The term prothallus is extended to cover homologous stages in the life-cycle of Gymnosperms, where the relations are less clear — (2) The very earliest stages in the development of the lichen thallus.

prothe'ca (*Zool.*). The calyx rudiment in coral formation.

prothe'cium (*Bot.*). A primitive or rudimentary perithecium.

protho'rax (*Zool.*). The first or most anterior of the three thoracic somites in Insects.

prothrom'bin (*Chem.*). A protein-like substance present in blood plasma. In shed blood it is converted to *thrombin* (q.v.) by the action of thromboplastin (thrombokinase), which is liberated from the blood platelets or is derived from tissue fluid. Calcium is concerned in the process.

Protis'ta (*Bot.*, *Zool.*). A large group of simple organisms, which show at least some characters common to plants and animals. The more plant-like are placed in the *Protophyta*, the more animal-like in the *Protozoa*. Two classes of *Protista* (*Flagellata* and *Mycetozoa* or *Myxomycetes*) are claimed by the zoologists as animals and by the botanists as plants. That these forms fit so neatly into both zoological and botanical classifications seems to point to the fact that they are among the most primitive forms of life, evolved before the animal and plant kingdoms began to diverge However, while this is probably true for the *Flagellata*, there are reasons for considering the *Myxomycetes* to be a somewhat specialised group.

proto- (Greek *protos*, first). A prefix used in the construction of compound terms; e.g. *protocephalon*, the first somite of the head in *Insecta*.

protoactinium (*Chem.*). Symbol, Pa. A radioactive element in the fifth group of the periodic system, with a half-life of 2×10^4 years. At. no. 91.

Protobran'chia (*Zool.*). A small order of primitive *Pelecypoda* in which the gills are simple bipectinate structures with free, flat, non-reflected filaments; the foot is flat and the byssus gland only slightly developed; ciliary feeders.

protocer'cal (*Zool.*). See **diphycercal.**

protocer'ebron, protocer'ebrum (*Zool.*). In higher *Arthropoda* (as *Insecta* and *Crustacea*), the fused ganglia of the first somite of the head, forming part of the 'brain.'

Protochorda'ta (*Zool.*). A division of *Chordata* comprising the *Hemichorda*, *Urochorda*, and *Cephalochorda*, which are distinguished by the absence of a cranium and of specialised anterior sense-organs. Cf. *Craniata.*

protocnemes, prŏ'tō-nēmz (*Zool.*). In *Zoantharia*, the six primary pairs of mesenteries.

pro'toconch, —konk (*Zool.*). In *Mollusca*, the larval shell.

pro'tocone (*Zool.*). In Mammals, the inner cusp of an upper molar tooth.

protoco'nid (*Zool.*). In Mammals, the inner cusp of a lower molar tooth.

pro'tocorm (*Bot.*). A tuber-like structure formed in the early stages of club mosses and some other plants which appear to live in close relations with fungi in youth.

pro'toderm (*Bot.*). See **dermatogen.**

pro'togam'y (*Biol.*). Union of gametes without fusion of their nuclei.

protogen'ic (*Chem.*). Capable of supplying a hydrogen ion (proton).

pro'togy'nous (*Bot.*, *Zool.*). Said of organisms in which the female germ-cells ripen before the male germ-cells; cf. *protandrous.*—*n.* **protogyny.**

pro'toly'sis (*Bot*). The decomposition of chlorophyll by light.

pro'toma'la (*Zool.*). In *Myriapoda*, the mandible.

protom'erite (*Zool.*). In some *Gregarinidea*, the part of the body intervening between the epimerite and the nucleus.

Pro'tomonadi'na (*Zool.*). An order of *Zoomastigina* the members of which have one or two flagella and never show active amoeboid movement over the whole surface of the body.

pro'ton (*Phys.*). A positively charged particle of mass $1{\cdot}66 \times 10^{-24}$ gm. and charge equal and opposite to that on an electron. The proton, being about 1840 times as massive as the electron, makes the main contribution to the mass of an atom. See **atom, nucleus** (*Phys.*).

pro'tone'ma (*Bot.*). (1) A branched filamentous plantlet, looking like an alga, produced when a moss spore germinates; from it the leafy moss plants arise by the development of lateral buds.—(2) The early filamentous stages of some algae, which differ in form from the adult plants.

Pro'tonemerti'ni (*Zool.*). An order of *Dimyaria* in which the mouth is behind the brain, the proboscis lacks stylets, and the cerebral ganglia and lateral nerves lie outside the muscles of the body-wall; marine forms.

pro'tonephrid'ial system (*Zool.*). The excretory system of *Platyhelminthes*, consisting of flame-cells and ducts.

pro'tonephrid'ium (*Zool.*). A larval nephridium, usually of the flame-cell type.

protophilic (*Chem.*). Capable of combining with a hydrogen ion (proton).

pro'tophlo'em (*Bot.*). The first phloem to be formed from the procambial strands; it may be generalised in structure, with poorly formed sieve tubes and no companion cells.

pro'tophyll (*Bot.*). A sterile leaf.

pro'tophyte (*Bot.*). A unicellular plant of simple characters.

pro'toplasm (*Biol.*). The material basis of all living matter, a greyish semitransparent semi-fluid substance, of complex chemical composition, within which physical, chemical, and electrical changes are constantly taking place.—*adj.* **pro'toplas'mic.**

protoplasmic circulation (*Biol.*). The streaming motion that may be seen in the protoplasm of a living cell.

protoplasmic respiration (*Bot.*). Respiration going on at the expense of protein materials in a starved plant.

pro'toplast (*Zool.*). See **energid.**

pro'topod (*Zool.*). Said of a phase in the development of larval Insects in which the abdomen is imperfectly segmented and bears no appendages.

protop'odite (*Zool.*). The basal portion of a typical arthropod limb.

pro'tosome (*Gen.*). A hypothetical central body in a gene, itself a hypothetical structure.

Protospon'dyli (*Zool.*). An order of *Neopterygii* having thin cycloid or rhombic scales, a long low dorsal fin, and a rounded tail-fin; voracious carnivorous forms occurring in the fresh waters of North America. Bow-fins.

pro'tostele (*Bot.*). A stele in which the vascular tissue forms a solid core, with centrally placed xylem surrounded by phloem.

protostig'mata (*Zool.*). In a Craniate embryo, the primary pair of gill-slits.

protosty'lic (*Zool.*). Having the lower jaw connected with the cranium throughout life by the dorsal portion of the original mandibular arch, as in Lung-fish.

pro'tothal'lus (*Bot.*). The first stages in the formation of the thallus of a lichen, often before the fungus and alga have become associated. The name is also applied to fringes of hyphae growing out from the edges of a mature thallus.

Protothe'ria (*Zool.*). A subclass of *Mammalia* of oviparous habit; it includes only a few scarce Australasian forms. Spiny Ant-eater, Duck-billed Platypus.

Pro'totra'chea'ta (*Zool.*). A class of terrestrial *Arthropoda* having a soft cylindrical body and a pair of unjointed legs to each somite; respiration is by tracheae; the perivisceral cavity is haemocoelic; the head bears a pair of jointed antennae, a pair of jaws, and a pair of oral papillae; primitive Arthropods closely allied to the *Annelida*; sluggish, carnivorous, viviparous forms, found in damp, shady places in S. Africa, S. America, and Australia.

pro'totroch, —trŏk (*Zool.*). In a trochophore larva, the pre-oral circlet of cilia.

protot'ropy (*Chem.*). The formation of tautomeric ions by the splitting off of hydrogen ion from a compound.

pro'totype (*Zool.*). An ancestral form: an original type or specimen.

prototype filter (*Elec. Comm.*). A basic type of filter which has the specified nominal cut-off frequencies, but which must be developed into derived forms to obtain further desirable characteristics, such as constancy of image impedance with frequency.

pro'tover'tebra (*Zool.*). In a Craniate embryo, the dorsal portion of a mesoderm band or mesoblastic somite, bordering the central nervous system and notochord.

protox'ide of iron (*Chem.*). Ferrous oxide.

pro'toxylem, —zi'lem (*Bot.*). The first xylem to be formed from the procambial strand; it has annular, spiral, and loose scalariform vessels or tracheids, and these are usually of much smaller diameter than the corresponding elements of metaxylem and secondary xylem.

Protozo'a (*Zool.*). A subkingdom and phylum of the animal kingdom, comprising those non-cellular animals in which no nucleus is ever in sole control of a specialised part of the cytoplasm. Cf. *Metazoa, Parazoa.*

protozoaea, —zō-ē'a (*Zool.*). In decapod *Crustacea*, a larval stage preceding the *zoaea* (q.v.), in which the abdominal region shows as yet no trace of segmentation.

Protozo'ic (*Geol.*). An obsolete term meaning 'first life,' applied to the rocks containing the first recognisable traces of organic remains. If used at all today it would refer to rocks other than those to which it was applicable in earlier times.

protractor (*Instruments*). An instrument used by the draughtsman for measuring or setting out angles on paper, etc.

protractor (*Zool.*). A muscle which by its contraction draws a limb or a part of the body forward or away from the body. Cf. *retractor.*

Protre'mata (*Zool.*). An order of *Testicardines* in which the shell is usually plano-convex and the animal is attached by the flat ventral valve; the eggs are incubated in a ventral brood pouch.

Protu'ra (*Zool.*). An order of minute *Apterygota* having twelve abdominal somites; antennae are lacking; three pairs of abdominal appendages usually occur; usually found under bark, leaves, and stones, or in moss.

proustite, proost'it (*Min.*). Sulphide of silver and arsenic which crystallises in the trigonal system. It is commonly associated with other silver-bearing minerals. Cf. *pyrargyrite.* Also called RUBY SILVER ORE, LIGHT-RED SILVER ORE.

proventric'ulus (*Zool.*). (1) In Birds, the anterior thin-walled part of the stomach, containing the gastric glands.—(2) In *Oligochaeta* and *Insecta*, the gizzard—a muscular thick-walled chamber of the gut posterior to the crop.—(3) In *Crustacea*, the stomach or gastric mill.

provisional sum (*Civ. Eng.*). A sum of money fixed by the engineer, and included in the bill of quantities, to provide for work not otherwise included therein or for any unforeseen contingency arising out of the contract.

prox'imal (*Biol.*). Pertaining to or situated at the inner end, nearest to the point of attachment. Cf. *distal.*

proximity effect (*Radio*). The increase in the effective high-frequency resistance of a conductor which occurs when it is brought into the proximity of other conductors, owing to eddy currents induced in the latter. It is especially prominent in the adjacent turns of an inductance coil.

prozy'mogen (*Zool.*). Chromidial substance: a substance which will give rise to zymogen.

pru'ina (*Bot.*). A powdery bloom or secretion on the surface of a plant.

pru'inose (*Bot.*). (1) Covered with a waxy or powdery bloom.—(2) Covered with minute points which give a frosted appearance to the surface.

pru'niform (*Bot.*). Shaped like a plum.

pruriginous, proo-rij'— (*Med.*). Of the nature of prurigo.

pru'rigo (*Med.*). A term common to various skin diseases the chief characteristic of which is a papular eruption and intense itching.

pruri'tus (*Med.*). Intense itching of the skin.

Prussian blue (*Chem.*). Ferric ferrocyanide, $Fe_4[Fe(CN)_6]_3$. A blue pigment obtained through reactions between solutions of iron salts and alkaline ferro- or ferri-cyanides. Known by a variety of other names, e.g. BERLIN BLUE.

prussic acid (*Chem.*). A solution of *hydrogen cyanide* (q.v.) in water.

ps. The English transliteration of the Greek letter **ψ.** In English it is commonly pronounced as **S.**

ψ- (*Chem.*). A symbol for *pseudo-.*

psalte'rium (*Zool.*). In ruminant Mammals, the third stomach; omasus; manyplies.

psammit'ic gneiss (*Geol.*). A gneissose rock which has been produced by the metamorphism of arenaceous sediments.

psammitic schists (*Geol.*). Schists formed from arenaceous sedimentary rocks. Cf. *pelitic gneiss, pelitic schist.*

psammo'ma (*Med.*). A tumour arising from the meninges, composed of fibrous tissue and endothelial cells and 'brain sand' (areas of calcification).

psam'mophile (*Bot.*). A plant which inhabits sandy soils.

psam'mophyte (*Bot.*). A plant which occurs only on sand.

pseud-, pseudo-, sūd'(ō) (Greek *pseudēs*, false). A prefix used in the construction of compound terms; e.g. *pseudodont*, having false teeth.

pseudap'ogam'y (*Bot.*). A replacement of a normal fusion of sexual nuclei by a fusion of two female nuclei, or of a female nucleus and a vegetative nucleus, or of two vegetative nuclei.

pseudapo'semat'ic (*Zool.*). Said of characters which serve to aid protective mimicry.

pseudap'ospo'ry (*Bot.*). The formation of a spore without meiosis, the spore being diploid.

pseudaut'osty'ly (*Zool.*). A type of jaw suspension in which the upper jaw is fused with the ethmoidal, orbital, and otic regions of the cranium; cf. *autostyly.*—*adj.* **pseudautostylic.**

pseudax'is (*Bot.*). See **monochasium.**

pseudep'isemat'ic (*Zool.*). Alluring by false resemblance.

pseudhae'mal (*Zool.*). Said of the so-called vascular system of *Echinodermata*.

pseudholop'tic (*Zool*). (Of *Diptera*) having the condition of the compound eyes between holoptic and dichoptic.

pseudo- (*Chem.*). A prefix which is sometimes used to indicate a tautomeric, isomeric, or closely related compound. Symbol, ψ-.

pseudo-acid (*Chem.*). A substance which can exist in two tautomeric forms, one of which functions as an acid.

pseudo-alums (*Chem.*). A name sometimes given to double sulphates of the alum type, where there is a bivalent element in place of the univalent element of ordinary alums.

pseu'doamito'sis (*Bot.*). An irregular nuclear division caused by treating cells with poisons.

pseudoangi'na (*Med.*). Angina innocens. The occurrence of symptoms of angina pectoris in the absence of organic disease of the heart.

pseudo-asymmetry (*Chem.*). The asymmetry of an atom which results from the attachment thereto of two enantiomeric groups.

pseudo-base (*Chem.*). A substance which can exist in two tautomeric forms, one of which functions as a base.

pseu'doberry (*Bot.*). A fleshy fruit which looks like a berry, but in which some of the succulent material is derived from the enlarged, persistent perianth.

pseudobra'chium (*Zool.*). In some Fish, an appendage used for propulsion along a substratum or on dry land; formed by modification of the pectoral fin.

pseu'dobranch (*Zool.*). A non-functional or vestigial gill, as the spiracular gill of *Selachii*.

pseu'dobulb (*Bot.*). A swollen stem internode formed by some orchids.

pseu'docarp (*Bot.*). A false fruit.

pseudocaud'al (*Zool.*). Said of a type of tail-fin found in some bony Fish which is contributed to by the dorsal and ventral median fins.

pseudocel'li (*Zool*). In *Collembola* and *Protura*, sense-organs of unknown function distributed over various parts of the body.

pseudocil'ium (*Bot.*). A very thin, motionless, elongated outgrowth from an algal cell.

pseu'docoele, —sēl (*Zool.*). In higher Vertebrates, a space enclosed by the inner walls of the closely opposed cerebral hemispheres; the fifth ventricle.

pseu'docolony (*Zool*). In *Protozoa*, a collection of individuals united only by non-living material.

pseu'docone (*Zool.*). In Insects, said of compound eyes in which there is no true crystalline cone in each ommatidium, its place being taken by a transparent viscous fluid.

pseudoconjugation (*Zool.*). In some *Sporozoa*, temporary union of individuals without fusion or exchange of nuclear material.

pseudo-cubic, pseudo-tetragonal, pseudo-hexagonal, etc. (*Min.*). See **pseudosymmetry.**

pseudocye'sis (*Med.*). Spurious pregnancy. The condition in which women desiring offspring imagine themselves to be pregnant, the abdomen often being considerably enlarged owing to rapid accumulation of fat or to gas in the intestines.—(*Zool.*) See **pseudopregnancy.**

pseu'docyst (*Zool.*). An animal cell in which there is no definite nucleus but chromatin is scattered through the cytoplasm.

pseudodeltid'ium (*Zool.*). In some *Brachiopoda*, a plate partially or entirely closing the deltidial fissure of the ventral valve.

pseu'doderm (*Zool.*). In some Sponges, a compact outer layer of tissue resembling skin.

pseu'dodont (*Zool.*). Having horny pads or ridges in place of true teeth, as Monotremes.

pseu'dogamy (*Bot.*). A union between two vegetative cells which are not closely related.

pseudogas'ter (*Zool.*). In some Sponges, a false gastric cavity into which true oscula open.

pseudogas'trula (*Zool*). In experimental embryology, an abnormal type of gastrula, produced artificially, in which there is invagination of the ectoderm.

pseu'dogyne (*Zool.*). An ant which has the characters of the worker combined with those of the female.

pseudohaemophil'ia hepatica (*Med.*). A haemorrhagic state resembling that of haemophilia, occurring in disease of the liver.

pseudoheart (*Zool.*). In *Oligochaeta*, one of a number of paired contractile anterior vessels by which blood is pumped from the dorsal to the ventral vessel: in *Echinodermata*, the axial organ.

pseudohypertroph'ic paralysis (*Med.*). A grave form of paralysis in children, in which progressive muscular weakness is associated with enlargement of certain groups of muscles (such as the calves, the buttocks, the muscles of the shoulder-blade), and wasting of others.

pseudoidiospore, sū-dō-id'— (*Zool.*). See **amoebula.**

pseudomal'achite (*Min.*). Phosphate and hydroxide of copper which resembles malachite and is thought to crystallise in the monoclinic system.

pseudo-marine (*Ecol.*). Applied to fresh-water forms bearing a superficial resemblance to marine types, but not necessarily closely related to them.

pseudom'erism (*Chem.*). A form of tautomerism in which only one tautomer is known, although derivatives corresponding to both forms can be prepared.

pseudometam'erism (*Zool.*). The condition of repetition of parts, found in some *Cestoda*, which bears a superficial resemblance to metamerism.

pseudomito'tic (*Zool.*). See **diaschistic.**

pseu'domix'is (*Biol*). Fusion between two vegetative cells, or between cells which are not differentiated as gametes.

pseudomonotro'pic (*Chem.*). Existing in two forms stable under all conditions, but such that the transition between them takes place in only one direction.

pseu'domorph (*Min.*). A mineral whose external form is not the one usually assumed by its particular species, the original mineral having been subjected to molecular replacement by another substance or substances.

pseu'domycorrhi'za (*Bot*). An association between a fungus and a higher plant in which the fungus is distinctly parasitic.

pseu'donavicel'la (*Zool.*). In some *Sporozoa*, a small boat-shaped spore containing sporozoites.

pseudono'tum (*Zool.*). See **postnotum.**

pseu'donucleo'lus (*Cyt.*). A net knot.

pseu'doparenchy'ma (*Bot.*). A mass of closely interwoven hyphae, appearing very like parenchyma, in prepared sections.

pseudoper'ianth (*Bot.*). A cup-like envelope surrounding the archegonia in some *Hepaticae.*

pseudoperid'ium (*Bot.*). A sheath of sterile hyphae surrounding the aecidium of the *Uredinales.*

pseudo-pest (*Vet.*). Newcastle disease.

pseudoplasmodium (*Bot.*). A mass of closely associated myxamoebae which have not united to form a true plasmodium.

pseu'dopod (*Zool.*). A foot-like process of the body-wall, characteristic of some Insect larvae.

pseudopo'diospore (*Zool.*). See **amoebula.**

pseudopo'dium (*Bot.*). (1) A leafless branch formed by some mosses, bearing gemmae.—(2) The stalk of the capsule in the bog mosses.

pseudopodium (*Zool.*). In *Sarcodina* and phagocytic cells of *Parazoa* and *Metazoa*, a temporary protrusion of cytoplasm serving for locomotion or prehension.

pseudopregnancy (*Med.*). See **pseudocyesis.**—

(*Zool.*). In some Mammals, uterine changes following oestrus and resembling those characteristic of pregnancy.

pseudopterygium, sū'do-pter-ij'i-um (*Med.*). The adherence of a tip of a fold of oedematous conjunctiva to a corneal ulcer, thus simulating a pterygium.

pseudopu'pa (*Zool.*). A coarctate pupa.

pseudorace'mic (*Chem.*). Consisting of mixed crystals of the dextro-rotatory and laevo-rotatory forms of a compound.

Pseudo-Scorpionidea (*Zool.*). See **Chelonethi.**

pseudos'culum (*Zool.*). In some Sponges, the external opening of a *pseudogaster* (q.v.).

pseudosemat'ic (*Zool.*). Serving as a false warning or signal, as *pseudosematic colours.*

pseudosep'tum (*Bot.*). A septum which is perforated by one or more pores; found in some lower fungi.

pseudoses'sile (*Zool.*). (In certain hymenopterous Insects) having a very short petiole so that the abdomen appears to be directly joined to the thorax.

pseudo-solution (*Chem.*). A colloidal solution or suspension.

pseu'dosperm (*Bot.*). A small indehiscent fruit which looks like a seed.

pseudostip'ule (*Bot.*) An appendage at the base of a leaf stalk, which looks like a stipule but is really part of the lamina.

pseudosymmetry (*Min.*). A term applied to minerals whose symmetry elements place them on the border-line between two crystal systems; e.g. a mineral with the C-axis very nearly equal to the B- and A-axes might, on casual inspection, appear cubic, though actually tetragonal. It would be described as possessing *pseudo-cubic symmetry.* The phenomenon is due to slight displacement of the atoms from the positions which they would occupy in the class of higher symmetry.

pseudotach'ylyte (*Geol.*). Flinty crush-rock, resulting from the vitrification of rock powder produced during faulting under conditions involving the development of considerable heat by friction, as in the Glencoe cauldron subsidence.

pseudotra'cheae (*Zool.*). Trachea-like food-channels in the labium of higher *Diptera.*

pseudotuberculosis (*Vet.*). A disease of sheep due to infection by *Corynebacterium pseudotuberculosis ovis*; characterised by caseous lymphadenitis and bronchopneumonia.

pseudove'lum (*Zool.*). In *Scyphozoa*, an internal flange occupying the same position as the true velum of *Hydrozoa* but lacking muscles and a nerve ring.

pseudovil'li (*Zool.*). Projections from the surface of the trophoblast in some *Mammalia,* distinct from the true villi, which are definite outgrowths.

pseudovitel'lus (*Zool.*). In some hemipterous Insects, an abdominal mass of cells which contains symbiotic micro-organisms; see also **mycetocytes.**

pseudo'vum (*Zool.*). A partheno-genetic ovum, capable of development without fertilisation.

pseudozoaea, —zō-ē'a (*Zool.*). In stomatopod *Crustacea*, a larval stage characterised by suppressed development of the thoracic appendages.

pseudozy'gospore (*Bot.*). See **azygospore.**

psilom'elane (*Min.*). An oxide of manganese which contains varying amounts of barium, potassium and sodium oxides and water. It is to be regarded as colloidal manganese dioxide, and is used as an ore of manganese.

psilo'sis (*Med.*). See **sprue.**

psit'tacinite (*Min.*). Vanadate and hydroxide of lead and copper, crystallising in the orthorhombic system.

psittaco'sis (*Med., Vet.*). Parrot disease. A contagious disease of parrots due probably to a filter-passing virus and communicable to man, in whom the symptoms of the disease resemble those of typhoid fever, accompanied by inflammation of the lungs.

Psocop'tera (*Zool.*). An order of minute soft-bodied *Exopterygota* having two pairs of membranous wings, the hindwings being slightly smaller; the mouth-parts are adapted for biting, and the maxilla bears a curious chisel-like structure used for gouging wood; they are widely distributed and are found on tree-trunks and in birds' nests; they feed on animal and vegetable refuse matter. Book Lice, Death Watches.

psophom'eter (*Elec. Comm.*). The line-noise measuring device standardised by the C.C.I.F. It is of two forms, one correcting for the apparent effect on the ear through a telephone receiver for normal telephone use, the other correcting for the ear only and operating over the greater frequency range required for programme transmission over music lines.

psori'asis (*Med.*). A chronic disease of the skin in which red scaly papules and patches appear, especially on the outer aspects of the limbs.

psych-, psycho- (Greek *psychē*, soul, mind). A prefix used in the construction of compound terms; e.g. *psycho-analysis* (q.v.).

psychasthe'nia (*Psycho-path.*). A severe functional mental disorder, characterised by fixed ideas, ruminative states, and hypochondriacal conditions.

psyche, sī'kē (*Psychol.*). The principle of mental and emotional life, consisting of conscious and unconscious processes. Used by Jung as synonymous with *soul.*

psychi'atry. That branch of medical science which deals with disorders and diseases of the mind, in particular, with such as arise from physical and organic causes.

psychic determinism (*Psycho-an.*). The Freudian theory that mental processes are determined by unconscious motivations.

psy'chism (*Biol.*). The doctrine that living matter possesses attributes not recognised in non-living matter; the distinctive attributes or 'mentality' of living things.

psycho-analysis. The method of treatment of functional nervous disorder introduced by Freud. It consists in bringing unconscious conflicts into consciousness by the methods of free association, dream-analysis, and use of the transference situation.

psychogalvan'ic reflex (*Zool.*). The decrease in the electrical resistance of the skin under the stimulation of various emotional states.

psychogen'ic (*Med.*). Having a mental origin.

psychog'raphy (*Photog.*). The supposed registration of optical images on sensitive surfaces susceptible to subsequent development.

psy'choid (*Zool.*). Applied to the inexplicable regulating element of a developing embryo; morphaesthetic.

psychology. The science of the mind. The general term is used to include all the observations, investigations, and recordings of the mind and its functions, normal and abnormal. Psychology is divided into four main groups of study, viz., (*a*) *academic psychology*, which investigates the normal functioning of the mind; (*b*) *medical psychology*, which investigates the abnormal functioning of the mind; (*c*) *social psychology*, which investigates mental functioning in relation to society and the outside world; (*d*) *industrial psychology*, which investigates the problems of mental functioning in relation to industry.

psychoneuro'sis (*Psycho-path.*). Functional disorder of the mind in a legally sane person who shows insight into his condition; the term includes such conditions as hysteria, obsessional states, and anxiety states. Freud distinguishes psychoneurosis from the real or actual *neuroses* (q.v.). In both there is a derangement of the normal ways of gratification of the *libido* (q.v.), but in psychoneurosis this is always accompanied by unconscious mental conflict between the ego and the id, giving rise to symptoms and pathological states which are capable of being relieved by psychotherapy.

psy′chopath (*Psychol.*). An individual who shows a pathological degree of congenital emotional instability, and who is definitely abnormal, although not suffering from a true organic mental disorder. In general the intellectual functions are not affected.

psychopathology. That branch of psychology which deals with the abnormal working of the mind.

psycho′sis (*Med.*). A grave disorder of the mind, characterised by such phenomena as illusions, delusions, hallucinations, mental confusion, etc, with absence of insight into his condition on the part of the patient; the term includes such conditions as manic-depressive psychosis, dementia praecox, paranoia, etc.

psychother′apist. An individual, usually a physician, but not always so at present, who practises *psychotherapy* (q.v.).

psychother′apy. The treatment of functional (and even so-called organic) psychic disorder. Methods: the different forms of analysis, as psycho-analysis (Freud), and its modifications, known as Jungian, Adlerian, Stekelian, and direct reductive analysis (Hadfield); explanation, persuasion, re-education, progressive relaxation, suggestion, hypnosis; occupational therapy.

psychrom′eter (*Meteor.*). The *wet and dry bulb hygrometer* (q.v.).

psychrophi′lic (*Bot.*). Growing best at a low temperature.

pt-. A common consonantal combination in words derived from the Greek. In English it is commonly pronounced **T** at the beginning of a word.

Ptd. A. (*Build.*). Abbrev. for *pointed arch.*

pter-, ptero- (Greek *pteron*, feather). A prefix used in the construction of compound terms; e.g. *pteropaedes* (q.v.).

ptera′lia (*Zool.*). See **axillary.**

pterer′gate (*Zool.*). A worker or soldier ant with vestigial wings, but otherwise unmodified.

Pteria Contorta Shales (*Geol.*). A series of black shales containing the lamellibranch *Pteria contorta*, found in the Lower Rhaetic rocks of England and S. Wales.

Pter′idophy′ta (*Bot.*). (Greek *pteris*, gen. *pteridos*, fern). The ferns, horsetails and club-mosses, together with a few smaller groups. Vascular plants showing well-marked alternation of generations, with independent gametophytes bearing antheridia and/or archegonia, from which the spore-bearing plants develop. A very old group with many ancient fossil representatives.

Pter′idosper′mae (*Bot.*). An ancient group of plants known from fossils but having no living representatives. They were fern-like in some respects, but produced seeds, often apparently on the edges of their leaves.

Pterobranc′hia (*Zool.*). A class of *Hemichorda* the members of which have the collar modified to form tentacles; colonial forms living in secreted tubes at considerable depths.

pteropae′des (*Zool.*). Young Birds which are able to fly as soon as they are hatched.

pterope′gum (*Zool.*). In Insects, the socket for the insertion of the wing.

pteropleu′ron (*Zool.*). In *Diptera*, a thoracic sclerite lying between the root of the wing, the sternopleuron, and the mesopleuron.

pter′opod ooze (*Geol.*). A calcareous deep-sea deposit which contains a large number of pteropod remains.

Pterop′sida (*Bot.*). A comprehensive name for the *Filicales*, *Gymnospermae*, and *Angiospermae*, plants having in general large leaves, and invariably having leaf gaps in the stele.

pterostig′ma (*Zool.*). In Insects, an opaque cell on the wing.

pterothe′ca (*Zool.*). In the pupal stage of some Insects, the wing-case.

ptero′tic (*Zool.*). A bone of the lateral wall of the auditory capsule of the skull in some Vertebrates.

pteryg-, pterygo- (Greek *pteryx*, gen. *pterygos*, wing). A prefix used in the construction of compound terms in the sense of 'pertaining to the pterygoid'; e.g. *pterygomandibular*, pertaining to the pterygoid and the mandible.

pterygial, ter-ij′ĭ-al (*Zool.*). In Fish, an element of the fin-skeleton: pertaining to a fin: pertaining to a wing.

pterygium (*Med.*). The encroachment on to the cornea from the side of a thickened, vascular, wing-shaped area of the conjunctiva.

pterygium (*Zool.*). In Vertebrates, a limb: in some *Coleoptera*, a process of the prothorax.

pterygo′da (*Zool.*). See **tegula.**

pter′ygoid (*Zool.*). A paired cartilage bone of the Vertebrate skull, formed by the ossification of the front part of the PPQ bar: a membrane bone which replaces the original pterygoid in some Vertebrates: more generally, wing-shaped.

pter′ygopal′atoquad′rate bar (*Zool.*). In Fish with a cartilaginous skeleton, the rod of cartilage forming the upper jaw and known as the PPQ bar.

pter′ygophore, pteryg′iophore (*Zool.*). A cartilaginous ray of a median fin.

pter′ylae (*Zool.*). The tracts of contour feathers on the body of a Bird.

ptili′num (*Zool.*). In certain *Diptera* (*Cyclorrhapha*), an expansible membranous cephalic sac by which the anterior end of the puparium is thrust off at emergence.

Ptolema′ic system (*Astron.*). The final form of Greek planetary theory as described in Claudius Ptolemy's treatise. In this the earth was the centre of the world, the planets, including the sun and moon, being supposed to revolve round it in motions compounded of eccentric circles and epicycles; the fixed stars were supposed to be attached to an outer sphere concentric with the earth.

ptomaines, tō-mānz (*Chem.*). Poisonous amino compounds produced by the decomposition of proteins, especially in dead animal matter. The ptomaines include substances such as putrescine, cadaverine, choline, muscarine, neurine. Few of the ptomaines are known to be poisonous by mouth, food poisoning being caused by specific bacteria, e.g. *Bacillus botulinus.*

pto′sis (*Med.*). (1) Paralytic dropping of the upper eyelid.—(2) Downward displacement of any bodily organ.

pty′alin (*Zool.*). A digestive ferment, found in saliva, which changes starch into sugar.

pty′alism (*Med.*). Excessive secretion of saliva.

ptyxis, tix′is (*Bot.*). The manner in which an individual leaf is folded in bud.

pu′berty. Sexual maturity.

puberu′lent (*Bot.*). Feebly pubescent.

pubes′cence (*Bot.*). A covering of downy hairs closely pressed on to the surface bearing them.—(*Zool.*) A covering of fine hairs or down.—*adj.* **pubes′cent.**

pubiot′omy (*Surg.*). The operation of cutting the pubic bone to one side of the mid-line, so as to facilitate childbirth in difficult labour.

pubis (*Zool.*). In *Craniata*, an element of the pelvic girdle.—*pl.* **pubes.**—*adj.* **pubic.**

public call office (*Teleph.*). A telephone station for public use, with an attendant or coin-box for the collection of charges. Also called PAY STATION.

pucherite, poohh'— (*Min.*). Vanadate of bismuth, crystallising in the orthorhombic system.

pucking cutter (*Mining*). A man employed in a coal-mine to cut the floor in cases of creep or upheaval towards the roof.

puddingstone (*Geol.*). A popular term for *conglomerate.* Hertfordshire puddingstone, consisting of rounded flint pebbles set in a siliceous sandy matrix, is a good example.

puddle (*Civ. Eng.*). See **clay puddle.**

puddled ball (*Met.*). The mass of iron intimately mixed with slag which is formed by the process of puddling pig-iron. See **puddling.**

puddled bar (*Met.*). Bars of wrought-iron which have been rolled from the puddled ball, after squeezing the ball to compact it and eliminate some of the slag. See **puddled ball.**

puddling (*Met.*). The agitation of a bath of molten pig-iron, by hand or by mechanical means, in an oxidising atmosphere, in order to oxidise most of the carbon, silicon, and manganese and thus produce wrought-iron.

puddling furnace (*Met.*). A small reverberatory furnace in which iron is puddled.

puden'dum (*Zool.*). See **vulva.**

Pudlo (*Build.*). Trade-name for a substance, sold in powder form, which is used as a waterproofing agent for concrete surfaces.

puering (*Tanning*). The process of steeping skins in a warm fermenting solution containing pancreatic enzymes, in order to soften them before tanning. See **bating.**

puer'peral (*Med.*). Pertaining to or ensuing upon childbirth.

puerpe'rium (*Med.*). Strictly, the period between the onset of labour and the return to normal of the generative organs: usually, the first five or six weeks after the completion of labour.

puffing (*Bot.*). The simultaneous and violent discharge of ascospores from many asci at the same time.

pug (*Mining*). In metalliferous mining, the parting of soft clay which sometimes occurs between the walls of a vein and the country rock.*

pug lifter (*Mining*). One who removes coal left adhering to the floor by a coal-cutting machine.

pug piles (*Civ. Eng.*). Dovetailed piles.

pugging (*Build.*). A special mixture carried on boards between the floor joists, serving to insulate the room against sounds from below.

pugio'niform (*Bot.*). Shaped like a dagger.

Pulas'ki Shales and Sandstones (*Geol.*). The main member of the Upper Mississippian succession in Virginia.

pu'legone (*Chem.*). $C_{10}H_{16}O$, occurs in oil of pennyroyal, a ketone of the terpene series.

Pulfrich refractometer, pool'frihh (*Chem.*). An instrument for measuring the refractive index of oils and fats.

pull (*Typog.*). A proof slip, a galley proof.

pull-off (*Elec. Eng.*). A fitting used in connexion with the overhead contact-wire of an electric traction system for retaining the contact-wire in the correct position above the track on curves.

pull-out (*Acous.*). A common defect in the pressing of gramophone records, a small portion of the pressing being pulled away from the disc and remaining on the stamper.

pull-out (*Aero.*). The transition from a dive or spin to substantially normal flight.

pull-out torque (*Elec. Eng.*). (1) The value of the torque at which a synchronous motor falls out of synchronism.—(2) The maximum torque of an induction motor.

pull-over mill (*Met.*). A rolling-mill using a single pair of rolls. The metal, after passing through the rolls, is pulled back over the top roll in order to be fed through the mill a second time.

pull switch (*Build.*). See **ceiling switch.**

pulled coil (*Elec. Eng.*). An armature coil wound with parallel sides on a suitable former and then pulled out to the correct coil span.

pulley (*Eng.*). A wheel on a shaft having a crowned or cambered rim for carrying an endless belt, or grooved for carrying a rope or chain. A *fast pulley* is one that is keyed to the shaft and revolves with it; a *loose pulley* is not attached to the shaft. The term 'pulley' is also applied to a small grooved wheel over which a sash-cord, etc. runs.

pulley mortise (*Join.*). A form of joint between the end of a ceiling joist, which is tenoned, and the binding joist, which is mortised, so as to let in the ceiling joist in a position such that the lower faces of both are in the same plane.

pulley-stile (*Join.*). One of the upright sides of the frame of a double-hung window, to which is secured the pulley over which the sash-cord passes.

pulling focus (*Cinema.*). The alteration of focus during a shot, e.g. during a pan or tracking shot, so that the same or different objects remain in focus in spite of varying distance.

pullo'rum infection (*Vet.*). Bacillary white diarrhoea.

pullula'tion (*Bot.*). Budding, sprouting.

pulmo- (Latin *pulmo,* lung). A prefix used in the construction of compound terms; e.g. *pulmogastric,* pertaining to the lungs and stomach. See **pulmones.**

pul'mobranch (*Zool.*). See **lung book.**

pul'monary (*Zool.*). In land Vertebrates, pertaining to the lungs: in pulmonate *Mollusca,* pertaining to the respiratory cavity.

Pulmona'ta (*Zool.*). An order of *Euthyneura,* of terrestrial or fresh-water habit, in which the mantle and its cavity form a lung, the shell is often reduced, and the opening of the mantle cavity is diminished by fusion of the mantle-border with the 'neck' True Snails, Fresh-water Snails, Land Slugs, etc.

pul'monate (*Zool.*). Possessing lungs or lung-books; air-breathing.

pulmonec'tomy (*Surg.*). Pneumonectomy.

pulmones (*Zool.*). Lungs.—*sing.* **pulmo.**—*adj.* **pulmonary.**

pulmoni'tis (*Med.*). Inflammation of lung tissue; pneumonia.

pulp. See **wood-pulp.**

pulp (*Zool.*). A mass of soft spongy tissue situated in the interior of an organ, as *spleen pulp, dental pulp.*

pulp boards (*Paper*). See **cardboards.**

pulp-saver (*Paper*). A machine through which water from the paper-making machine passes to avoid wastage of fibrous materials.

pulpwood (*Join.*). A board composed of wood-pulp and adhesive pressed into sheets; used for panelling, partitions, etc.

pulpy kidney disease (*Vet.*). An acute toxaemia of lambs due to *Clostridium welchii, type D* (*B. ovitoxicus*).

pulsa'tance (*Elec. Eng.*). A term used to denote the product $2\pi\times$frequency of an alternating quantity; generally represented by the symbol ω.

pulsating current (*Elec. Eng.*). An electric current which periodically changes in magnitude but not in direction.

pulsating vacuole (*Zool.*). See **contractile vacuole.**

pulsa'tor (*Agric. Mach.*). A piece of apparatus attached to a milking machine which causes alternations of suction and release on the cow's teats when the machine is in operation; the pulsations range from 50-60 a minute.

pulse (*Med.*). The periodic expansion and elongation of the arterial walls which follows each contraction of the heart.

pulse (*Radio*). A signal of very short duration, such as a single dot.

pulsel'lum (*Zool.*). A posterior flagellum of *Mastigophora* which pushes the organism in front of it. Cf. *tractellum.*

pulsom'eter pump (*Eng*). A steam pump in which an automatic ball-valve, the only moving part, admits steam alternately to a pair of chambers, so forcing out water which has been sucked in by condensation of the steam after the previous stroke.

pulverised-coal burners (*Eng.*). See **fantail burner, turbulent burner.**

pulverised fuel (*Fuels*). Fuel that has been subjected first to crushing, and then reduced to an impalpable dust by pulverisers. The latter are usually air-swept, the velocity of the air being so regulated that particles of fuel when sufficiently reduced are carried away from the mill.

pulveru'lent (*Bot.*). Appearing as if covered with dust.

pulvil'lus (*Zool*). One of a pair of pads situated beneath the tarsal claws in Insects.—*adjs.* **pulvillar, pulvilliform.**

pul'vinate (*Bot.*). Shaped like a cushion.

pulvinated (*Carp.*). Said of a frieze which presents a bulging face.

pul'vinule (*Bot.*). The small pulvinus of a leaflet.

pulvi'nus (*Bot.*). A swollen leaf base, often capable of changes of form, bringing about movement of the leaf.

pul'viplume (*Zool.*). See **powder-down feather.**

Pumecrete (*Build.*). Trade-name for a pumice stone used in the construction of fire-safe floors and partitions.

pumice (*Geol.*). An 'acid' vesicular glass, formed from the froth on the surface of some particularly gaseous lavas. The sharp edges of the disrupted gas-vesicles enable pumice to be used as an abrasive.

pummel (*Build*). A *punner* (q.v.).

pump. A machine driven by some prime mover, and used for raising fluids from a lower to a higher level, or for imparting energy to fluids.

See **air—**
air-lift—
centrifugal—
force—
pulsometer—
rotary—

pump-line (*Elec. Eng.*). A term used to denote a cable extending throughout the length of an electric train for the control of auxiliary apparatus such as air-compressors.

pumping (*Phys.*). The motion of mercury in a barometer arising from the movement of a ship or from fluctuations of air pressure in a varying wind.

punch (*Civ. Eng.*). A follower placed on the head of a pile in any case where the pile has been driven in beyond the stroke of the monkey.

punch (*Eng.*). A steel tool for making holes in metal by shearing out a circular wad under pressure, the work being supported on a die the hole in which is slightly larger than the diameter of the punch.

puncheon (*Carp.*). A short post giving intermediate support to a beam carried between principals, especially in trussed partitions.

punching (*Elec. Eng.*). See **lamination.**

punching machine (*Eng.*). A machine for punching holes in plates, the punch being driven either mechanically by a crank and reciprocating block, or by a hydraulic ram.

punctate basiphilia (*Med.*). See under **basophilia.**

punctum (*Zool.*). A minute aperture: a dot or spot in marking.—*adj.* **punctate.**

punctured (*Masonry*). A term applied to a variety of rusticated work distinguished by holes picked in the faces of the stones, either in lines or irregularly.

pungent (*Bot.*). Ending in a sharp, hard point.

punner (*Build., Civ. Eng.*). A heavy-headed tool, with a long upright handle, used in the operation of punning, the tool being repeatedly lifted and dropped on to the surface to be consolidated.

punning (*Build., Civ. Eng.*). The operation of ramming or consolidating the surface of hardcore, earth, etc, with repeated blows from a heavy-headed tool.

punty, puntee, pontie, pontil (*Glass*). A short iron rod, at one end of which is either a button of hot glass or a suitably shaped piece of metal, which is applied hot to the end of a partially formed glass article in order that (*a*) it may be cracked off the blowpipe and manipulated on the punty, or (*b*) in the case of tube drawing, the mass of glass may be drawn out between punty and blowpipe.

pu'pa (*Zool.*). An inactive stage in the life-history of an Insect during which it does not feed and reorganisation is taking place to transform the larval body into that of the imago.—*adj.* **pupal.**

pupa'rium (*Zool.*). The hardened and separated last larval skin which is retained to form a covering for the pupa in some *Diptera.*

pupil (*Zool.*). The central opening of the iris of the eye.—*adj.* **pupillary.**

Pupin cable (*Elec. Comm.*). A cable in which the conductors are coil-loaded at intervals, with resulting attenuation, which is uniform up to a cut-off frequency and then increases rapidly.

Pupin loading, Pupin coil (*Elec. Comm.*). The loading coil, devised by Pupin, in which the reduction in attenuation, due to the inductance inserted in the transmission line, is not more than offset by the additional attenuation due to dissipation. The two legs of the circuit are taken through equal coils wound on a toroid core.

pupip'arous (*Zool.*). Giving birth to offspring which have already reached the pupa stage, as some two-winged Flies.

Purbeck Beds, Purbeckian Stage (*Geol.*). A series of limestones, largely non-marine, dirt-beds, and 'marbles,' found in the Upper Jurassic rocks of Southern England, following directly upon the Portlandian Stage.

Purdy's solution (*Chem.*). A modified Fehling's solution containing sufficient ammonium hydroxide to redissolve the cuprous oxide as it is formed. Similar to Pavy's solution.

pure clay (*Build.*). See **foul clay.**

pure continuous waves (*Radio*). Waves which are not modulated or broken up into trains except by keying, as distinguished from *interrupted continuous waves.*

pure culture (*Bot.*). A culture containing a pure stock of one species of plant, especially of lower plants.

pure line (*Zool.*). (1) A homogenous collection of individuals within a species, resulting from autogamous reproduction.—(2) A population consisting of individuals whose descent can be traced to a single ancestor.

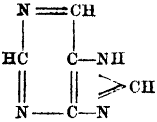
pure metal (*Met.*). Theoretically, an absolutely pure metallic element, but as such are not obtainable the term is applied in practice to metals of high purity.

pure metal crystals (*Met.*). The crystals of which a solid pure metal is composed. Each crystal in a given metal has a similar structure consisting of the same atoms arranged in the same way, and one crystal differs from another in orientation.

pure tone (*Acous.*). A sound-wave of a single frequency, so-called to distinguish it from a *complex tone.*

Purimachos (*Build.*). Trade-name for a fireclay cement for forming heat-resistant joints.

pu'rine group (*Chem.*). A group of cyclic diureides derived from one molecule of a dibasic hydroxy acid and two molecules of urea. The simplest member of this group is *purine*, of the formula:



Purkinje cells, poor′kin-ye (*Zool.*). Large flask-shaped cells lying between the two layers of grey matter in the cortex of the cerebellum in higher Vertebrates.

Purkinje effect (*Illum*). A phenomenon associated with the human eye, making it more sensitive to blue light when the illumination is poor (less than about 0·1 lumen per sq. ft.) and to yellow light when the illumination is good.

Purkinje fibres (*Zool.*). A network of large beaded trabeculae lying under the endocardium in some animals.

purl (or **pearl**) **fabrics** (*Hosiery*). Knitted fabrics in which the reverse side stitches are brought to the surface for effect; used extensively for ladies' pull-overs, etc.

Purley Shales (*Geol.*). A group of shaly rocks, of Middle Cambrian age, found near Nuneaton.

purlin (*Build., Civ. Eng.*). A member laid horizontally on the principal rafters and supporting the common rafters.

purlin post (*Carp.*). A post placed beneath a purlin to support it against sagging.

purple copper ore (*Min.*). Bornite.

purple of Cassius (*Chem.*). Produced by adding a mixture of stannic and stannous chlorides to a very dilute solution of gold chloride; hydrated stannic oxide is precipitated and the gold chloride reduced to metal. The red-to-violet colour is due to the precipitation of finely divided gold on the stannic hydroxide.

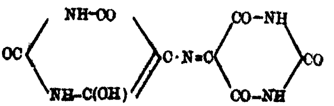
purpose-made brick (*Build.*). A brick which has been specially moulded to a shape suiting it for use in a particular position, e.g. an arch brick shaped like the voussoir of an arch.

purposiveness (*Zool.*). Correlation of individual reactions to a definite end.

pur′pura (*Med.*). The condition in which spontaneous haemorrhages appear beneath the skin and the mucous membranes, forming purple patches; these may occur as a result of infection, or the cause may be unknown. See also **Henoch's purpura** and **peliosis rheumatica.**—*adj.* **purpuric.**

purpura haemorrhagica (*Med.*). Haemogenia. Essential thrombooytopenia. Werlhof's disease. A disease characterised by purpuric haemorrhages in the skin, bleeding from mucous membranes, and abnormal diminution of the platelets in the blood (thrombocytopenia).—(*Vet.*) An acute non-contagious disease of horses characterised by haemorrhages and oedema in the subcutaneous connective tissues and mucous membranes.

purpu′ric acid (*Chem.*). Barbituryl iminoalloxan, of the formula:



The ammonium salt is *murexide* (see **murexide test**).

pu′rulent (*Med.*). Forming or consisting of pus: resembling or accompanied by the formation of pus: of the nature of pus.

pus (*Med.*). Matter. The yellowish fluid formed by suppuration, consisting of serum, pus cells (white blood cells), bacteria, and the debris of tissue destruction.

pushbutton (*Elec. Eng.*). A device, carrying a small current, which closes or opens an electric circuit by means of the pressure of the finger on a small button.

pushbutton control (*Elec. Eng.*). The control of electric motors or other apparatus by means of pushbuttons situated at one or more convenient points, not necessarily adjacent to the motor itself.

pushbutton receiver (*Radio*). A receiver the tuning of which can be automatically switched to one or more predetermined frequencies by the operation of a corresponding number of pushbutton switches.

pushbutton switch (*Elec. Eng.*). A switch operated by a pushbutton. Also called BUTTON SWITCH.

push piece (*Horol.*). (1) A small cylindrical plunger which projects just beyond the band of a watch case and is pressed in when it is required to set the hands.—(2) The button and stem of a hunting watch, which, on being pressed, causes the opening of the case.

push-pull amplifier (*Elec. Comm.*). Two thermionic valves so connected that when the grid of one is positive (with respect to its mean potential) that of the other is negative, and vice versa. Used for the reduction of harmonic distortion in amplifiers, and in short-wave oscillators and amplifiers, etc.

push-pull microphone (*Acous.*). A carbon microphone in which two carbon-granule cells are mounted on either side of a stretched diaphragm, so that amplitude distortion arising in one is largely balanced out by the opposite phase amplitude distortion in the other.

push-pull sound-track (*Cinema.*). A system of sound recording on film in which the two halves of recorded waves are made transparent and displaced, there being no transmitted light with zero modulation.

push rod (*I.C. Engs.*). A rod through which the tappet of an overhead-valve engine operates the rocker arm, when the camshaft is located in the crankcase.

pusher (*Aero.*). See **tractor.**

pusher-on (*Mining*). The man in charge of haulage hands in a coal-mine. Also called MASTER HAULIER.

pus′tule (*Bot.*). A mass of fungal spores and the hyphae bearing them.

pustule (*Med.*). A small elevation of the skin containing pus.—*adj.* **pus′tular.**

pu′sule (*Bot.*). A small vacuole present in the protoplast of some lower plants, which is able to expand and contract.—(*Zool.*) In *Dinoflagellata*, a non-contractile vacuole discharging to the exterior by a duct.

pu′tamen, *or* pū-tā′men (*Bot.*). The hard endocarp of a drupe, such as the stone of a plum.

putamen (*Zool.*). In Birds, the shell membrane of the egg: in higher Vertebrates, the lateral part of the lentiform nucleus of the cerebrum.

putlog (*Build.*). A transverse bearer which, in the case of a bricklayer's scaffold, is lashed at one end to the ledger and at the other end is wedged into a hole left by the bricklayer in the wall; used to support the scaffold boards.

putres′cine (*Chem.*). $H_2N{\cdot}(CH_2)_4{\cdot}NH_2$, tetramethylene-diamine, crystals, m.p. 27° C., formed during the putrefaction of flesh.

putter (*Mining*). A man employed in a coal-mine to take empty tubs from a flat or siding to the working face, and to bring back full ones. Also called KIBBLER.

putter and filler (*Mining*). A man employed in a coal-mine as a putter and also to fill the tubs.

putter-out (*Mining*). See under **hanger-on.**

putty (*Build.*).

See **glazier's— painter's— plasterer's—**

putty and plaster (*Plast.*). See **gauged stuff.**

putty knife (*Build.*). See **stopping knife.**

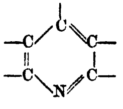
putty powder (*Build.*). Tin oxide, used for polishing glass.

puy, pwē (*Geol.*). The name given to a small volcanic cone, especially in the Auvergne, France.

puzzolan'o, poot-sō— (*Build., Civ. Eng.*). See **pozzuolana.**

P.X. (*Teleph.*). Abbrev. for *private exchange.*

Py (*Chem.*). A symbol for the pyridine nucleus



py-, pyo- (Greek *pyon*, pus). A prefix used in the construction of compound terms; e.g. *pyaemia*, *pyorrhoea* (qq.v.).

pyae'mia (*Med.*). The condition in which infection of the blood with bacteria, from a septic focus, is associated with the development of abscesses in different parts of the body.—*adj.* **pyaemic.**

py'castyle (*Build.*). See **pycnostyle.**

pycn-, pycno-, pykn-, pykno- (Greek *pyknos*, compact, dense). A prefix used in the construction of compound terms; e.g. *pycnoxylic wood* (q.v.).

pycnid'iospore (*Bot.*). A spore formed within a pycnidium.

pycnid'ium (*Bot.*). A roundish fructification formed by many species of fungi, usually with an opening, and having a general resemblance to a perithecium. It contains fertile hyphae and pycnidiospores, but no asci, and has apparently no connexion with any sexual act, real or modified.

pyc'niospore (*Bot.*). A term used, chiefly in America, to denote the spermatium in *Uredinales.*

pyc'nium (*Bot.*). A term used, chiefly in America, to denote the spermogonium of the *Uredinales.*

pyc'noconid'ium (*Bot.*). A conidium formed inside a pycnidium.

Pycnogo'nida (*Zool.*). A class of marine *Arthropoda* having no specialised respiratory apparatus; the head is reduced and modified; the appendages are uniramous; there are no antennae; the legs are enormous in proportion to the body, there being four or more pairs. Sea Spiders.

pycno'sis (*Bot.*). The formation of a perithecium, under the cover of the tissue of a stroma.—(*Cyt.*) The shrinkage of the stainable material of a nucleus into a deeply staining knot.

pyc'nospore (*Bot.*). (1) A spore formed inside a pycnidium.—(2) See **spermatium** (*Uredinales*).

pyc'nostyle (*Build.*). A colonnade in which the space between the columns is equal to one-and-a-half times the lower diameter of the columns.

pycnoxylic wood, —zi'lik (*Bot.*). The compact wood characteristic of pine trees, with little or no parenchyma.

pyeli'tis (*Med.*). Inflammation of the pelvis of the kidney. (Greek *pyelos*, trough.)

py'elocysti'tis (*Med.*). Inflammation of the pelvis of the kidney and of the bladder.

pyelog'raphy (*Med.*). Radiography of the pelvis of the kidney and the ureter, after these have been filled with a substance opaque to X-rays.

py'elolithot'omy (*Surg.*). The operation for removal of a stone from the pelvis of the kidney.

pyelonephri'tis (*Med.*). Inflammation of the kidney and of its pelvis.

pye'mia (*Med.*). See **pyaemia.**

py'gal (*Zool.*). Pertaining to the posterior dorsal extremity of an animal: in *Chelonia*, a posterior median plate of the carapace. (Greek *pygē*, rump.)

pygid'ium (*Zool.*). In Insects, the tergum of the last abdominal somite; the suranal plate.—*adj.* **pygid'ial.**

py'gochord (*Zool.*). In some *Hemichorda*, a median ventral ridge-like outgrowth of the intestinal epithelium.

py'gostyle (*Zool.*). In Birds, a bone at the end of the vertebral column formed by the fusion of some of the caudal vertebrae.

pykn-. Prefix. See **pycn-.**

pyk'nic type (*Psychol.*). One of Kretschmer's three types of individual, characterised by short squat stature, small hands and feet, domed abdomen, round face, and short neck, the limbs being short in relation to the trunk. People in this group are extravert individuals with happy jovial temperaments, tending to develop manic-depressive psychosis if any breakdown occurs.

pyk'nolepsy (*Med.*). A form of epilepsy in which there are sudden attacks of momentary loss of consciousness; eventually the attacks disappear.

pyknom'eter (*Chem.*). A small, graduated glass vessel, of accurately defined volume, used for determining the specific gravity of liquids.

py'lephlebi'tis (*Med.*). Inflammation of the portal vein (the vein formed by veins running from the spleen, stomach, and intestines, and entering the liver) with or without thrombosis; in suppurative pylephlebitis abscesses form in the liver.

py'locyte (*Zool.*). See **porocyte.**

py'lome (*Zool.*). In some *Sarcodina*, an opening through which pseudopodia can be protruded and food-particles taken in.

py'lon (*Struct.*). A slender vertical structure which is self-supporting; also called a TOWER. Cf. *mast.*—(*Elec. Eng.*) See **steel tower.**

pylorec'tomy (*Surg.*). Excision of the pylorus.

py'loroplasty (*Surg.*). An operation for widening the lumen of the pylorus when this has been pathologically narrowed.

pylor'ospasm (*Med.*). Spasm of the circular muscle of the pyloric part of the stomach.

pylor'us (*Zool.*). In Vertebrates, the point at which the stomach passes into the intestine.

pyo-. Prefix. See **py-.**

py'ocolpos (*Med.*). A collection of pus in the vagina, the result of infection of a *haematocolpos* (q.v.) which has been inadequately treated.

pyogen'ic (*Med.*). Having the power to produce pus.

pyome'tra (*Med.*). A collection of pus in the cavity of the uterus.

pyonephro'sis (*Med.*). Accumulation of pus in the pelvis of the kidney.

pyopneumotho'rax, pī'ō-nū— (*Med.*). The presence of pus and air or gas in the pleural cavity.

pyorrhoe'a, pyorrhe'a (*Med.*). (Lit., a flow of pus.) The term now used as a synonym for *pyorrhoea alveolaris*, a purulent inflammation of the periosteum round a tooth.

py'osalpingi'tis (*Med.*). Purulent inflammation of a Fallopian tube.

pyosal'pinx (*Med.*). Accumulation of pus in a Fallopian tube.

py'osepticae'mia of sucklings (*Vet.*). Infectious disease of new-born animals, characterised by pyaemia and septic arthritis, resulting from infection via the umbilicus. Also called NAVEL-ILL.

pyr-. Prefix. See **pyro-.**

pyramid (*Crystal.*). A crystal form with three or more inclined faces which cut all three axes of a crystal. See also **bipyramid.**

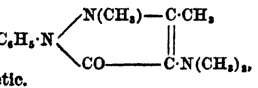
pyramid (*Zool.*). A conical structure; as part of the medulla oblongata in Vertebrates.—*adj.* **pyram'idal.**

pyramid, colour (*Photog.*). See **colour pyramid.**

pyramid of numbers (*Zool.*). The relative decrease in numbers at each stage in a food-chain characteristic of animal communities.

pyram'idal system (*Crystal.*). See **tetragonal system.**

Pyramidone (*Chem.*). A trade-name for 4-dimethyl amino-antipyrine,



$$C_6H_5\cdot N\begin{cases} N(CH_3)-C\cdot CH_3 \\ \qquad\qquad\quad \| \\ CO-\!-\!-\!-C\cdot N(CH_3)_2 \end{cases}$$

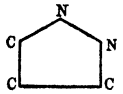
a valuable antipyretic.

pyrar'gyrite (*Min.*). Sulphide of silver and antimony which crystallises in the trigonal system. It is commonly associated with other silver-bearing minerals; cf. *proustite.* Also called RUBY SILVER ORE, DARK-RED SILVER ORE.

pyr'azines (*Chem.*). Six-membered heterocyclic rings containing two nitrogen atoms in the *para* position.

pyr'azole (*Chem.*). $C_3H_4N_2$, long needles, m.p. 70° C., b.p. 185° C. It is a weak secondary base. Fuming sulphuric acid forms a sulphonic acid. Pyrazole and its derivatives can be halogenated, nitrated, diazotised, and generally treated in a similar way to benzene or pyridine.

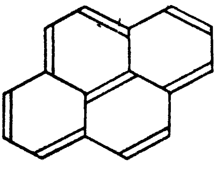
pyrazoles (*Chem.*). Heterocyclic compounds containing a five-membered ring consisting of three carbon and two nitrogen atoms arranged thus:



Pyrazole derivatives are formed by the condensation of hydrazines with compounds containing two CO groups, or a CO and a COOH group, in the *beta* position, or which contain a CO or COOH group attached to a doubly linked carbon atom. Pyrazoles have a similar chemical character to benzene and pyridine.

pyrene, pī-rēn (*Bot.*). A small hard body containing a single seed, comparable with the stone of a plum except that pyrenes often occur several together in one fruit.

pyrene (*Chem.*). A tetracyclic hydrocarbon obtained from the coal-tar fraction boiling above 360° C.



$= C_{16}H_{10}$

Colourless, monoclinic crystals, m.p. 148° C.; soluble in ether, slightly soluble in alcohol, and insoluble in water.

pyre'nocarp (*Bot.*). See **perithecium.**

py'renoid (*Bot.*). A small mass of refractive protein occurring singly or in numbers in or on the chromatophores of some algae and *Bryophyta*, and concerned in the formation of carbohydrates.—(*Zool.*) A centre of starch formation in some *Mastigophora.*

Pyre'nomyce'tes (*Bot.*). One of the major subdivisions of the *Ascomycetes*, including some 12,000 species, mostly of small fungi. The characteristic fructification is a perithecium, either formed single on the hyphae or developed in groups in a mass of hyphae known as a stroma, which assumes many forms. In general the perithecia are dark-brown or black, though some are brightly coloured.

pyret'ic (*Med.*). Pertaining to, or of the nature of, fever.

py'retother'apy (*Med.*). The treatment of disease by artificially increasing beyond normal the temperature of the body.

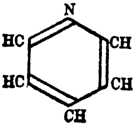
Pyrex glass. A general name for a whole family of glasses developed by the Corning Glass Co., Corning, N.Y., U.S.A., as heat-resisting glasses, and as line insulators. Those generally known by this name are used for chemical apparatus and for domestic cooking ware. The glass is essentially a soda-alumina-borosilicate glass, having very little alkali and a high silica content.

pyre'xia (*Med.*). An increase above normal of the temperature of the body; fever.—*adj.* **pyrexial.**

pyrhe'liom'eter (*Meteor.*). An instrument for measuring the rate at which heat energy is received from the sun. The earlier forms employed mercury thermometers; more modern types embody a bolometer or a thermo-couple to measure the rate of rise of temperature of a black surface heated by the sun. See **solar constant.**

pyrid'azines (*Chem.*). Six-membered heterocyclic rings containing two nitrogen atoms in the *ortho* position.

pyr'idine (*Chem.*). A heterocyclic compound containing a ring of five carbon atoms and one nitrogen atom, having the formula C_5H_5N,

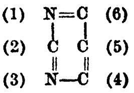


It occurs in the coal-tar fraction with a boiling range between 80° and 170° C.; a colourless liquid of pungent, characteristic odour, b.p. 114° C.; a very stable compound and resists oxidation strongly.

pyr'iform (*Bot., Zool.*). Pear-shaped; as the *pyriform organ* of a *Cyphonautes* larva.

pyriform organ (*Zool.*). In the larval stage of some *Polyzoa*, a mass of cells in close relation to the ectodermal groove, believed to be of sensory function.

pyrim'idine nucleus (*Chem.*). A heterocyclic ring with the following atomic arrangement:



$$\begin{array}{ccccc} (1) & N & = & C & (6) \\ & | & & | & \\ (2) & C & & C & (5) \\ & \| & & \| & \\ (3) & N & - & C & (4) \end{array}$$

pyrimidines (*Chem.*). Six-membered heterocyclic rings containing two nitrogen atoms in the *meta* position.

py'rite, py'rites (*Min.*). See **iron pyrite.**

pyrit'ic smelting (*Met.*). Blast-furnace smelting of sulphide copper ores, in which heat is mainly supplied by oxidation of iron sulphide.

pyritohe'dron (*Crystal.*). A crystal form of the cubic system, consisting of twelve pentagonal faces; particularly characteristic of pyrite, hence the name. Also called PENTAGONAL DODECAHEDRON.

pyro-, pyr- (Greek *pyr*, gen. *pyros*, fire). A prefix used in the construction of compound terms; e.g. *pyrogenic, pyrheliometer* (qq.v.).

pyro- (*Chem.*). A prefix used to denote an acid (and the corresponding salts) which is obtained by heating a normal acid, and thus contains relatively less water; e.g. *pyrosulphuric acid*, $H_2S_2O_7$.

pyro (*Photog.*). Abbrev. for *pyrogallol* (q.v.).

pyrobo'rates (*Chem.*). Generally known as **borates.**

pyrobo′ric acid (*Chem.*). See **boric acid.**

pyrocat′echin (*Chem*). See **catechol.**

py′rochlore (*Min.*). Chiefly a niobate of the cerium metals, calcium, and other bases, with titanium, thorium, and fluorine; crystallises in the cubic system. It is found in nepheline-syenites.

pyrochro′ite (*Min*). Hydroxide of manganese, crystallising in the trigonal system. It is very similar to brucite.

pyroclas′tic rocks (*Geol*). A name given to fragmental deposits of volcanic origin.

pyrocondensation (*Chem.*). A molecular condensation caused by heating to a high temperature, e.g. the formation of biuret from urea.

pyro-electric effects (*Diel.*). Effects due to the generation of heat by the dielectric losses.

pyro-electricity (*Min.*). Positive and negative charges of electricity which simultaneously develop on different parts of the same crystal when its temperature is suitably changed, e.g. in tourmaline.

pyrogal′lol (*Chem.*). Pyrogallic acid, 1,2,3-trihydroxy-benzene, $C_6H_3(OH)_3$, white plates, m.p. 132° C.; it sublimes without decomposition, is soluble in water, and is a strong reducing agent. It is much used as a photographic developer and as an absorbing agent for oxygen in gas analysis.

pyrogen′ic (*Chem.*). Resulting from the application of a high temperature, e.g. red-heat.

Pyrok (*Build.*). Trade-name for a bituminous substance used for surfacing flat roofs.

pyrolig′neous acid (*Chem.*). An aqueous distillate obtained by the destructive distillation of wood, which contains acetic acid, methyl alcohol, acetone, and other products.

pyrolu′site (*Min.*). Dioxide of manganese, commonly containing a little water, and crystallising in the orthorhombic system. It often occurs as a pseudomorph after manganite, and is used as an ore of manganese, as an oxidiser, and as a decoloriser. Cf. *polianite.*

pyrol′ysis (*Chem.*). The decomposition of a substance by heat.

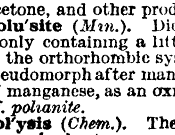
pyrom′eride (*Geol.*). An anglicised French term for nodular rhyolite. It is a quartz-felsite or devitrified rhyolite containing spherulites up to several inches in diameter which impart a nodular appearance to the rock.

pyrom′eter (*Heat*). An instrument for determining high temperatures from a distance.
See **optical— radiation— Seger cones.**

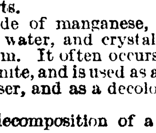
pyromor′phite (*Min.*). Phosphate and chloride of lead, crystallising in the hexagonal system. It is a mineral of secondary origin, frequently found in lead deposits; a minor ore of lead.

pyron detector (*Radio*). A crystal detector formed by a contact between iron and iron pyrites.

pyrones (*Chem.*). Six-membered heterocyclic compounds containing a ring of five carbon atoms and one oxygen atom, one of the former being oxidised to a CO group. According to the position of the CO and the O in the molecule, there are α-pyrones and γ-pyrones.



α-pyrone



γ-pyrone

py′rope (*Min.*). The fiery-red garnet; silicate of magnesium and aluminium, crystallising in the cubic system. It is often perfectly transparent and then prized as a gem, being ruby-red in colour.

py′rophi′lous (*Bot.*). Growing on ground which has been recently burnt over.

pyropho′ric powders (*Chem.*). Finely divided powders which take fire or oxidise extremely rapidly when exposed to the air; usually a metal, or a mixture of a metal and its oxide.

pyrophyl′lite (*Min.*). A clay mineral; silicate of aluminium with chemically combined water, crystallising in the orthorhombic system. It occurs in metamorphic rocks; often resembles talc.

py′rophyte (*Bot*). A plant which is protected by a thick bark from permanent damage by forest fires.

Pyropruf (*Build.*). Trade-name for a material similar to Pyrok but fire-resistant.

Pyrosomat′ida (*Zool.*). An order of *Thaliacea* in which the larval stage is lacking; the oözooid is degenerate and retained within the parent; a cylindrical colony is formed from the blastozooids by budding.

pyrostibnite (*Min*). See **kermesite.**

py′rotechny (*Chem.*). The study and manufacture of fire-works.

Pyrotenax (*Cables*). Trade-name for a magnesia insulation used for low-voltage cables. It is very tough, non-inflammable, and heat-resisting.

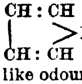
pyrox′ene group (*Min.*). A number of mineral species which, although falling into different systems (orthorhombic, monoclinic, and triclinic), are closely related in form, composition, and structure. They are metasilicates of calcium, magnesium, iron with manganese, and less often with sodium, potassium, zirconium, and fluorine. See **acmite, aegirine, augite, diallage, diopside, enstatite, hypersthene.**

pyrox′enite (*Geol*). A coarse-grained, holocrystalline igneous rock, consisting chiefly of pyroxenes. It may contain biotite, hornblende, or olivine as accessories. See **diallagite, enstatite, hypersthenite.**

pyrox′ilins (*Chem.*). Nitrocelluloses with a low nitrogen content, containing from two to four nitrate groups in the molecule. Used in an alcohol-ether solution to form collodion. Pyroxilin is a synonym for *guncotton* (q.v.).

pyr′rhotite (*Min.*) Ferrous sulphide which contains variable amounts of dissolved sulphur; it crystallises in the hexagonal system. Often contains nickel, and then it becomes a valuable ore. Also called MAGNETIC PYRITE.

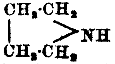
pyrrole (*Chem.*). A heterocyclic compound having a ring of four carbon atoms and one nitrogen atom,



$$\begin{array}{l}CH:CH\\ \mid \quad > NH\\ CH:CH\end{array}$$

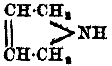
, a colourless liquid of chloroform-like odour, b.p. 131° C., sp. gr. 0·984. Pyrrole is a secondary base, and is a constituent of coal-tar. It is obtained chiefly from bone-oil. Numerous important natural colouring matters are derivatives of pyrrole, e.g. chlorophyll and haemoglobin.

pyrrol′idine (*Chem.*). The final reduction product of pyrrole, a colourless, strongly alkaline base, b.p. 86° C, having the formula:



$$\begin{array}{l}CH_2{\cdot}CH_2\\ \mid \qquad > NH\\ CH_2{\cdot}CH_2\end{array}$$

pyr′roline (*Chem.*). A reduction product of pyrrole obtained by treating it with zinc and glacial acetic acid. It is a colourless liquid, b.p. 91° C., and is a strong secondary base. It has the formula:



$$\begin{array}{l}CH{\cdot}CH_2\\ \parallel \qquad > NH\\ CH{\cdot}CH_2\end{array}$$

Pyruma (*Build.*). Trade-name for a fireclay cement used in forming heat-resistant joints.

pyu′ria (*Med.*). The presence of pus in the urine.

pyx′idate (*Bot.*). Having a lid.

pyxid′ium (*Bot.*). A capsule which dehisces by means of a transverse circular split, so that the upper part of the pericarp forms a lid.

q **(*Chem.*).** A symbol for the quantity of heat which enters a system.

Q (*Radio*). The accepted symbol for the ratio of the reactance of an inductance coil to its resistance. This factor determines the selectivity and resonance step-up of the coil when tuned by a condenser having no losses. Sometimes called MAGNIFICATION FACTOR.

Q point (*Elec. Comm.*). The quiescent condition of a valve without excitation, as represented by a point on its characteristic curves.

Q.F. guns (*Artillery*). Quick-firing guns. These may be guns, or howitzers, that are loaded with ammunition having brass cartridge cases, either attached to the shell or separate.

qibli, kib'lē (*Meteor.*). A sirocco-type wind blowing from the south in Tripoli.

Q.P. (*Carp.*). Abbrev. for *quartered partition.*

Q.P.P. (*Elec. Comm*). Abbrev. for *quiescent push-pull.*

Q.S. (*Build.*). Abbrev. for *quick sweep.*

Qu (*Chem.*). A symbol for the quinine molecule, $C_{20}H_{24}O_2N_2$.

quad (*Paper*). A prefix used in the names of standard paper sizes to denote a size four times the single and twice the double size; e.g. *demy*, 17½×22½ in.; *double-demy*, 22½×35 in.; *quad demy*, 35×45 in. *Double quad demy* would be 45×70 in. Similarly with other basic sizes, e.g. *quad crown, quad royal*, etc.

quad (*Typog.*). See **quadrat.**

quad (or **star-quad**) **cable** (*Cables*). Lead-covered cable in which the unit group is four paper-insulated conductors twisted together, opposite conductors forming the go and return circuits of a four-wire channel respectively.

quadra (*Arch.*). A plinth at the base of a podium.

quadrant (*Civ. Eng.*). A special granite sett, usually 18×18×8 in. deep, shaped like a sector of a circle enclosing 90°.

quadrant (*Eng.*). A slotted segmental guide through which an adjusting lever (e.g. a reversing lever) works. It is provided with means for locating the lever in any desired angular position. See **link motion.**

quadrant (*Furn.*). A type of hinge or controlling device resembling a sextant, used in flap-closed writing-tables, etc.

quadrant (*Surv.*). An angle-measuring instrument of the sextant type, but embracing an angle of 90° or a little more.

quadrant (*Zool.*). A section of a segmenting ovum originating from one of the four primary blastomeres.

quadrant dividers (*Carp.*). A form of dividers in which one limb moves over an arc fixed rigidly to the second limb, and may be secured to it by tightening a binding screw.

quadrant electrometer (*Elec. Eng.*). An electrometer in which a flat metal needle is arranged to swing within or near four quadrants connected in pairs and subjected to a difference in potential. Also called KELVIN ELECTROMETER.

quadran'tal bearing (*Surv.*). See **reduced bearing.**

quadrantal deviation (*Ships*). The error introduced into the reading of a ship's compass by the magnetism induced in the steel hull of the ship by the earth's field. The error is corrected by placing soft iron spheres on each side of the compass.

quadrat (*Bot.*). A square area of vegetation marked off for study.

quadrat or **quad** (*Typog.*). A piece of metal used for spacing. It is less than type height.

quadrate (*Bot*). Square to squarish in cross-section or in face view.

quadrate (*Zool.*). A paired cartilage bone of the Vertebrate skull formed by the ossification of the posterior part of the PPQ bar, or the corresponding cartilage element prior to its ossification; except in Mammals, it forms part of the jaw-articulation.

quadratic system (*Crystal.*). The tetragonal system.

quadra'toju'gal (*Zool.*). In some Vertebrates, a paired membrane bone of the skull, lying between the quadrate and the jugal.

quad'rature (*Astron.*). The position of the moon or a superior planet in elongation 90° or 270°; that is, when the lines drawn from the earth to the sun and the body in question are at right-angles.

quadrature component (*Elec. Eng.*). See **reactive component.**

quadrature reactance (*Elec. Eng.*). A term used in the two-reaction theory of synchronous machines to denote the ratio which the synchronous reactance drop produced by the quadrature component of the armature current bears to the actual value of the quadrature component.

quadrature transformer (*Elec. Eng.*). A transformer designed so that the secondary e.m.f is 90° displaced from the primary e.m.f.

quadra'tus (*Zool*). A muscle of rectangular appearance; e.g. *quadratus femoris.*

quad'riceps (*Zool.*). A muscle having four insertions, as one of the thigh muscles of Primates.

quadrigem'inal bodies (*Zool.*). See **corpora quadrigemina.**

quadrilateral speed-time curve (*Elec. Eng.*). A simplified form of speed-time curve used in making preliminary calculations regarding the energy consumption and average speed of electric trains. The acceleration and coasting portions of the curve are sloping straight lines and the braking portion is neglected, so that the curve becomes a quadrilateral. Cf. *trapezoidal speed-time curve*

quad'rimolec'ular (*Chem.*). Associated with four molecules.

quadripartition (*Bot.*). The division of a spore mother cell to yield four spores.

quadripen'nate (*Zool.*). See **tetrapterous.**

quadriple'gia (*Med.*). Paralysis of both arms and both legs.

quadriplex (*Gen.*). Containing four dominant genes.

quadripo'lar spindle (*Bot.*). An achromatic spindle with four poles, seen in preparations of spore mother cells in course of division.

quadrituber'culate (*Zool.*). (Of tuberculate cheek-teeth) having four cusps.

quadriva'lent (*Chem.*). Tetravalent.

quadrivalent (*Cyt.*). A nucleus having two pairs of homologous chromosomes: an organism plant containing such nuclei.

quadru'manous (*Zool.*). (Of Vertebrates) having all four podia constructed like hands, as in Apes and Monkeys.

quadruped (*Zool.*). (Of Vertebrates) having all four podia constructed like feet, as Cattle.

quadruple-expansion engine (*Eng.*). A steam engine in which the steam is expanded successively in four cylinders of increasing size, all working on the same crankshaft. See **multiple-expansion engine, triple-expansion engine.**

quadruple-phantom circuit (*Teleph.*). A telephone circuit using two double-phantom circuits in parallel for both go and return speech channels.

quadruple point (*Chem.*). A point on a concentration-pressure-temperature diagram at which a two-component system can exist in four phases.

quadruplex (*Gen.*). A tetraploid organism having four doses of a dominant factor.

quadruplex (*Teleg.*). A system in which two channels are operated in both directions over a single telegraph line.

quagginess (*Timber*). A term used to indicate the defective condition of timber having shakes at the heart of the log.

qualitative analysis (*Chem.*). The identification of the constituents of a material irrespective of their amount. In the case of inorganic mixtures, the metals and the acid radicals are tested for separately. In the case of organic mixtures, a preliminary determination of the elements present is made. The components of a mixture may often be separated by distillation, extraction, etc., and tests applied for the detection of certain groups of atoms. The melting-point and the boiling-point are of great value in the identification of an organic compound.

quality (*Acous.*). In sound reproduction, the degree to which a sample of reproduced sound resembles a sample of the original sound. The general description of freedom from various types of acoustic distortion in sound-reproducing systems. See **high-fidelity.**

quality (*Photog.*). (Of light or of radiation) the general assessment of the spectral distribution of components in a complex colour or lighting.

quality number, spinning number (*Textiles*). The number assigned to worsted tops to indicate the counts for which they are suitable; e.g. 58's and downwards are crossbred qualities, 60's and upwards Botany. In yarns and noils, this number indicates the material from which they are derived.

quality terms (*Textiles*). Terms applied to worsted and woollen fabrics to indicate the type of wool and the system of yarn spinning employed in their manufacture. *Botany* indicates merino wool, spun on the worsted system. *Crossbred* denotes a worsted cloth made from crossbred wool. *Saxony* means composed of merino wool, spun on the woollen system. *Cheviot* is applied to cloth made from Cheviot quality wool, spun on the woollen system.

quantitative analysis (*Chem.*). The determination of the amounts in which the various constituents of a material are present. Apart from purely chemical methods of analysis (see **gas analysis, gravimetric analysis, volumetric analysis**), the measurement of physical properties, such as specific gravity, refractive index, thermal conductivity, etc., is of great value, particularly in binary mixtures.

quantity of electricity (*Elec. Eng.*). The product of the flow of electricity (current) and the time during which it flows. The term may also refer to a charge of electricity.

quantity of light (*Illum.*). The product of luminous flux and the time during which it is maintained; usually stated in lumen-hours.

quantity sensitivity (*Elec. Eng.*). The throw, in millimetres, produced on a scale one metre from a measuring instrument designed to measure the quantity of electricity.

quantum (*Phys.*). See **quantum theory.**

quantum efficiency (*Chem.*). The number of molecules decomposed per quantum of light absorbed in a photochemical reaction.

quantum theory (*Phys.*). The conception of energy as being 'atomic' in nature, that is, not variable continuously but only in multiples of a minimum indivisible quantity called a *quantum*. For radiant energy (for example, light) of frequency ν, the quantum is equal to $h\nu$ where h is *Planck's constant* (q.v.). See **Planck's radiation formula, Bohr theory.**

quaquaver'sal fold (*Geol.*). A dome-like structure of folded sedimentary rocks which dip uniformly outwards from a central point. See **dome.**

Quarella Sandstone (*Geol.*). A sandstone which forms part of the Rhaetic series of the Jurassic System and is quarried extensively near Bridgend (Glamorgan).

quarrel (*Build.*). The diamond-shaped pane of glass used in *fret-work* (q.v.).

quarries (*Build.*). *Quarry tiles* (q.v.).

quarry. (1) An open working or pit for granite, building-stone, slate, or other rock.—(2) (*Mining*) An underground working in a coal-mine for stone to fill the goaf.

quarry-faced (*Masonry*). A term applied to a building-stone whose face is hammer-dressed before leaving the quarry.

quarry-pitched (*Masonry*). A term applied to stones which are roughly squared before leaving the quarry.

quarry sap (*Civ. Eng., etc.*). The moisture naturally contained in building-stone freshly cut from the quarry.

quarry-stone bond (*Masonry*). A term applied to the arrangement of stones in rubble masonry.

quarry tile (*Build.*). The common unglazed, machine-made paving tile not less than ¾ in. in thickness. Also called a PROMENADE TILE.

quartan (*Med.*). The term is now used to denote *quartan malaria*, in which the febrile paroxysm recurs every fourth day (i.e. at an interval of 72 hours). Quartan malaria is due to infection with the parasite *Plasmodium malariae*.

quarter (*Astron.*). The term applied to any of the (four) positions of the moon when in quadrature, her *first quarter* being when her elongation is 90°, and *third quarter* when it is 270°; the two other quarters, theoretically corresponding to *full moon* and *new moon*, are no longer so called.

quarter (*Carp.*). A rough vertical timber in the framework of a stud partition.

quarter bend (*Plumb.*). A bend, as in a piece of pipe, connecting two parts whose directions are mutually at right-angles.

quarter bond (*Build.*). The ordinary brickwork bond obtained by using a 2¼-in. closer.

quarter-bound (*Bind.*). A term applied to a book having its back and part of its sides covered in one material and the rest of its sides in a different one.

quarter elliptic spring (*Automobiles*). One half of a semi-elliptic spring, anchored to the frame at the thick end and to a shackle on the axle at the free end; a true *cantilever spring* (q.v.) and also known as such.

quarter ill, quarter evil (*Vet.*). See **blackleg.**

quarter lines (*Ship Constr.*). The aggregation of waterlines, buttocklines, sections, and diagonals indicative of a ship's form, drawn on a scale of ¼ in. = 1 ft. See **fairing.**

quarter-pace landing (*Build.*). A *quarter-space landing* (q.v.).

quarter-phase systems (*Elec. Eng.*). See **two-phase systems.**

quarter rack (*Horol.*). The rack of the striking work of a clock or repeater-watch which regulates the striking of the quarters.

quarter sawing (*Timber*). A mode of converting timber, adopted when it is desired that the growth rings shall all be at least 45° to the cut faces. Also called RIFT SAWING.

quarter screws (*Horol.*). Four screws in the rim of a compensating balance, one placed at either end of the arms, and the other two at right-angles to the arm. Used for rating the watch but not for compensation purposes.

quarter snail (*Horol.*). The snail in a chiming clock or repeater-watch which controls the number of teeth picked up on the quarter rack.

quarter-space landing (*Build.*). A landing extending across only half the width of a staircase.

quarter stuff (*Carp.*). A board ¼ in. thick.

quarter turn (*Join.*). A wreath subtending an angle of 90°.

quarter-wave antenna (*Radio*). An antenna whose overall length is approximately a quarter of the free-space wavelength corresponding to the frequency of operation. Under these conditions it is oscillating in its first natural mode.

quarter-wave plate (*Light*). A plate of quartz, cut parallel to the optic axis, of such thickness that a retardation of a quarter of a period is produced between ordinary and extraordinary rays travelling normally through the plate. By using a quarter-wave plate, with its axis at 45° with the principal plane of a Nicol prism, circularly polarised light is obtained.

quartered partition (*Carp.*). A partition built with quarterings.

quartering (*Civ. Eng.*). A method of obtaining a representative sample of an aggregate with occasional shovelfuls, of which a heap or cone is formed. This is flattened out and two opposite quarter parts are rejected. Another cone is formed from the remainder which is again quartered, the process being repeated until a sample of the required size is left.

quartering (*Timber*). A piece of timber of square section between 2 and 6 in. side.

quartet, quartette (*Bot*). The group of four related nuclei or cells formed as a result of meiosis.—(*Zool.*) A set of four related cells in a segmenting ovum.

quarto (*Print.*). A book having eight pages to the sheet. Often abbrev. to 4to, and used as a prefix along with the particular size of sheet used, e.g. *demy* 4*to*, *crown* 4*to*.

quartz (*Min.*). Crystalline silica occurring either in prisms capped by rhombohedra (low-temperature, α-quartz); or in hexagonal bipyramidal crystals (high-temperature, β-quartz). Widely distributed in rocks of all kinds—igneous, metamorphic and sedimentary; usually colourless and transparent (rock crystal), but often coloured by minute quantities of impurities as in citrine, cairngorm, etc.; also finely crystalline in the several forms of chalcedony, jasper, etc. See also **tridymite, cristobalite.**—(*Diel.*) Quartz retains its high resistivity at high temperatures and is used for mercury-vapour lamps, radio transmitting-valves, etc.

quartz crystal (*Radio*). A disc or rod cut in the appropriate directions from a specimen of piezo-electric quartz, and accurately ground so that its natural resonance shall occur at a particular frequency.

quartz-crystal clock (*Horol.*). A synchronous electric clock of great accuracy, having a quartz crystal to control the frequency of the a.c. supply to the motor unit.

quartz-diorite (*Geol.*). A coarse-grained holocrystalline igneous rock of intermediate composition, composed of quartz, plagioclase feldspar, hornblende, and biotite, and thus intermediate in mineral composition between typical diorite and granite. This is the TONALITE of some authors.

quartz-dolerite (*Geol.*). A variety of dolerite which contains interstitial quartz usually intergrown graphically with feldspar, forming patches of micropegmatite. A dyke-rock of world-wide distribution, well represented by the Whin Sill rock in N. England.

quartz-keratophyre (*Geol.*). A type of soda-trachyte carrying accessory quartz.

quartz oscillator (*Radio*). A quartz crystal maintained in mechanical vibration at its natural frequency by means of thermionic valves. Used as a constant-frequency oscillator.

quartz-porphyrite (*Geol.*). A porphyrite carrying quartz as an accessory constituent; the representative in the medium grain-size group of the fine-grained dacite.

quartz-porphyry (*Geol.*). A medium-grained igneous rock of granitic composition occurring normally as minor intrusions, and carrying prominent phenocrysts of quartz. Differs from rhyolite only in the coarser grain of the groundmass.

quartz resonator (*Radio*). A standard of frequency comparison making use of the sharply resonant properties of a piezo-electric quartz crystal.

quartz-syenite (*Geol.*). A potash- or soda-syenite carrying quartz as an accessory constituent, and hence on the borderline between true syenite and granite.

quartz topaz (*Min.*). See **citrine.**

quartz-trachyte (*Geol.*). A soda- or potash-trachyte carrying quartz as an accessory constituent only. Increase in the amount of quartz would convert the rock into rhyolite.

quartzite (*Geol.*). The characteristic product of the metamorphism of a siliceous sandstone or grit. The term is also used to denote sandstones and grits which have been cemented by silica, often in optical continuity with each fragment.

quartzose (*Geol.*). An adjective denoting richness in quartz; applied to sediments and sedimentary rocks.

Quasi-arc welding (*Elec. Eng.*). A system of arc welding in which covered iron electrodes are used, the covering consisting of asbestos yarn impregnated with a fluxing compound. The covering protects the deposited metal from oxidation.

quasi-duplex (*Teleph.*). A circuit which operates apparently duplex, but actually functions in one direction only at a time; e.g. a long-distance telephone or a radio-link, which is automatically switched by speech.

quasi-optical waves (*Radio*). Electromagnetic waves of such short wavelength that their laws of propagation are similar to those of visible light.

quaternary (*Chem.*). Consisting of four components, etc.

quaternary ammonium bases (*Chem.*). Bases derived from the hypothetical ammonium hydroxide $NH_4 \cdot OH$, in which the four hydrogen atoms attached to the nitrogen are replaced by alkyl radicals, e.g. $(C_2H_5)_4N \cdot OH$, tetraethylammonium hydroxide.

Quaternary Era (*Geol.*). The era of geological time which succeeded the Tertiary Era. It includes the Pleistocene and Recent Periods.

quater'nate (*Bot.*). In groups of four.

quay, kē (*Civ. Eng.*). A place on the seacoast or riverside for the loading or unloading of vessels.

quebracho extract, kā-bra'cho (*Chem.*). An aqueous extract of the wood of *Quebracho Colorado*, growing in South America. The wood contains up to 20% of tannin, and the extract is used for tanning.

Queckenstedt's sign, kvek'en-stet (*Med.*). Increase in the pressure of the cerebrospinal fluid when the jugular veins in the neck are compressed; if this manœuvre causes no rise of pressure in the spinal fluid, an obstruction is present at a higher level.

queen (*Build.*). A slate, 36 × 24 in.

queen (*Zool.*). In social Insects, a sexually perfect female.

Queen Anne arch (*Build.*). A combination of a central semi-circular arch with side camber arches carried from the same springings.

queen bee (*Armaments*). A pilotless aircraft, remotely controlled by radio; used as a realistic target in anti-aircraft gun practice.

queen bolt (*Carp.*). A long iron or steel bolt serving in place of a timber queen-post in a roof truss.

queen closer (*Build.*). A half-brick made by cutting the brick lengthwise, each half being 2¼ in. wide.

queen-post (*Carp.*). For roofs of more than about 80 ft. span, the central support given to the tie-beam by the king-post is insufficient, and two other vertical ties, one on each side of the king-post, are required. These are called *queen-posts.*

queen-post roof (*Carp.*). A timber roof having two queen-posts but no king-post.

quench (*Teleph.*). See **absorber.**

quenched spark (*Radio*). An oscillatory spark discharge which is extinguished after the first few oscillations by mechanical or thermal means.

quenched-spark gap (*Radio*). A spark gap in which the discharge takes place between cooled or rapidly moving electrodes.

quenched-spark system (*Radio*). A system of spark transmission in which means are employed to extinguish each spark rapidly, so as to reduce the decrement of the oscillatory currents which it induces in the antenna or closed oscillatory circuit.

quenching (*Met.*). Generally means cooling steel from above the critical range by immersing in oil or water, in order to harden it. Also applied to cooling in salt and molten-metal baths or by means of an air blast. Applied also to the rapid cooling of other alloys after solution treatment. See **oil-hardening, tempering.**

quenching (*Radio*). The suppression of oscillation, particularly periodically, as in a super-regenerative receiver. See **super-regeneration.**

quenching oscillator (*Radio*). An oscillator whose frequency is slightly above the audible limit, and which generates the voltage necessary to quench the high-frequency oscillations in a super-regenerative receiver.

quer'citol (*Chem.*). $C_6H_7(OH)_5$, a polyhydroxy derivative of hexamethylene, found in the oak. Colourless crystals, m.p. 235° C., dextro-rotatory.

Quevenne scale, ke-ven' (*Chem.*). A scale indicating the relationship between the percentages of fat and total solids and the specific gravity. Used in milk analysis.

quick-break switch (*Elec. Eng.*). A switch having a spring or other device to produce a quick break, independently of any action of the operator.

quick-firing guns (*Artillery*). See **Q.F. guns.**

quick gouge (*Carp., etc.*). A gouge having a cutting edge shaped to a small radius of curvature. See **flat gouge, middle gouge.**

quick-levelling head (*Surv.*). A fitting provided on some levels to facilitate setting up the instrument approximately level, the instrument head being usually secured to a ball-and-socket joint for easy adjustment to the desired position, in which it can be fixed by means of a clamping device.

quicklime (*Build.*). See **lime.**

quick make-and-break switch (*Elec. Eng.*). See **snap switch.**

quick return (*Eng.*). A reciprocating motion, for operating the tool of a shaping machine, etc., in which the return is made more rapidly than the cutting stroke, so as to reduce the 'idling' time of the tool.

quick-revolution engine (*Eng.*). A term formerly applied to high-speed steam-engines direct-coupled to generators.

quicksand. Loose sand mixed with such a high proportion of water that its bearing-pressure is very low. Better term, RUNNING SAND.

quick-setting level (*Surv.*). A level fitted with a *quick-levelling head* (q.v.).

quicksilver (*Min.*). See **mercury.**

Quickstryp (*Paint.*). Trade-name for a paint-remover.

quick sweep (*Build.*). A term applied to circular work in which the radius is small.

quiescent antenna (*Radio*). The same as *dummy antenna.*

quiescent push-pull amplifier (*Elec. Comm.*). A thermionic amplifier employing two valves so arranged that only one passes anode current at one time, each valve amplifying one half-cycle of the input voltage

quiescent tank (*Sewage*). A form of sedimentation tank in which the sewage is allowed to rest for a certain time without flow taking place.

quiet-littoral fauna (*Ecol.*). Animals living at the edges of lakes with gently sloping shores.

quill (*Zool.*). See **calamus.**

quill or **quill drive** (*Eng.*). A hollow shaft revolving on a solid spindle. They may be connected by a clutch, or by a flange at one end to provide a flexible drive.—(*Elec. Eng.*) A form of drive used for electric locomotives in which the armature of the driving motor is mounted on a quill surrounding the driving axle, but only connected to it by a flexible connexion. This enables a small amount of relative motion to take place between the motor and the driving axle. See **geared quill drive.**

quill feathers (*Zool.*). In Birds, the remiges and rectrices.

quilt (*Acous.*). See **Cabot— Euphon—**

quinal'dine (*Chem.*). $C_{10}H_9N$, 2-methyl-quinoline, a colourless refractive liquid, b.p. 246° C., which occurs to the extent of 25% in quinoline obtained from coal-tar.

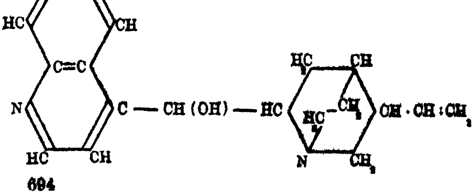
Quincke's disease, kvink'e (*Med.*). **See angio-neurotic oedema.**

quincun'cial aestivation (*Bot.*). A particular type of imbricate aestivation in a five-petalled corolla. Two petals overlap their neighbours by both edges, two are overlapped on both edges, and one overlaps one neighbour and is overlapped by the other.

quinhy'drone (*Chem.*). $C_6H_4O_2+C_6H_4(OH)_2$, an additive compound of one molecule of *p*-quinone and one molecule of hydroquinone. It crystallises in green prisms with a metallic lustre.

quinhydrone electrode (*Chem.*). A system consisting of a clean, polished gold or platinum electrode dipping into a solution containing a little quinhydrone, used for the determination of *p*H-values.

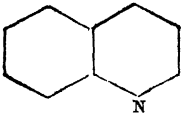
quinine' (*Chem.*). $C_{20}H_{24}O_2N_2 \cdot 3H_2O$, an alkaloid of the quinoline group, present in Cinchona bark. It is a diacid base of very bitter taste and alkaline reaction. It crystallises in prisms or silky needles, m.p. 177° C., and is laevo-rotatory; the hydrochloride and sulphate are a valuable febrifuge and remedy for malaria. Its constitution is:



quiniz'arine (*Chem.*). A synonym for 1,4-dihydroxy-anthraquinone.

quin'ol (*Chem., Photog.*). Hydroquinone, $C_6H_4(OH)_2$, *p*-dihydroxy-benzene, monoclinic plates or hexagonal prisms, m.p. 169° C. It is obtained by the reduction of quinone with sulphurous acid. It is a strong reducing agent and is extensively used as a developer in photography.

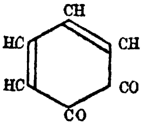
quin'oline (*Chem.*). A heterocyclic compound consisting of a benzene ring condensed with a pyridine ring:



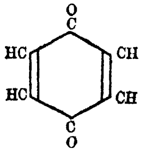
It is a colourless, oily liquid, m.p. −19·5° C., b.p. 240° C., sp. gr. 1·08, of characteristic odour, insoluble in water, soluble in most organic solvents. It is found in coal-tar, in bone oil, and in the products of the destructive distillation of many alkaloids. It can be synthesised by heating a mixture of aniline, glycerine, and nitrobenzene with concentrated sulphuric acid.

quinone' (*Chem.*). See **benzoquinones.**

quinones (*Chem.*). Compounds derived from benzene and its homologues by the replacement of two atoms of hydrogen with two atoms of oxygen. They are characterised by their yellow colour and by being readily reduced to dihydric phenols. According to their configuration they are divided into *ortho*-quinones and *para*-quinones; e.g.



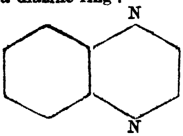
ortho-quinones



para-quinones

quin'onoid formula (*Chem.*). A formula based upon the diketone configuration of *p*-quinone (*benzoquinone*, q.v.), involving the rearrangement of the double bonds in a benzene nucleus; adopted to explain the formation of dyestuffs, e.g. coloured salts of compounds of the triphenyl-methane series.

quinox'alines (*Chem.*). A group of heterocyclic compounds consisting of a benzene ring condensed with a diazine ring:



They can be obtained by the condensation of *o*-diamines with 1, 2-diketones.

quin'quefa'rious (*Bot.*). Said of leaves which are arranged in five ranks.

quinquefo'liolate (*Bot.*) Having five leaflets

quinquemolec'ular (*Chem*). Associated with five molecules.

quin'queva'lent (*Chem.*). Pentavalent.

quinquituber'culate (*Zool.*). (Of tuberculate cheek-teeth) having five cusps.

quinsy (*Med.*). Acute suppurative tonsillitis; peritonsillar abscess. Acute inflammation of the tonsil with the formation of pus around it.

quintocu'bital (*Zool*) In Birds, a term indicating the presence of the fifth secondary remex or fifth flight feather carried by the ulna. Cf. *diastataxy*.

quintuple point (*Chem.*). A point on a concentration-pressure-temperature diagram at which a three-component system can exist in five phases.

quin'tuplinerved, —nervd' (*Bot.*). Having five main veins or ribs in the leaf.

quire (*Paper*). Twenty-four sheets.

quirewise (*Bind.*). Small sections which after printing are folded and inserted one in the other. This method allows the booklet to be stitched instead of stabbed.

quired paper (*Paper*). Reams folded in quires.

quirk (*Join.*). The narrow groove alongside a bead which is sunk into the face of the work so as to be flush with it.

quirk-bead (*Join.*). See **bead-and-quirk.**

quirk float (*Plast.*). A plasterer's trowel specially shaped for finishing mouldings.

quirk moulding (*Join.*). A moulding having a small groove in it.

quirk-router (*Join.*). A form of plane for shaping quirks.

quitclaim (*Mining*). A deed of relinquishment of a claim or portion of mining ground.

quittor (*Vet.*). A chronic suppuration of the lateral cartilage and its surrounding tissues within the horse's foot.

quoin (*Build., Masonry*). A salient angle of a building, especially one formed of large squared corner-stones projecting beyond the general faces of the meeting wall surfaces.

quoin (*Typog.*). A wooden or metal wedge used to lock up formes. Another variety consists of a steel box the sides of which are expanded with a key.

quoin bonding (*Build.*). The mode of arranging the bricks when building a return wall.

quoin header (*Build.*). A brick which is so laid at the external angle of a building that it is a header in respect of the face of the wall proper, and a stretcher in respect of the return wall.

quoin-post (*Hyd. Eng.*). See **heel-post.**

quotations (*Typog.*). Large metal spaces, not less than 4 ems square. They are usually hollow, and are used for filling blanks in pages or formes.

quotation marks, quotes (*Typog.*). See **inverted commas.**

r **(*Chem.*).** (With subscript) a symbol for specific refraction.

r- (*Chem.*). An abbrev. for *racemic.*

ρ- (*Chem.*). A symbol for *pros-*, i.e. containing a condensed double aromatic nucleus substituted in the 2.3 positions.

R. (*Build.*). Abbrev. for *render.*

R (*Chem.*). A general symbol for an organic hydrocarbon radical, especially an alkyl radical.

R (*Chem., Phys.*). A symbol for (1) the *gas constant* (q.v.); (2) the *Rydberg constant* (q.v.).

[*R*] (*Chem.*). (With subscript) a symbol for molecular refraction.

R_H, r_H, *r*H (*Chem.*). See ***r*H-value.**

R-acid (*Chem*). β-Naphthol-3,6-disulphonic acid. It is mostly used in the preparation of azo-dyes for wool.

R-wire (*Teleph.*). In the cord circuit on a telephone switchboard, the ring-wire connected to the ring contacts on the terminating plugs, and eventually to the B-wire of the subscriber's line.

R.A. (*Astron.*). See **right ascension.**

Ra (*Chem.*). The symbol for *radium.*

ra- (*Chem.*). A symbol for *radio-*, i.e. a radioactive isotope of an element; e.g. *ra*Na, *radio*sodium.

rab (*Build.*). A stick for mixing hair with mortar.

rabbet (*Carp.*). A corruption of *rebate.*

rabbet plane (*Join.*). A plane specially adapted to cutting a groove in the corner of a board.

rabbeted lock (*Join.*). A lock which is fitted into a recess cut in the edge of a door.

rabbit (*Furs*). Rabbit skins are marketed as 'coney,' and are dressed to imitate numerous other furs considered to be more valuable.

rabies (*Med.*). Hydrophobia. An acute disease of dogs, wolves, and other animals, due to infection with a filter-passing virus, communicable to man by the bite of the infected animals. In man the disease is characterised by intense restlessness, mental excitement, muscular spasms (especially of the mouth and throat), and paralysis.

raccoon (*Furs*). The dressed skin of the raccoon, an American nocturnal animal related to the bears; the fur is greyish-brown, and the tail has black and white rings.

race (*Build., Geol.*). Fragments of limestone sometimes found in certain brick earths of a hard marly character.

race (*Eng.*). The inner or outer steel rings of a *ball-bearing* or *roller-bearing* (qq.v.).

race (*Hyd. Eng.*). A channel conveying water to or away from a hydraulically operated machine.

race board (*Weaving*). The part of the sley in a loom along which the shuttle travels. Also called SHUTTLE RACE.

race (*Zool.*). A category of variant individuals occurring within a species and differing slightly in characteristics from the typical members of the species: a breed of domesticated animals.

raceme, ra-sēm′ (*Bot.*). An indefinite inflorescence, in which stalked flowers are borne in acropetal succession on an unbranched main stalk. The term is also applied to a group of sporangia similarly arranged.

race′mic acid (*Chem.*). See **tartaric acid.**

racemic compounds (*Chem.*). Compounds consisting of equal quantities of enantiomorphous stereoisomers (*d-* and *l*-forms), which are optically inactive. Racemic compounds are always obtained in the chemical synthesis of substances, but can be resolved into the optically active components by various methods, e.g. by coupling with an optically active substance, such as an alkaloid, and subsequent fractional crystallisation, by the action of lower plant organisms, e.g. bacteria, moulds, yeasts, etc., which attack only one of the isomers, leaving the other one intact.

racemisation (*Chem.*). The transformation of an optically active substance into its racemic inactive form; it may be effected by boiling the active form, resulting in the formation of 50% of the enantiomer, or also by chemical reactions in which a racemic mixture is ultimately obtained.

racemose, ras′— (*Bot.*). (1) Bearing racemes.—(2) Said of an inflorescence which is a raceme.—(*Zool*) Shaped like a bunch of grapes; said especially of glands.

racemule, ras′— (*Bot.*). A small raceme.

rachi-, rachio- (Greek *rhachis*, spine). A prefix used in the construction of compound terms; e.g. *rachianaesthesia* (q.v.).

ra′chianaesthe′sia (*Med.*). Anaesthesia produced by the injection of anaesthetic agents into the space round the spinal cord.

rachil′la (*Bot.*). The axis in the centre of a spikelet of a grass.

ra′chiodont (*Zool.*). Having some of the anterior thoracic vertebrae with the hypapophysis enlarged, forwardly directed and capped with enamel to act as an egg-breaking tooth; as certain egg-eating Snakes.

rachios′tichous (*Zool.*). Having the axis of the fin occupied by a row of somactids, as in *Dipnoi.* Cf. *orthostichous, rhipidostichous.*

ra′chis (*Bot.*). (1) The main axis of an inflorescence.—(2) The central stalk on which the leaflets of a compound leaf are borne.—(*Zool.*) The shaft or axis the shaft of a feather: the vertebral column.—*adj.* **rachidial.**

rachischisis, rā′kis-ki′sis (*Med.*). Spina bifida. A developmental defect of the spinal column, especially in the lower part behind.

rachit′ic (*Med.*). Affected with or pertaining to rickets.

rachi′tis (*Med.*). *Rickets* (q.v.).

rachit′omous (*Zool.*). Temnospondylous.

racial habit (*Zool.*). See **instinct.**

rack (*Elec. Comm.*). A vertical mounting frame made of channel iron of standard dimensions so that individual racks can be joined together by bolts to form bays. Panels of apparatus of standard dimensions can be fixed on one or both sides of each rack.

See **apparatus— special apparatus—**

rack (*Horol.*). A toothed segment; used in the striking and chiming mechanism of a clock or a repeater watch. The number of blows struck by the hammer is controlled by the number of teeth gathered on the rack.

rack (*Photog.*). See **drying rack.**

rack (*Textiles*). The term used in lace manufacture to signify the number of motions concerned in making a piece of lace or net. This varies with the type of machine.

rack-and-pinion (*Eng.*). A method of transforming rotary into linear motion, or vice versa; this is accomplished by means of a pinion or small gear-wheel which engages a straight, toothed rack. See **pitch line.**

rack-and-pinion steering-gear (*Automobiles*). A steering-gear in which a pinion carried by the steering column engages with a rack attached to the divided track rod; used on some Continental vehicles.

rack hook (*Horol.*). Part of the rack-striking work. Just before the hour, the lifting piece lifts the *rack hook*, which allows the rack to fall.

rack mounting (*Elec. Comm.*). The use of standard racks, of varying height but otherwise of standard dimensions, for mounting panels carrying apparatus, such as repeaters or filters, with a uniform scheme of wiring; such mounting gives both accessibility and compactness.

rack railway (*Civ. Eng.*). A form of mountain-railway in which additional adhesion is obtained from a cog-wheel working in some sort of rack laid beside the ordinary rails, the cog-wheel running in bearings carried by a special locomotive.

rack saw (*Carp.*). A saw having wide teeth.

rack rent. Rent equal to the full annual value of the premises.

racked (*Carp.*). Said of temporary timbering which is braced so as to stiffen it against deformation.

racked or **shogged-rib** (*Hosiery*). Terms applied to knitted patterns of the type used extensively for sports sweaters and jerseys. Known also as SHAKER PATTERNS.

racking (*Brew.*). The operation of conveying the beer by hose from the fermenting vat to casks, after removal of the yeast.

racking (*Mining*). The operation of separating ore by washing on an inclined plane.

racking (*Surv.*). See **fixed needle surveying.**

racking back (*Build.*). The procedure adopted when the full length of a wall is not built at once, the unfinished end being stepped or *racked back* at an angle, so that when the remainder of the wall is built there shall not be a vertical line of junction, which might cause cracking of the foundations owing to uneven settlement of the parts.

raddle or **wraithe** (*Weaving*). A comb or half-reed used in beaming to spread the threads to the width of the warp beam.

radial. Radiating out from a common centre: pertaining to a *radius* (q.v.) —(*Zool.*) In *Crinoidea*, a whorl of ossicles supporting the oral disc.

radial commutator (*Elec. Eng.*). A commutator for a d.c. machine in which the commutator bars are arranged radially from the axis to form a disc instead of a cylinder.

radial drill (*Eng.*). A large drilling machine in which the drilling head is capable of radial adjustment along a rigid horizontal arm carried by a pillar.

radial ducts (*Elec. Eng.*). In an electric machine, ventilating ducts which run radially from the shaft.

radial engine (*Aero., Eng.*). An aircraft or other engine having the cylinders arranged radially at equal angular intervals round the crankshaft.

See **double-row— single-row—**
master connecting-rod.

radial feeder (*Elec. Eng.*). See **independent feeder.**

radial fission (*Zool.*). Repeated longitudinal fission in which the daughter individuals remain in position, as in some *Protozoa.*

radial longitudinal section (*Bot.*). A section cut in the radius of the longitudinal axis of an organ.

radial recording (*Acous.*). The same as *lateral recording* (q.v.).

radial symmetry (*Zool.*). The condition in which the body of an animal can be divided into two similar halves by any one of several vertical planes passing through the centre; as in *Echinodermata, Coelenterata.*

radial system (*Cables*). A distribution system in which the cables radiate out from a generating or supply station. If a fault occurs, all consumers beyond the fault are cut off.

radial valve gear (*Eng.*). A steam-engine valve gear in which the slide-valve is given independent component motions proportional to the sine and cosine of the crank angle respectively.

See **Hackworth valve gear.**
Joy's do.
Marshall do.
Walschaert's do.

radial vascular bundle (*Bot.*). A vascular strand having the xylem and phloem on different radii, as is usual in roots.

radial velocity (*Astron.*). See **line of sight velocity.**

radial wall (*Bot.*). An anticlinal wall placed in or across a radius of an organ.

radiale, rā-di-ah'le (*Zool.*). A bone of the proximal row of the carpus in line with the radius.—***pl.*** **radia'lia**, see **somactids.**

radian (*Maths.*). A unit of circular measure defined as the angle subtended at the centre of a circle by an arc equal in length to the radius. 2π radians equal 360°; 1 radian equals 57·2958°; 1° equals ·017453 radian.

radian frequency (*Elec. Comm.*). The same as *angular frequency* or *pulsatance.*

radiant (*Astron.*). The point on the celestial sphere from which a series of parallel tracks in space, such as those followed by the individual meteors in a shower, appears to originate.

radiant (*Bot.*). Radiate.

radiant heat (*Phys.*). Heat communicated to a body by *radiation* (q.v.). It is transmitted by electromagnetic waves of a similar nature to light waves but having a greater wavelength.

radiant-type boiler (*Eng.*). A water-tube boiler having one or more drums and a circulation system consisting of vertical or horizontal inclined banks of tubes, heating surfaces of bare or protected water-tubes forming the walls of the combustion chamber; firing is generally by pulverised fuel.

radiant umbel (*Bot.*). An umbel in which the outermost flowers are much larger than those in the middle.

radiate (*Bot.*). (1) Said of a capitulum which has ray florets.—(2) Said of a flower which spreads like a ray from the periphery of any densely packed inflorescence.—(3) Said of a stigma in which the receptive surfaces radiate outwards from a centre.

radiating brick (*Build.*). See **compass brick.**

radiating circuit (*Radio*). Any circuit capable of sending out power, in the form of electromagnetic waves, into space: especially the antenna circuit of a radio transmitter.

radiating surface (*Heating*). The effective area of a radiator available for the transmission of heat by radiation.

radiation (*Phys.*). Energy emitted in the form of electromagnetic waves. These include, in order of increasing wavelength, cosmic rays, gamma rays, X-rays, ultra-violet radiation, light, infra-red radiation, heat rays, and radio waves. See **black-body radiation, Bohr theory, Planck's radiation formula, spectrum,** etc.—(*Heat*) A process by which heat may be transferred from a source to a receiver without heating of the intervening medium or without the existence of a material medium; e.g. heat received by the earth from the sun. See **radiant heat, solar constant, Stefan-Boltzmann law, Wien's displacement law.**

radiation (*Surv.*). A method of plane table surveying in which a point is located on the board by marking its direction with the alidade and measuring off its distance to scale from the instrument station.

radiation efficiency (*Radio*). The ratio, expressed as a percentage, of the power radiated from an antenna system to that delivered to it from the transmitter.

radiation height (*Radio*). See **effective height of antenna.**

radiation impedance (*Acous.*). The impedance (per unit area), as measured by the complex ratio of the sound-pressure to the velocity, at the surface of a vibrating body which is generating sound-waves.

radiation pressure (*Phys.*). The mechanical pressure exerted by light and other forms of radiation on surfaces on which they are incident. Electromagnetic theory leads to the result that, for a perfect reflector, this pressure should be equal to the total energy density in the medium. This has been confirmed experimentally in spite of the extreme smallness of the pressure (about 10^{-4} dyne per sq. cm. for sunlight).

radiation pyrometer (*Phys.*). A device for ascertaining the temperature of a distant source of heat, such as a furnace, by allowing radiation from the source to face, or be focused on, a thermojunction connected to a sensitive galvanometer, the deflection of the latter giving, after suitable calibration, the required temperature. Suitable for temperatures between about 500° C. and 1500° C.

radiation resistance (*Radio*). That part of the resistive component of the impedance of an antenna which represents the power radiated into space. It is numerically equal (in ohms) to the radiated power (in watts) divided by the mean square current (in amperes) at the base of the antenna.

radiative equilibrium (*Astron.*). An ideal state of a star, postulated in astrophysical researches, implying a control of temperature by the transfer of heat from one part of the star to another by radiation instead of by convection.

radiator (*Acous.*). See **acoustic radiator.**

radiator (*Automobiles, etc*). A device for dissipating the heat absorbed by the jacket cooling water of petrol- and oil-engines. It consists of thin-walled tubes, or narrow passages of honeycomb form, through which the water is conducted, and across which an airstream is induced either by the motion of the vehicle or by a fan.

radiator (*Heating*). A heating unit fed usually by hot water or steam and serving as a source of radiant heat.

radical (*Bot.*). Appearing as if springing from the root at soil-level.

radical (*Chem.*). A group of atoms which passes unchanged through a series of reactions, but is normally incapable of separate existence.

rad'icant (*Bot.*). Rooting.

rad'icate (*Bot.*). Rooted.

radica'tion (*Bot.*). The general characters of the root system of a plant.

rad'icellose (*Bot.*). Bearing rhizoids.

radicico'lous, rad'is-i— (*Bot.*). Said of a parasite which attacks roots.

radicif'erous (*Bot.*). Bearing roots.

radiciform, rad-is'— (*Bot.*). Shaped like a root.

radiciv'orous (*Zool.*). Root-eating.

radicle (*Bot.*). (1) The root of the embryo of a flowering plant.—(2) A rhizoid of a moss.—(3) Any very small root.

radic'ular (*Bot.*). Belonging to, or relating to, a radicle.

radiculec'tomy (*Surg.*). The operation of cutting the roots of spinal nerves.

radiculi'tis (*Med.*). Inflammation of the root of a spinal nerve, especially of that part which lies within the spinal canal.

radic'ulose (*Bot.*). Said of the stem of a moss which bears many rhizoids at its base.

radio- (*Chem.*). A prefix denoting an artificially prepared radioactive isotope of an element.

radio. A generic term applied to methods of signalling through space, without the use of connecting-wires, by means of electromagnetic waves generated by high-frequency alternating currents. Though synonymous with WIRELESS, the term is employed throughout this work as being more logical, and more universal in its currency.

radio altimeter (*Radio*). A form of altimeter depending on the measurement of the time taken by a radio wave emitted from an aircraft to return thereto after reflection from the ground. Also called TERRAIN CLEARANCE INDICATOR.

radio beacon (*Radio*). A stationary radio-transmitter which transmits a steady beam of radiation along certain directions for the guidance of ships or aircraft, or in certain cases one which transmits from an omnidirectional antenna and is used for the taking of bearings.

radio beam (*Radio*). A concentration of electromagnetic radiation within narrow angular limits, such as is emitted from a highly directional antenna.

radio-communication (*Radio*). The transmission of intelligence through space, without the use of intervening conductors or guides, by means of electromagnetic waves of wavelength greater than that of radiant heat.

radio-compass (*Radio*). Any device, such as a directional radio receiver, which can be used for position finding. Particularly one specially calibrated for such indications.

radio direction-finder (*Radio*). See **direction finder.**

radio echo (*Radio*). See **echo.**

radio engineering. The science which deals with the design, construction, and maintenance of apparatus used for radio communication purposes.

radio exchange (*Elec. Comm.*). A radio receiving station, with multiple power amplifiers, for distributing to subscribers radio programmes on a relay basis, via overhead wires, telephone lines, or electric power mains.

radio frequency (*Radio*). A term applied generally to those frequencies used for radio communication, viz. of the order of about ten kilocycles per second or over.

radio-frequency amplifier (*Radio*). An amplifier designed for operation at radio frequencies. Particularly, in a radio receiver, the amplifier which precedes the detector or frequency changer.

radio-frequency resistance (*Radio*). See **high-frequency resistance.**

radio-frequency transformer (*Radio*). A transformer designed for operation at radio frequencies. Generally, the primary or secondary winding, or both, are tuned.

radio goniometer (*Radio*). See **goniometer.**

radiogram (*Radio*). (1) A message transmitted by radio telegraphy.—(2) A radio gramophone.

radio gramophone (*Radio*). A combination of gramophone and radio broadcast receiver, enabling records to be reproduced through the loudspeaker of the radio receiver; contracted to *radiogram*.

radio link (*Radio*). A complete radio communication circuit. It comprises transmitters, receivers, and antennae, and is generally capable of working in both directions. The term is especially applied to such a system when used to join up two landline circuits.

radiophare (*Radio*). A *radio beacon* (q.v.). (French *phare*, beacon.)

radiophone (*Radio*). A telephone system employing radio.

radio-photogram (*Radio*). See **photo-radiogram.**

radio range (*Radio*). See **range beacon.**

radio sounding, radio sondage, son^{g}-dahzh (*Radio*). The technique of releasing sounding balloons fitted with radio transmitting apparatus which transmits information respecting the meteorological conditions during flight.

radio station (*Radio*). The complete equipment for the transmission and/or reception of radio-telegraphy or -telephony, together with the building (or buildings) housing it.

radio-telegraphy (*Radio*). Telegraphy carried on between two remote stations by means of electromagnetic waves, without the aid of connecting wires.

radio-telephony (*Radio*). Telephony carried on by means of electromagnetic waves, without the aid of connecting wires.

radio transmitter. See **transmitter** (*Radio*).

Radiotron (*Thermionics*). Trade-name for a thermionic vacuum tube.

radiovision (*Television*). Television in which the connecting link between the transmitter and receiver is via radio.

radiovisor (*Television*). A former trade-name for a *television receiver.*

radioactin'ium (*Chem.*). A radioactive isotope of thorium, having a half-life of 18·9 days.

radioactivity. The spontaneous disintegration of certain heavy elements (radium, actinium, uranium, thorium) accompanied by the emission of α-rays, which are positively charged helium nuclei; β-rays, which are fast electrons; and γ-rays, which are short X-rays. The ultimate end product of radioactive disintegration is one of the isotopes of lead. See **half-life.**

radiochemistry (*Chem.*). The chemistry of the radioactive elements.

radiogen'ic (*Chem.*). Produced by radioactive disintegration.

radiogram (*Radiol.*). A radiograph or skiagraph.

radiograph (*Radiol.*). The impression made on a sensitive film or plate by the passage of X-rays through an object; an X-ray photograph.

radiog'raphy (*Radiol.*). The technique of making X-ray photographs.

Radiola'ria (*Zool.*). An order of marine *Sarcodina* the members of which have numerous fine radial pseudopodia which do not anastomose; the ectoplasm is vacuolated; there is a central capsule and usually a skeleton of siliceous spicules.

radiola'rian chert, radiola'rite (*Geol.*). A cryptocrystalline siliceous rock in part composed of the remains of radiolaria. Most described examples seem to be of shallow-water origin, such as that which reaches a thickness of 9000 ft. in New South Wales and contains a million radiolaria to the cubic inch.

radiolarian ooze (*Geol.*). A variety of non-calcareous deep-sea ooze, deposited at such depth that the minute calcareous skeletons of such organisms as *Foraminifera* pass into solution, causing a preponderance of the less soluble siliceous skeletons of *Radiolaria.* Confined to the Indian and Pacific Oceans, and passes laterally into red clay.

radiolarite (*Geol.*). See **radiolarian chert.**

radiology. That branch of medical science which deals with the examination of the body by means of X-rays, with the interpretation of radiographs, and with the treatment of disease by the use of radiant energy.

Radiometal (*Met.*). An alloy of permalloy type. Contains iron 50%, nickel 45%, and copper 5%. Used because of high magnetic permeability and low hysteresis loss.

radiom'eter, Crookes's (*Phys.*). A small mica 'paddlewheel' which rotates when placed in daylight in an evacuated glass vessel. Alternate faces of the mica vanes are blackened and the slight rise of temperature of the blackened surfaces caused by the radiation which they absorb warms the air in contact with them and increases the velocity of rebound of the molecules, the sum of whose impulse constitutes the driving pressure.

ra'diosperm (*Bot.*). A seed which is approximately circular in cross-section: by extension, a plant bearing such seeds, especially some fossil plants.

radiother'apy (*Med.*). The treatment of disease by radiant energy.

radiothor'ium (*Chem.*). A disintegration product and isotope of thorium, with a half-life of 1·90 years.

radio-ul'na (*Zool.*). The shaft-bone of the fore-arm in some *Amphibia*, in which the two elements are fused.

radium (*Chem.*). Symbol, Ra. A radioactive metallic element in the second group of the periodic system, one of the alkaline earth metals. At. no. 88, at. wt. 226·05, half-life 1580 years. The metal is white and resembles barium in its chemical properties; m.p. 700°. It occurs in broggerite, cleveite, carnotite, pitchblende, in certain mineral springs, and in sea water. Pitchblende and carnotite are the chief sources of supply. Radium is remarkable for spontaneous and uncontrollable disintegration. See **radon.**

radium emanation (*Chem.*). See **radon.**

radius (*Bot.*). The group of ray flowers in a capitulum.

radius (*Zool.*). In land *Vertebrata*, the pre-axial bone of the antebrachium: one of the veins of the wing in *Insecta*: in *Echinodermata*, one of the primary axes of symmetry.—*adj.* **radial.**

radius brick (*Build.*). See **compass brick.**

radius of action (*Aero.*). Half the range in still air; the *total range* is out and home again.

radius of atom (*Phys.*). See **atomic diameters.**

radius of curvature (*Phys.*). The radius of the circle of which a curve is a part, or the radius of the sphere of which a surface is a portion; the point of intersection of the normals drawn through neighbouring points in a curve or surface.

radius of gyration (*Phys., etc.*). The square root of the moment of inertia of a body about a given axis, divided by its mass. The radius of gyration is usually denoted by k, so that $I = mk^2$.

radius rod (*Build.*). A rod pivoted at one end and carrying a marking point at the other end so that, as the rod is swung around, a circle or part of a circle, of radius equal to the length of the rod, may be marked out.

radius rod (*Eng.*). A rod attached to the die or block of a *Walschaert's valve gear* (q.v.) for transmitting its motion to the end of the combination lever pivoted to the valve rod.

radius vector (*Astron.*). The line joining the focus to the body which moves about it in an elliptic orbit, as the line from the sun to any of the planets.

ra'dix (*Zool.*). The root or point of origin of a structure, as the *radix aortae.*

ra'don (*Chem.*). Rn. A zero-valent, radioactive element, the heaviest of the noble gases. At. no. 86, at. wt. 222, half-life 3·82 days. It is a colourless gas; m.p. −110° C., density 9·73 gms. per litre at N.T.P. It is formed by the disintegration of radium and is used in the non-surgical treatment of cancer.

Radstockian Series (*Geol.*). The highest series in the Westphalian stage of the Carboniferous System which comprises the upper coal measures of Somerset (Radstock) and the Keele Series of North Staffordshire.

rad'ula (*Zool.*). In *Mollusca*, a strip of horny basement membrane bearing numerous rows of horny or chitinous teeth.—*adjs.* **radular, radulate, raduliform.**

radula sac (*Zool.*). The ventral diverticulum of the buccal cavity, in which the radula is formed.

Raeberry Castle Group (*Geol.*). A group of mudstones and grits with shelly fossils found in Southern Scotland, belonging to the Wenlockian Series of the Silurian System.

RaEm (*Chem.*). A symbol for *radium emanation* or *radon*.

raffia. See **bast.**

raf'finose (*Chem.*). Melitriose, $C_{18}H_{32}O_{16}+5H_2O$, a trisaccharose found in the sugar-beet, in molasses, in cotton-seed cake, etc. It is tasteless, dextrorotatory, and does not reduce Fehling's solution.

raft bridge (*Civ. Eng.*). A bridge somewhat similar to a pontoon bridge but supported on rafts instead of on boats.

raft foundation (*Build.*). A layer of concrete, usually reinforced, extending under the whole area of a building and projecting outside the line of its walls; used to provide a foundation in cases where the ground is unduly soft or the loading to be put upon it is unduly heavy.

rafter (*Build., Civ. Eng.*). A member in a roof framework extending from the ridge to the eaves.

rag-bolt (*Eng.*). A foundation bolt with a long tapered head of increasing size towards its end, and having jagged points projecting from its surface. The bolt is secured in a hole at the anchorage by molten lead poured around it.

rag frame (*Mining*). A broad, slightly inclined wooden plane, for partially concentrating slimes; used in series.

rag stone (*Build.*). A general term for coarse-grained sandstone, often with a calcareous cement, e.g. Kentish rag

rag-work (*Masonry*). A term applied to wall construction in which undressed flat stones of about the thickness of a brick are built up into a wall the outer faces of which are left rough.

ragging (*Mining*). Rough concentration or washing, for a low ratio of concentration.

ragging-off (*Mining*). Getting coal down.

raglan, raglin (*Carp.*). A slender ceiling joist.

raglet (*Plumb.*). A narrow groove cut into a masonry or brickwork surface, for receiving the edge of a lead flashing which is to be fixed to it.

rags (*Build.*). A slate size, 36 × 24 in.

Ragusa (*Build.*). Trade-name for a form of asphalt.

raies ultimes, rāz ül-tēm′ (*Chem.*). The strongest lines in the spectrum of an element, which therefore serve for its detection by spectrum analysis Also called by the English equivalent, ULTIMATE LINES.

rail (*Civ. Eng.*). A steel bar, usually of special section, laid across sleepers to provide a track for the passage of rolling stock with flanged wheels. The standard section for main line rails in Great Britain is the 95 lb. (per yard) rail of 60 feet length, made in accordance with specification of the B.S.I.

rail (*Join.*). (1) A horizontal member in framing or panelling.—(2) The upper member in a balustrade.

rail bender (*Eng.*). A short stiff steel girder with claws at the ends and a central boss carrying a heavy screw; used by plate-layers for bending rails to the required curvature.

rail bond (*Elec. Eng.*). An electrical connexion between two adjacent lengths of track or conductor-rail on a tramway or railway.

See **conductor—**
track—
continuity bond
cross bond
impedance bond.

rail chair (*Rail.*). See **chair.**

rail gauge. See **gauge** (5), **standard gauge, broad gauge, narrow gauge.**

rail guard (*Rail.*). See **check rail.**

rail post (*Build.*). A newel post.

railroad. The American term for *railway*.

railroad disease (*Vet.*). A disease of pregnant or fattened cows during, or at the end of, a long journey by rail; characterised by paresis and loss of consciousness.

rail test (*Eng.*). A drop test for ductility in which a tup weighing 1 ton is allowed to fall from varying heights on to a rail carried on supports 3 ft. apart.

railing (*Build., etc.*). An open form of fence made of upright iron rods secured in line, side-by-side, by horizontal bars passing across them.

railway (*Civ. Eng.*). A way, laid with rails, used for the passage of rolling stock; especially, a system of such rails, with all appurtenances (stations, lands, etc.), traversed by locomotives.

railway curve (*Instruments*). A drawing instrument similar to a French curve but cut at the edge to an arc of large radius. Used for drawing arcs when these are too large for beam compasses. Supplied in sets covering a wide range of radii.

railway transit (*Surv.*). A transit theodolite unequipped with means for measuring vertical angles.

rain (*Meteor.*). Rain is due to the condensation of excess water vapour when moist air is cooled below its dew-point. Rain falls when droplets increase in size until they form drops whose weight is equivalent to the frictional air resistance. The greater proportion of raindrops have a diameter of 0·2 cm. or less; in torrential rain a small proportion reach a diameter of 0·4 cm.

rain-band (*Meteor.*) An absorption band in the solar spectrum on the red side of the D lines, produced by water vapour in the earth's atmosphere.

rainbow (*Meteor., Phys.*). A rainbow is formed by sunlight which is refracted and internally reflected by raindrops, the concentration of light in the bow corresponding to the position of minimum deviation of the light. The angular radius of the primary bow is 42°, this being equal to 360° minus the angle of minimum deviation for a spherical drop. The colours, red outside, violet inside, are due to dispersion in the water. See **secondary bow.**

rainbow negative (*Cinema.*). The orthochromatic red-dyed green-sensitive negative film used as the front negative in the Multi-colour process.

rain cloud (*Meteor.*). A *nimbus cloud* (q.v.).

rain gauge (*Meteor.*). An instrument for measuring the amount of rainfall over a given period, usually 24 hours. The usual form consists of a sharp-rimmed funnel, 5 in. in diameter, leading into a narrow-necked collecting vessel which may be graduated so as to read the rainfall directly in inches or centimetres.

rain, geological action of. Rain effects important geological work by assisting in the mechanical disintegration of rocks; also chemically, in bringing about solution of carbonates, etc.; and, through the agency of running water, in redistributing the products of erosion and disintegration.

rain prints (*Geol.*). More or less circular, vertical, or slanting pits occurring on the bedding planes of certain strata; believed to be the impressions of heavy rain-drops falling on silt or clay, hard enough to retain the impression before being covered by a further layer of sediment.

rain-wash (*Geol.*). The creep of soil and superficial rocks under the influence of gravity and the lubricating action of rain.

rainwater pipe (*Build.*). A *downpipe* (q.v.).

Rainey's corpuscles (*Zool.*). In certain *Sarcosporidia*, sickle-shaped spores occurring encysted in muscle.

Rainey's tubes (*Zool.*). See **Miescher's tubes.**

raise (*Mining*). A shaft or winze excavated upwards.

raised bands (*Bind.*). Bands which show on the back of a book when bound. This indicates that the book has been sewn 'flexible.' See **bands, flexible.**

raised beach (*Geol.*). Beach deposits which are found above the present high-water mark; due to the relative uplift of the land or to a falling sea-level. See **eustatic movements.**

raised datum (*Surv.*). The datum line for the representation on plan of a section, when for convenience in drawing this is not shown in reference to the datum used for levelling but in reference to another datum parallel to it.

raised oil (*Leather*). Oil recovered by warming the wash waters, to which an acid has been added; used in the manufacture of chamois leather.

raised panel (*Join.*). A panel whose surface stands proud of the general surface of the framing members. Cf. *panel.*

raiser (*Build.*). See **riser.**

raising (*Leather*). The process by which oil is recovered from the wash waters in the manufacture of chamois leather.

raising (*Textiles*). A process carried out by means of card wire or by mechanically operated teazles, usually after milling, in order to produce a pile surface on certain woollen and worsted fabrics and on cotton blankets, flannelettes, etc.

See **raw-thread— dry— wet—**

raising-plate (*Carp.*). A horizontal timber resting on part of a structure and supporting a superstructure. See **wall plate** (2), **pole plate.**

rake (*Build.*). A long-handled tool with projecting teeth at one end, used for mixing plaster.—(*Mining*) A forked tool for loading coal underground.

rake. Generally, an angle of inclination.—(*Eng., etc.*) Angular relief, e.g. *top-rake, side-rake,* given to the faces of cutting tools to obtain the most efficient cutting angle.—(*Ship Constr.*) A term used in shipbuilding to denote *not perpendicular to the datum line.* See also **batter.**

rake (*Build.*). In a theatre, the upward slope, from the horizontal, of both the stage and the auditorium.

rake (*Mining*). An irregular vein of iron-stone: in Derbyshire, any transverse fissure vein.

raker (*Build.*). A *pointer* (q.v.).

raker (*Carp.*). See **raking shore.**

raking bond (*Build.*). A form of bond sometimes used for very thick walls, or for strengthening the bond in footings carrying heavy loads. The courses are built diagonally across the wall, successive courses crossing one another in respect of rake; triangular bats are added to enable square facework to be completed. Also called DIAGONAL BOND. See also **herring-bone bond.**

raking cornice (*Arch.*). A cornice decorating the slant sides of a pediment.

raking flashing (*Plumb.*). A *flashing* (q.v.) much used where a masonry chimney projects from a sloping roof, the upper edge of the flashing being cut to the same slope as the roof.

raking pile (*Civ. Eng.*). A pile which is not driven in vertically.

raking prop (*Mining*). An inclined timber support.

raking shore (*Carp.*). An inclined baulk of timber one end of which rests upon the ground while the other presses against the wall to which temporary support is to be given.

raking-out (*Build.*). The operation of preparing mortar joints in brickwork for pointing.

râle, rahl (*Med.*). A bubbling or crackling sound produced in a diseased lung by the passage of air over or through secretions in it; heard during auscultation.

ram (*Civ. Eng.*). (1) The monkey of a pile-driver.—(2) To consolidate the surface of loose material by punning.

ram (*Eng.*). See **hydraulic ram.**

ra'mal, ra'meal (*Bot.*). Relating to a branch.

Raman effect, rah'— (*Light*). Appearance of additional lines in the spectrum of the light scattered by a substance when illuminated by monochromatic light. The so-called 'Raman lines' appear close to and on each side of the exciting radiation-line. They are caused by the increase or decrease of frequency due to the incident light quanta losing energy to, or gaining it from, a vibrating molecule. See **Compton effect.**

rambler (*Bot.*). A weak-stemmed plant which leans on and scrambles over surrounding vegetation.

ramenta'ceous (*Bot.*). Covered with ramenta.

ramen'tum (*Bot.*). A thin brownish scale, one cell-layer thick, occurring on the stems, petioles, and leaves of ferns.—*pl.* **ramenta.**

ram'icole (*Bot.*). Living on twigs.

ram'icorn (*Zool.*). (Of Insects) having branched antennae.

ramification (*Bot., Zool.*). Branching, a branch; as of the shoot of a plant or of a nerve or blood-vessel.

ramisec'tion, ramisec'tomy (*Surg.*). The operation of cutting the sympathetic nerves between their origin from the spinal cord and the sympathetic ganglia.

ram'melsbergite (*Min.*). Essentially composed of di-arsenide of nickel, but with isomorphous diarsenide of iron; crystallises in the orthorhombic system.

rammer (*Build.*). A *punner* (q.v.).

rammer (*Moulding*). A hand tool, which may take various forms, for packing the sand of a mould evenly round the pattern.

Ramm'stedt's operation (*Surg.*). Incision of the pylorus down to the mucous membrane, done in the treatment of congenital hypertrophy of the pylorus.

ram'ose (*Bot.*). Much branched.

ramp (*Civ. Eng.*). An inclined surface provided in lieu of steps: especially, a sloping end to a railway platform.

ramp (*Join.*). A sudden rise in a handrail when it is concave upwards. Cf. *knee.*

ramp (*San. Eng.*). A short length of sewer laid locally at a much steeper gradient than the normal.

ramp & twist (*Masonry*). A term applied to work in which a surface both twisting and rising has to be or is produced.

rampant arch (*Civ. Eng.*). An arch whose abutments are not in the same horizontal line.

rampant centre (*Carp.*). A centre for a rampant arch.

Ramsay and Young's rule (*Chem.*). The ratio of the boiling-points of two liquids of similar chemical character is approximately independent of the pressure at which they are measured.

Ramsay Sound Series (*Geol.*). A group of schistose and slaty rocks with tuffs found in Pembrokeshire; of Pre-Cambrian age.

Ramsden eyepiece (*Light, Surv.*). An eyepiece often used in an optical instrument in which cross-wire measurements are to be made. It consists of two similar plano-convex lenses separated by a distance equal to two-thirds the focal length of each, and having their convex faces towards each other. The focal plane is just outside the system.

ramshorn test (*Eng.*). A test for determining the suitability of iron and steel bar for forging; the heated bar is flattened, split, and the halves bent in opposite directions through 180°.

ram'ular (*Bot.*). Relating to a branch.

ram'ulus (*Bot.*). A very small branch of a stem or of a leaf.—(*Zool.*) See **hydrocladia.**—*pl.* **ramuli.**

ra'mus (*Zool.*). The barb of a feather: in *Vertebrata*, one lateral half of the lower jaw, the mandible: in *Rotifera*, part of the trophi: any branch-like structure; a ramification.

rance (*Build.*). A shore.

random (*Masonry*). Said of rubble masonry in which the stones are of irregular shape and the work is not coursed.

random (*Typog.*). A composing frame used for making-up, and for holding standing matter or matter awaiting distribution.

random response (*Acous.*). The same as the *reverberation response* of a microphone.

random slates (*Build.*). Slates of odd sizes.

random-tooled ashlar (*Masonry*). A block of stone finished with groovings irregularly cut, usually with a broad tool.

random winding (*Elec. Eng.*). See **mush winding.**

range (*Aero.*). The maximum distance that an aircraft can travel without refuelling. Measured in air miles, or in still air. See **radius of action.**

range (*Bot.*, *Zool.*). The area over which a species grows or feeds, and breeds in the wild state.

range (*Build.*). A *kitchener* (q.v.).

range (*Radio*). The distance over which signals can be reliably transmitted.

range (*Surv.*). To fix points, either by eye or with the aid of an instrument, to be in the same straight line.—(*Typog.*) To set in vertical alignment, e.g. in tabulation work.

range beacon (*Radio*). A radio beacon used for the guidance of aircraft, in which the course is marked by the region of equal fields from two directional antennae, which transmit different signals on the same wavelength and at the same power. Also called RADIO RANGE.

rangefinder (*Armaments*). An instrument used for finding the range to the target before opening fire with guns or small arms.

range of a tide. The vertical distance between consecutive high- and low-water levels at a place.

range of stress (*Met.*). The range between the upper and lower limit of a cycle of stress such as is applied in a fatigue test. The mid-point of the range is the *mean stress.*

ranging rod (*Surv.*). A wooden pole used to mark stations conspicuously, or to assist in ranging lines.

rangs (*Textiles*). See **tier.**

ran'ine (*Zool.*). Pertaining to, or situated on, the under surface of the tongue.

raniv'orous (*Zool.*). Feeding on frogs.

rank of coal (*Geol.*). This is determined by the extent to which the original 'mother substance' of the coal has been modified by heat, pressure, and chemical change after burial. Thus brown coal is of *low rank*, anthracite of *high rank.*

rank of selectors (*Auto. Teleph.*). The whole set of selectors which are concerned with a specified stage in setting up a call through an exchange.

Rankine cycle (*Eng.*). A composite steam plant cycle used as a standard of efficiency, comprising introduction of water by a pump to boiler pressure, evaporation, adiabatic expansion to condenser pressure, and condensation to the initial point.

Rankine efficiency (*Eng.*). The efficiency of an ideal engine working on the *Rankine cycle* (q.v.), under given conditions of steam pressure and temperature.

Rankine's formula (*Civ. Eng.*). An empirical formula giving the collapsing load for a given column. It states that

$$P=\frac{f_c.A}{1+a\left(\frac{l}{k}\right)^2}$$

where P=the collapsing load, f_c=safe compressive stress for very short lengths of the material, A=area of cross-section, l=the length of the pin-jointed column, k=the least radius of gyration of the section, a=a constant for the material$=\frac{f_c}{\pi^2.E}$ where E is Young's modulus for the material.

ran'ula (*Med.*). A cyst formed in the gland under the tongue.

ranun'cula'ceous (*Bot.*). Having the characters of a buttercup.

Ranvier's nodes, rahn^{g}vyā (*Zool.*). Constrictions of the neurolemma occurring at regular intervals along the course of peripheral medullated nerve-fibres.

Raoult's law, ra-ool' (*Chem.*). For dilute solutions, the relative lowering of the vapour pressure of a liquid by a dissolved substance is approximately equal to the mol fraction of the latter, independently of the temperature and of the nature of both the solvent and the solute.

Rap'akivi Granite, —kē've (*Geol.*). A type of granite described from a locality in Finland, characterised by the occurrence of rounded pink crystals of orthoclase surrounded by a mantle of whitish sodic plagioclase. As a textural term, applicable to all granites showing this anomaly, *Rapakivi* has a wide use.

Rapaloid (*Paint.*). Trade-name for a cellulose enamel.

raphe, rāf (*Bot.*). (1) An elongated mass of tissue, containing a vascular strand, and lying on the side of an anatropous ovule, between the chalaza and the attachment to the placenta.—(2) A line running longitudinally on the valve of a diatom indicating the position of a narrow slit in the wall; it bears a nodule at each end and one in the middle.

raphe (*Zool.*). A broad junction; as the junction between the two halves of the brain in Vertebrates.

ra'phide (*Bot.*). A long needle-shaped crystal, usually of calcium oxalate, occurring singly, or more often in rounded masses, or in sheafs, in plant cells.

rapidity of lenses (*Photog.*). The so-called speed of a lens is measured by the ratio of the working aperture diameter to the focal-length. See ***f*-number.**

rapping (*Moulding*). The process of loosening a pattern in a mould to facilitate its withdrawal. A spike or lifting screw is inserted in the pattern and tapped smartly in every direction.

rapport, ra-pōr' (*Psychol.*). The emotional bond or atmosphere existing between analyst and patient, which is conducive to *suggestion* (q.v.).

Rap-rig (*Build.*). Trade-name for a form of light scaffolding capable of being speedily erected; it is especially convenient for interior use.

rap'tatory, rapto'rial (*Zool.*). Adapted for snatching or robbing, as birds of prey.

rare earths (*Chem.*). The oxides (M_2O_3) of the rare earth elements.

rare earth elements (*Chem.*). A group of metallic elements so similar in their chemical properties that they are generally considered as occupying the position of a single element in Group III of the periodic system. Their separation, involving the repeated fractional crystallisation and decomposition of their salts, is a very long and tedious process. They all form a basic oxide, M_2O_3 (an 'earth'), but some of them are relatively abundant. Strictly, the rare earth group consists only of the elements with atomic numbers from 57 to 71 (lanthanum, cerium, praseodymium, neodymium, illinium, samarium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium, lutecium), but scandium (21) and yttrium (39) are generally included on account of their similarity to the above elements. See Periodic Table in *Appendix*.

rare gases (*Chem.*). The elements of Group O of the periodic system, helium, neon, argon, krypton, xenon, and radon. They show practically no tendency to combine with other elements and, with the exception of radon, can all be obtained from the atmosphere.

rarefaction (*Med.*). Abnormal decrease in the density of bone as a result of absorption from it of calcium salts, as in infection of bone.

Rar'itan Sandstones (*Geol.*). Lignitic sands of aeolian origin occurring in the Cretaceous of the Atlantic Plain, succeeding the Comanchean; equivalent to the Dakota Sandstone of the Great Plains.

Raschel (*Hosiery*). The name for the two-bar warp loom, fitted with latch needles.

rashing (*Mining*). A thin layer of shale or inferior coal, sometimes found between the coal-seam and the roof.

raso'rial (*Zool.*). Adapted for scratching.

rasorite (*Min.*). See **kernite.**

rasp (*Eng.*). A coarse file

rastel'lus (*Zool.*). In Spiders which dig burrows, a rake-like row of stout teeth on the outside lower edge of the first joint of the chelicerae.

raster (*Television*). The pattern of closely spaced parallel lines formed on the fluorescent screen of a cathode ray tube when the frame and line-scanning currents or voltages are applied simultaneously, as for reception of the picture. The image is formed by modulating the brightness of the different parts of the raster.

rat-bite fever (*Med.*). See **sodoku.**

rat-trap bond (*Build.*). A form of bond in which a 9-in. wall is built up of bricks on edge, so arranged as to enclose a 9 × 3 in. cavity.

ratch (*Spinning*). The distance between the nip of the front and back rollers in a drawing machine.

ratchet brace (or **drill**) (*Eng.*). A drilling brace in which the drill spindle is rotated intermittently by a ratchet wheel engaged by a pawl on a hand-lever; used in confined spaces, repair work, etc.

ratchet time base (*Television*). The time base used for generating the framing frequency current or voltage in a system employing ratcheting. The current or voltage must change in a series of equal steps uniformly spaced in time, and then return to its original value.

ratchet-toothed escape wheel (*Horol.*). An escape wheel with fine-pointed teeth; used in English lever watches.

ratchet wheel (*Eng.*). A wheel with inclined teeth for engaging with a *pawl* (q.v.), so as to allow of forward motion only and arrest backward running.—(*Horol.*) A wheel with specially shaped pointed teeth which engage with a click; used on the barrel arbor to prevent it turning back when the spring is being wound.

ratcheting (*Television*). Formation of the raster in such a manner that the deflection of the spot in the vertical (frame-frequency) direction remains constant during the scanning of each line, being altered during the flyback periods of the line frequency.

ratching (*Cotton Spinning*). The operation of attenuating the rovings between the front rollers and spindles of a mule spinning machine, by stopping the front roller delivery before the carriage carrying the spindles has completed its outward run.

rate of climb (*Aero.*). Generally, the rate of ascent from the earth. In performance testing, the vertical component of the air path of an ascending aircraft, corrected for the standard atmosphere.

rated altitude (*Aero.*). The height, measured in the *standard atmosphere* (q.v.), at which a supercharged engine delivers its maximum power at normal boost.

rated blowing-current (*Elec. Eng.*). The current at which a fuse-link is specified by the maker to melt and break the circuit.

rated breaking-capacity (*Elec. Eng.*). The r.m.s. current, or the kVA at the rated voltage, which a circuit-breaker is specified by the maker to interrupt without damage.

rated input (or **output**) (*Elec. Eng.*). The input (or output) of an electrical machine or transformer specified as the maximum permissible by the maker, under certain given conditions. Also called RATED CAPACITY, RATED CONSUMPTION, RATED LOAD.

rated making-capacity (*Elec. Eng.*). The maximum asymmetrical current which a circuit-breaker can make at the rated voltage.

Rathke's pocket, rat'ke (*Zool.*). In developing Vertebrates, a small pit situated on the dorsal side of the oral cavity, which marks the point of invagination of the hypophysis and itself gives rise to the transitory hypophysial duct.

ratine, —tēn' (*Textiles*). A dress fabric with a rough surface, and either plain, fancy, or stripe effects; made from worsted or cotton yarns.

rating (*Elec. Eng.*). The maximum output or input of a piece of electrical apparatus as specified by the maker.

See **continuous— intermittent—**

rating nut (*Horol.*). A milled nut which supports the pendulum bob. By rotating it the bob is raised or lowered, thus altering the time of vibration of the pendulum.

ratio (*Acous.*). See **acoustic ratio.**

ratio arms (*Elec. Eng.*). Two adjacent arms of a Wheatstone bridge, the resistances in which can be made to have one of several fixed ratios.

ratio, aspect (*Aero.*). See **aspect ratio.**

Ratio-balance protective system (*Elec. Eng.*). A name given to a special form of impedance protective system in which discrimination is obtained by a measurement of the reactance between a particular relay and the fault.

ratio error (*Elec. Eng.*). A departure of the ratio between the primary and secondary voltages or currents of a voltage or current transformer from the rated value.

ratio of compression (*Eng.*). See **compression ratio.**

ratio of slenderness (*Struct.*). The ratio between the length or height of a pillar and its least radius of gyration.

ratio of specific heats (*Phys.*). The ratio of the specific heat of a gas at constant pressure to that at constant volume has a constant value of about 1·67 for monatomic gases, 1·4 for diatomic gases, and values which approach unity for polyatomic gases. This ratio, denoted by γ, enters into the *adiabatic equation* (q.v.).

ratio of transformation (*Elec. Eng.*). See **transformation ratio.**

rational horizon (*Surv.*). See **true horizon.**

rationalisation (*Psychol.*). The attempt to substitute conscious reasoning for unconscious motivations in explaining or excusing behaviour.

Ratlinghope Group (*Geol.*). A series of red and purple grits and shales, with conglomerates of Pre-Cambrian age, occurring in the West of the Longmynd in Shropshire.

rattle (*Acous.*). The perception of a large number of echoes, which are distinct but received at very short intervals of time.

rattle (*Paper*). The crackling noise when paper is handled. It indicates the degree to which the pulp or fibre has been hydrated in the process of beating, and can be augmented by the addition of starch.

rattle (*Zool*.). The series of horny rings representing the modified tail-tip scale in Rattlesnakes (*Colubridae*).

rattle echo (*Acous.*). An unmusical multiple echo, generally associated with thunder, which is formed by near-by flashes giving rise to a sharp acoustic impulse which is reflected between mountains or strata of air.

Rauber's cells, row'ber (*Zool.*). In *Mammalia*, cells of the trophoblast situated immediately over the embryonic plate.

raw (*Photog.*). Said of any sensitive emulsion which has not been exposed.

raw hide (*Tanning*). A hide which has been dried or treated with a preservative in order to prevent putrefaction prior to tanning.

rawhide hammer (*Eng.*). A hammer the head of which consists of a close roll of hide projecting from a short steel tube; used by fitters to avoid injuring a finished surface.

raw silk (*Textiles*). The natural material from which silk yarns are made. The filaments from 4, 5, 6, or more cocoons are reeled to form 'single' threads, which are converted into yarns by throwing.

raw thread raising (*Textiles*). A process of raising which produces a soft pile on fabrics; usually carried out after scouring.

Rawlplug (*Build.*). Trade-name for a small tube of tough compressed fibre for insertion in a hole, to provide a fixing plug into which a screw may be turned.

ray (*Bot.*). See **vascular ray.**

ray (*Phys.*). A line which represents the direction in which light is travelling. A ray forms a normal to a wave-surface. Sometimes, a beam of light of small cross-section. See Supplement; also **geometrical optics.**

ray (*Zool.*). A skeletal element supporting a fin: a sector of a radially symmetrical animal.

ray floret (*Bot.*). One of the small flowers radiating out from the margin of a capitulum or other dense inflorescence.

ray initial (*Bot.*). One of the cells of the cambium which takes part in the formation of a vascular ray.

ray tracheide (*Bot.*). A somewhat thick-walled cell which, with many other similar cells, occurs in the vascular rays of pine trees; it has bordered pits, and conducts aqueous solutions horizontally.

ray tube. Contraction for *cathode ray tube.*

Rayleigh disc (*Acous.*). A small disc, with a vertical diameter, hung by a fine thread of glass or quartz. If placed at an angle to a progressive sound-wave, the disc experiences a torque which depends on the square of the velocity of the molecules in the medium.

Rayleigh refractometer (*Light*). An instrument for measuring the refractive index of a gas by an optical interference method. Each of two interfering light beams passes through a tube which may contain air or gas or be evacuated. By observing the shift of the interference fringes when one of the tubes is evacuated and the other contains gas, the refractive index of the gas may be calculated from the expression $\mu=1+\frac{s\lambda}{l}$ where l is the length of tube and s the number of fringes shifted.

Raynaud's disease, rā-nō (*Med.*). A paroxysmal disorder of the arteries of the fingers and toes characterised by attacks of pain in them, the fingers (or toes) going white and then blue; gangrene may supervene.

rayon (*Textiles*). 'Artificial silk.' Filaments formed from solutions of modified cellulose, made by various processes. After passing through the spinneret or spinning jet, the filaments are combined to form yarn. In the viscose and copper processes of making rayon, the filaments pass through a bath which coagulates them. In acetate manufacture, spinning is a dry process.

See **acetate—** **viscose—**
cuprammonium (or **copper**)**—**

raze (*Build., Civ. Eng.*). To demolish (see **demolition**).

Rb (*Chem.*). The symbol for *rubidium.*

R.C. (*Build.*). Abbrev. for *rough cutting.*

RdAc (*Chem.*). The symbol for *radioactinium,* an isotope of thorium.

RdTh (*Chem.*). The symbol for *radiothorium,* a disintegration product and isotope of thorium.

Re (*Chem.*). The symbol for *rhenium.*

reach (*Hyd. Eng.*). A clear uninterrupted stretch of water.

reactance (*Acous.*). See under **acoustic impedance.**

reactance (*Elec. Eng.*). The component of the impedance of an a.c. circuit which is due to inductance or capacitance in the circuit.

See **leakage—** **synchronous—**
quadrature— **transient—**

reactance coil (*Elec. Eng.*). See **inductor, reactor.**

reactance coupling (*Radio*). Coupling between two circuits by means of a reactance common to both, particularly when the reactance is that of an inductance coil.

reactance drop (or **rise**) (*Elec. Eng.*). The decrease or increase in the available voltage at the terminals of a circuit caused by the reactance voltage set up within that circuit.

reactance relay (*Elec. Eng.*). An impedance relay which operates as soon as the reactance of the circuit to which it is connected falls below a predetermined value.

reactance theorem (*Elec. Comm.*). See **Foster's reactance theorem.**

reactance voltage (*Elec. Eng.*). The voltage produced by current flowing through the reactance of a circuit; equal to the product of the current (amps) and the reactance (ohms).

reactants (*Chem.*). The substances taking part in a chemical reaction.

reaction (*Bot., Zool.*). Any change in behaviour of an organism in response to a stimulus.

reaction (*Chem.*). (1) See **chemical reaction.** —(2) The acidity or alkalinity of a solution.

reaction (*Radio*). The result of coupling between the anode and grid circuits of a thermionic valve or valves whereby an initially small voltage on the grid is reinforced by the amplified currents flowing in the anode circuit. Used for reducing the effects of resistance losses in a resonant circuit. A preferable term is *retroaction.*

reaction chain (*Chem.*). See **chain reaction.**

reaction circuit (*Radio*). That part of the anode circuit of a thermionic valve through which passes the current that reacts on the grid circuit.

reaction coil (*Radio*). A coil included in the anode circuit of a thermionic valve and inductively coupled to the grid circuit.

reaction condenser (*Radio*). A variable condenser for controlling the degree of reaction.

reaction coupling (*Radio*). Coupling between the anode and grid circuits of a thermionic valve for obtaining reaction.

reaction formation (*Psycho-an.*). The development of a character trait which is usually the exact opposite of the original simple character trait. Formed as a reaction against the environment or from endogenous causes, or both, e.g. the character trait of submissiveness in place of the original one of aggression.

reaction generator (*Elec. Eng.*). A special form of synchronous generator excited by alternating current.

reaction isochore (*Chem.*). See **van't Hoff's reaction isochore.**

reaction isotherm (*Chem.*). See **van't Hoff's reaction isotherm.**

reaction order (*Chem.*). See **order of reaction.**

reaction pair (*Geol.*). Two minerals of different composition which exhibit the reaction relationship (see **reaction principle**). Thus forsterite at high temperature is converted into enstatite at a lower temperature, by a change in the atomic structure involving the addition of silica from the magma containing it. Forsterite and enstatite form a *reaction pair.*

reaction principle (*Geol.*). The conversion of one mineral species stable at high temperature into a different one at lower temperatures, by reaction between the crystal phase and the liquid magma containing it. The change may be continuous over a wide temperature range (*continuous reaction*), or may take place at certain fixed temperatures only (*discontinuous reaction*).

reaction products (*Chem.*). The substances formed in a chemical reaction.

reaction rate, specific (*Chem.*). See **velocity constant.**

reaction rim (*Geol.*). The peripheral zone of mineral aggregates formed round a mineral or rock fragment by reaction with the magma during the consolidation of the latter. Thus, quartz caught up by basaltic magma is partially resorbed, at the same time being surrounded by a reaction rim of granular pyroxene.

reaction time (*Bot., Zool.*). The time interval between a stimulus and the appropriate reaction.

reaction turbine (*Eng.*). A steam turbine in which the steam expands progressively in passing alternate rows of fixed and moving blades, the kinetic energy continuously developed being absorbed by the latter.

reactivation (*Chem.*). The restoration of an atom, molecule, or substance to an activated state.

reactive (*Chem.*). Readily susceptible to chemical change.

reactive component (*Elec. Eng.*). A term often used to denote the component of the vector representing an alternating quantity which is in quadrature (at 90°) with some reference vector; e.g. *reactive component of current,* commonly called *reactive current.* Also called QUADRATURE COMPONENT, WATTLESS COMPONENT, IDLE COMPONENT. See **reactive voltage, reactive volt-amperes.**

reactive current (*Elec. Eng.*). The component of a vector representing the current in an a.c. circuit which is in quadrature (at 90°) with the voltage.

reactive factor (*Elec. Eng.*). The ratio of the reactive volt-amperes in a circuit to the total volt-amperes.

reactive iron (*Elec. Eng.*). Iron inserted in the leakage-flux paths of a transformer in order to increase its leakage reactance.

reactive load (*Elec. Eng.*). A load in which the current lags behind or leads on the voltage applied to its terminals.

reactive power (*Elec. Eng.*). The reactive volt-amperes, i.e. the product of the voltage of a circuit and the reactive component of the current.

reactive volt-amperes (*Elec. Eng.*). The product of the reactive voltage and the current, or the voltage and the reactive current, in an a.c. circuit. Commonly abbreviated to **var** (*volt-ampere-reactive*).

reactive volt-ampere-hour (*Elec. Eng.*). A unit employed in measuring the product of reactive volt-amperes in a circuit and the time during which they have been passing.

reactive volt-ampere-hour meter (*Elec. Eng.*). An integrating meter which measures and records the total number of reactive volt-ampere-hours which have passed in the circuit to which it is connected.

reactive voltage (*Elec. Eng*). That component of the vector representing the voltage of an a c. circuit which is in quadrature (at 90°) with the current.

reactor (*Elec. Eng*) A piece of apparatus used in an electric circuit, primarily on account of its reactance.

See **current-limiting—** **earthing—**

reader (*Typog*) One who reads and corrects printers' proofs, comparing them with the original copy.

Reading Beds (*Geol.*). A group of sands, mottled clays, and gravels of Eocene age, occurring in the London and Hampshire basins; of fluviatile origin in the west, passing into deltaic deposits and ultimately into the marine Woolwich Beds of the same age in the east.

reading (or **shunted**) **condenser** (*Teleg.*). A resistance shunted with a condenser; inserted in a telegraph line to improve the definition of received signals over great distances.

reading microscope (or **telescope**) (*Phys.*, etc.). See **cathetometer.**

reading-off (*Textiles*). The operation of converting a lace pattern draft into a figure sheet or other form from which jacquard cards, etc. can be punched.

reagent (*Chem.*). A substance or solution used to produce a characteristic reaction in chemical analysis.

real image (*Light*). See **image.**

realgar, re-al'ger (*Min.*). A bright-red monosulphide of arsenic, which crystallises in the monoclinic system.

realism (*Photog.*). See under **impressionism.**

ream (*Paper*). Twenty quires, or 480 sheets. A *printer's ream* is 516 sheets.

reamer (*Eng.*). A hand- or machine-tool for finishing drilled holes. It consists of a cylindrical or conical shank on which cutting edges are formed by longitudinal or spiral flutes, or in which separate teeth are inserted. See **expanding reamer.**

reany (*Textiles*). A yarn made by doubling together a single thread and a twofold thread.

rearranged twills (*Textiles*). Fancy weaves made by rearranging the ends of a regular twill.

reason-piece (*Carp.*). A *raising-plate* (q.v.).

Réaumur malleable cast-iron, rā'ō-mür (*Met.*). See **malleable cast-iron.**

Réaumur scale (*Phys.*). A temperature scale in which the fixed points are 0° R. (freezing-point of water) and 80° R. (boiling-point of water). Sometimes used on the Continent.

re-balsaming (*Photog., etc.*). The process of separating and re-cementing lens elements with Canada balsam, after deterioration of the latter.

rebate (*Build.*). A shallow recess, in which door or window frames are to be fitted, formed with small projections in the jambs of external walls.

rebate (*Carp.*). A groove cut into the edge of a piece of timber.

recales'cence (*Met.*). The evolution of heat which occurs when iron or steel cools through the critical range. This causes a retardation of the cooling, which is shown on cooling curves and can be seen by the eye in a darkened room. Cf. *de-calescence.*

recapitulation (*Biol.*). Reflection of ancestral characteristics in the developmental stages of the individual.

rece'dent (*Gen.*). A term applied either to the genom or to the plasmon when these are of subsidiary importance in heredity.

receiver (*Elec. Comm.*). The equipment which receives signals in an electrical form and converts them into the form desired; e.g. a radio *receiver*, or a telephone *receiver*.

See **all-wave—**
Bell—
broadcast—
loudspeaking—
moving-coil—
piezo—
telephone—
thermal—

receiver response (*Acous.*). The response of a telephone receiver operating into a real or artificial ear; expressed as the ratio of the square of the excess-pressure in the specified cavity to the electrical power applied to the receiver.

receptacle (*Bot.*). A term of wide application and diverse meaning. It may mean:—(1) In fungi, a spore-bearing structure, especially if more or less concave; (2) in algae, a swollen end of a branch containing reproductive organs; (3) in liverworts, a cup containing gemmae; (4) in mosses, a group of sexual organs surrounded by leaves; (5) in ferns, the cushion of tissue bearing the sporangia; (6) in flowering plants, (*a*) the more or less enlarged end of the flower stalk bearing the parts of the flower (also known as TORUS, THALAMUS), (*b*) the enlarged end of the peduncle, bearing the flowers of a crowded inflorescence.

receptac'ulum (*Zool.*). (1) A receptacle: a sac or cavity used for storage.—(2) A sac in which ova are stored, as in some *Oligochaeta.*

receptaculum sem'inis (*Zool.*). A sac in which spermatozoa are stored, as in many Invertebrates; a spermatheca.

reception wall (*Build.*). A *retention wall* (q.v.).

receptive papilla (*Bot.*). In some *Phycomycetes*, a small outgrowth, from the oögonium into the antheridium, to which the antheridium becomes attached.

receptive spot (*Bot.*). A clear area in the eggs of some fungi and algae through which the sperm enters.—(*Zool.*) The point on the surface of an ovum at which the sperm enters.

receptiveness (*Bot.*). The condition of the stigma when effective pollination is possible.

receptivity (*Bot.*). See **susceptibility.**

receptor (*Med.*). See **side-chain theory.**

receptor (*Zool.*). An element of the nervous system specially adapted for the reception of stimuli; as a sense-organ or sensory nerve-ending.

recess (*Build.*). A niche or alcove in a wall.

recess (*Zool.*). A small cleft or depression; as the *optic recess.*

recessed arch (*Build.*). A *compound arch* (q.v.).

recessed pointing (*Build.*). A method of pointing designed to prevent any peeling off; the mortar at all joints both vertical and horizontal is pressed back about ¼ in. from the face of the wall.

recessed switch (*Elec. Eng.*). See **flush-switch.**

recessive character (*Gen.*). Of a pair of allelomorphic characters, the one which will not be manifested if both are present. Also known briefly as RECESSIVE.

reciprocal cross (*Bot.*). A cross between two plants in which each plant receives pollen from the other.

reciprocal diagram (*Struct.*). See **force diagram.**

reciprocal hybrids (*Zool.*). A pair of hybrids obtained by crossing the same two species, in which the male parent of one belongs to the same species as the female parent of the other; e.g. mule and hinney.

reciprocal innervation (*Zool.*). Innervation of an organ by two sets of nerves having opposite effects; e.g. the innervation of the arteries by vasoconstrictor and vasodilator fibres.

reciprocal levelling (*Surv.*). The operation of finding the difference of level between two points as the mean of the differences of level found by reading on staffs held on the two points from (1) a level set up near the first point, and (2) a level set up near the second point. This process eliminates instrumental error and corrects errors due to curvature and refraction.

reciprocal networks (*Elec. Comm.*). Two networks are said to be *reciprocal* when the product of their impedances remains a constant at all frequencies; thus an inductance is reciprocal to a condenser.

reciprocal proportions (*Chem.*). See **law of equivalent** (or **reciprocal**) **proportions.**

reciprocal theorem (*Struct.*). The statement, enunciated by Clerk Maxwell, that on any elastic structure, if a load W applied at a point A causes a deflection y at another point B, then, if the loading be taken off A and applied at B, it will cause a deflection y at A, provided that W acts at B along the line in which y was measured, and that the deflection at A is measured along the original line of action of W at A.

reciprocal translocation (*Cyt.*). A mutual interchange of portions between two chromosomes.

reciprocating engine (*Eng.*). Any engine which employs a piston working in a cylinder, the piston being caused to oscillate by the periodic pressure of the working fluid.

reciprocation (*Elec. Comm.*). The operation of finding a reciprocal network to a given network. Used in the design of electric wave filters.

reciprocity (*Struct.*). The principle enunciated in the *reciprocal theorem* (q.v.).

reciprocity theorem (*Elec. Comm.*). The interchange of electromotive force at one point in a network and the current produced at any other point produces the same current for the same electromotive force.

Recklinghausen's disease (*Med.*). See **molluscum fibrosum**; also **fibrocystic disease** (2).

reclaimed rubber (*Rubber*). Rubber recovered from waste or used rubber goods. The most extensively used method of reclamation is that of heating ground scrap with a dilute solution of caustic soda at a temperature of about 180° C. for 12 to 20 hours.

recli'nate (*Bot.*). Bent back: curved downwards.

recoil escapement (*Horol.*). A clock escapement (invented by Hooke, 1635-1703) in which the acting faces of the pallets are arcs of circles, and at the end of each swing of the pendulum the pallets push the escape wheel backwards a small amount, causing the recoil. This escapement (also known as the ANCHOR ESCAPEMENT) is used largely for domestic clocks. Although departing from the requirements of the ideal escapement, it gives very satisfactory results, as it tends to be self-correcting; i.e. if there is any tendency for the arc of vibration to increase, there is a proportionally greater recoil, which reduces the arc.

recoil gear (*Artillery*). The whole recoil mechanism, embracing both buffer and recuperator.

recolonisation (*Bot.*). The re-establishment of vegetation on an area which has been stripped of plants.

recombination (*Cyt.*, *Gen.*). Regroupings of linked characters caused by crossing-over.

re-combing (*Textiles*). A second combing of worsted tops, to remove further noil and ensure a better yarn.

recon'naissance (*Surv.*). The process of preliminary examination, by the surveyor, of the ground which he is to survey, so that he may decide on the best way of arranging the work.

reconstructed stone (*Civ. Eng.*). Artificial stone made of concrete blocks faced to resemble natural stone.

reconstruction (*Zool.*). The reconstitution of the structure of an organ or organism from a series of sections.

record (*Acous.*). The popular name for a gramophone record in disc form. Made by die-pressing, under high pressure and temperature, a plastic compound (based on shellac and a filler) between two stampers. Each stamper is formed by electrodeposition processes from an original wax blank, on which a track has been cut by a stylus operated by currents amplified from a microphone. The term strictly applies to any sound record from which the original sounds can be reproduced at any time.

See **cylindrical—**
disc—
film—
laminated—
paper-surface—
shellac—
unbreakable—

Recordak (*Photog.*). A machine for making routine photographic records of documents on micro-film, for subsequent reference by projection on a ground-glass plate.

recorder (*Acous.*). A machine for registering a sound, either magnetically, photographically, or on wax.

See **film—**
home—
magnetic—
photographic—
wax—

recorder (*Elec. Eng.*). See **graphic instrument.**

recording (*Acous.*). The art, practice, and science of registering wave-forms arising from sound sources, so that they can be re-created at any arbitrary subsequent time, with allowance for delay necessitated by processing.

See **acoustic—**
constant-velocity—
contour—
cross—
disc—
electric—
film—
hill-and-dale—
instantaneous—
lateral—
magnetic—
noiseless—
photographic—
radial—
variable-area—
variable-density—
vertical—

recording amplifier (*Acous*). The thermionic amplifier preceding the recording heads of wax cutters.

recording drum (*Cinema.*). The smooth wheel which carries the unexposed film as it is being subjected to the modulated light-beam in a sound-film recorder.

recording head (*Acous.*). (1) The electromechanical device to which modulation currents are applied to operate the cutting stylus in a wax recorder.—(2) The registering device, containing magnetising coils and pole-pieces, through which magnetic tape is drawn in magnetic recording.

recording instrument (*Elec. Eng.*). See **graphic instrument.**

recor'dist (*Elec. Comm.*). The operator of the controls which determine the amplitude of electric currents which control a sound-recording device. See **control** (*Acous.*), **monitor-man.**

recovery voltage (*Elec. Eng.*). The normal frequency or d.c. voltage which appears across the contacts of a switch, circuit-breaker, or fuse after it has interrupted the circuit.

recovery, water (*Aero.*). See **water recovery.**

recrystallisation (*Chem.*). The process of the reforming of crystals, usually by dissolving them, concentrating the solution, and thus permitting the crystals to reform. Frequently performed in the process of purification of a substance.—(*Met.*) The replacement of deformed crystals by a new generation of crystals, which begin to grow at certain points in the deformed metal and eventually absorb the deformed crystals. This process leads to the elimination of strain-hardening.

recrystallisation temperature (*Met.*). The temperature at which recrystallisation occurs. It is sometimes defined as the temperature at which the new generation of crystals first appears on heating, but is more usually the range of temperature in which the strain-hardening disappears rapidly. Lead, tin, and zinc can recrystallise at air temperature; iron, copper, aluminium, and nickel have to be heated.

rectal gland (*Zool.*). In *Selachii*, a small dorsal glandular diverticulum of the rectum; of unknown function.

rectangular notch (*Civ. Eng.*). A notch plate having a rectangular notch cut in it; used for the measurement of large discharges.

recti- (Latin *rectus*, straight). A prefix used in the construction of compound terms; e.g. *rectirostral*, having a straight beak.

rectification (*Chem.*). The purification of a liquid by redistillation.

rectification (*Elec. Eng.*). The conversion of an alternating current into a direct current by means of some form of rectifier or rectifying apparatus. See **half-wave rectification, full-wave rectification.**—(*Radio*) Usually, the conversion of radio frequency into audio frequency in a radio receiver (also called DETECTION, DEMODULATION). See **linear rectification.**

rectified current (*Radio*). The low-frequency current output from a rectifier.

rectifier (*Elec. Eng.*). A device for converting an alternating current into a direct current by the inversion or suppression of alternate half-waves.

See **arc—**
copper-oxide—
electrolytic—
ignitron—
jet-wave—
mechanical—
point-plate—
thermionic—

rectifier cell (*Photo-electric Cells*). A cell comprising an intimate contact surface between a metal and its oxide. In addition to its photo-electric properties, it exhibits unidirectional conductivity. A typical example is the *Photox cell.*

rectifier instrument (*Elec. Eng.*). An a.c. instrument in which the current to be measured is rectified and measured on a d.c. instrument.

rectifying detector (*Radio*). A detector of electromagnetic waves which depends for its action on the rectification of high-frequency currents, as opposed to one employing thermal, electrolytic-breakdown, or other similar effects.

rectifying valve (*Radio, Thermionics*). Any thermionic valve in which direct use is made of the unilateral or asymmetrical conductivity effects, as opposed to one used primarily for amplification; e.g. a diode used as a rectifier for the anode voltage supply to a receiver, or a triode used as a detector.

rectilinear lens (*Photog.*). A lens which provides images with no distortion, as far as parallel lines are concerned.

rec'tinerved (*Bot.*). Having straight or parallel veins.

rec'tipet'aly (*Bot.*). The tendency of a plant member to grow in a straight line.

rectiros'tral (*Zool.*). Having a straight beak.

rectise'rial (*Bot.*). Arranged in straight rows.

recto (*Typog.*). The right-hand page of a book, bearing an odd page-number.

recto-. A prefix used in the construction of compound terms having reference to the *rectum* (q.v.); e.g. *rectogenital*, pertaining to the rectum and the genitalia.

rec'tocele, —sēl (*Med.*). A prolapse or protrusion of the lower part of the posterior vaginal wall, carrying with it the anterior wall of the rectum.

rec'trices, —tris-ēz (*Zool.*). In Birds, the stiff tail feathers used in steering.—*sing.* **rectrix.**—*adj.* **rectri'cial.**

rectum (*Zool.*). (Latin *rectum intestinum*, straight intestine.) The posterior terminal portion of the alimentary canal leading to the anus.—*adj.* **rectal.**

rectus (*Zool.*). A name used for various muscles which are of equal width or depth throughout their length; e.g. the *rectus abdominis* in Vertebrates.

recuperative air-heater (*Eng.*). An air-heater in which heat is transmitted from hot gases to the air through metallic walls, the flows of gas and air being continuous and unidirectional.

recuperator (*Artillery*). A system of springs or compressed air which returns the gun to its firing position. See **buffer.**

recuperator (*Met*). An arrangement of flues which enables the hot gases leaving a furnace to be utilised in heating the incoming air (and sometimes gas). Outgoing hot gases and incoming cold gases pass in opposite directions through parallel flues and heat is transferred through the dividing walls.

recurrent (*Bot.*). Said of the smaller veins of a leaf when they bend back towards the midrib.—(*Zool.*) Returning towards the point of origin.

recurrent sensibility (*Zool.*). In Vertebrates, sensibility shown by the ventral roots of the spinal nerves (motor) due to the sensory fibres of the dorsal roots.

recurrent vision (*Photog.*). The perception of repeated images of brightly illuminated objects when the source of illumination is suddenly removed.

recurved (*Bot.*). Bent or curved backwards.

recur'viros'tral (*Zool.*). Having the beak bent upwards.

red algae (*Bot.*). See **Rhodophyta.**

red body (*Zool.*). See **red gland.**

red brass (*Met.*). Copper-zinc alloy containing approximately 15% zinc; used for plumbing pipe, hardware, condenser tubes, etc.

Red Chalk (*Geol.*). A thin bed of brick-red chalk occurring in the Cretaceous rocks of Lincolnshire and Norfolk. It is equivalent in age to the Gault Clay of Southern England, and separates the Carstone from the White Chalk above.

red clay (*Geol.*). A widespread deep-sea deposit restricted to the oceanic abysses; essentially a soft, plastic clay consisting dominantly of insoluble substances which have settled down from the surface waters; these substances are partly of volcanic, partly of cosmic origin, and include nodules of manganese and phosphorus, crystals of zeolites, and rare organic remains such as shark's teeth.

red-conscious (*Television*). Said of an electron camera which is unduly sensitive to light of long wavelengths. This results in inartistic enhancement of the relative brightness of areas of the image which are red.

red corpuscle (*Zool.*). See **erythrocyte.**

Red Crag (*Geol.*). A local group of richly fossiliferous sands which accumulated as shell banks in land-locked bays in the Pliocene Sea; restricted in distribution to parts of Norfolk and Suffolk.

red deal (*Timber*). A light-yellow soft wood obtained from the Scots fir; commonly used for timbering trenches, heavy framing, piles, joinery, etc.

red fever (*Vet.*). See **swine erysipelas.**

red gland (or body) (*Zool.*). In some Fish, a structure found on the wall of the air-bladder, consisting of a network of blood capillaries and a number of tubular glands, which open into the cavity of the bladder and are believed to be responsible for the secretion or absorption of gas.

Red Head Series (*Geol.*). A group of thin-bedded sandstones and shales passing into thicker sandstone with volcanic rocks, ascribed to the Dittonian stage of the Old Red Sandstone of Devonian age in the Midland Valley of Scotland.

red-lead (*Chem.*). Pb_3O_4. Formed by heating lead monoxide in air at approximately 450° C. It occurs as red and yellow crystalline scales. Commercial varieties contain up to approximately 35% PbO_2.

red light (*Cinema.*). In motion-picture production, any light which is illuminated over the period during which a take is in operation, in order to warn persons not to make a noise.

red marls (*Geol*). A lithological term applied to red silts and calcareous clays, which in some cases may have accumulated in the same way as loess, i.e. as wind-driven desert dust, but in other cases red marls were water deposited. They occur as the most extensive deposit in the Old Red Sandstone of parts of England and Wales, and in the Keuper Series.

red marrow (*Zool.*). The reddish vasoformative tissue occupying the cavities of some of the bones in Mammals.

red muscles (*Zool.*). In Vertebrates, muscles which perform long-continued actions and are therefore rich in sarcoplasm and haemoglobin, and are of a red colour.

red nucleus (*Zool.*). An aggregation of nerve-cells in the *tegmentum* (q.v.).

red oxide of copper (*Min.*). See **cuprite.**

red oxide of zinc (*Min.*). See **zincite.**

red-short (*Met*). See **hot-short.**

red silver ore (*Min.*). For *dark-red silver ore*, see **pyrargyrite**; for *light-red silver ore*, see **proustite.**

red snow (*Bot.*). Snow stained by a surface growth of unicellular algae rich in haematochrome; sometimes seen on mountains.

red spot (*Astron*). A marking on the surface of the planet Jupiter first observed in 1878, since when it has faded almost entirely; it is therefore thought to have been due to some violent eruption.

redwater (*Vet*). See **Texas fever.** EUROPEAN REDWATER, a disease of cattle in Europe, due to infection of the blood by piroplasms (*Babesia bovis*), transmitted by ticks (*Isodes ricinus*).

red wood (*Timber*). A name given to *red deal* (q.v.) in the north of England.

Redalon (*Build.*). Trade-name for a retarder applied to concrete surfaces which are to be plastered.

reddle (*Eng.*). A mixture of red lead and oil which is wiped over one of two surfaces to be bedded together to indicate the high spots to be removed by scraping.

reddle (*Min.*). A red and earthy variety of haematite, with a certain admixture of clay.

re-development (*Photog.*). The second development of a film or plate after bleaching, antecedent to reversal or intensification.

Redhill Beds (*Geol.*). A group of olive-green mudstones referred to the Caradoc Series of the Ordovician System; found in western South Wales.

re'dia (*Zool.*). The secondary larval stage of a *Trematode*, possessing a pair of locomotor papillae and a rudimentary pharynx and intestine, and capable of paedogenetic reproduction.

redistilled zinc (*Met.*). Zinc from which the impurities have been eliminated by selective distillation. The process takes advantage of the different boiling-points of zinc (907° C.) and the impurities lead (1620° C.) and cadmium (778° C.). Metal over 99·99% zinc is produced.

redox (*Chem.*). Abbrev. for *oxidation-reduction*.

redruthite (*Min.*). A name frequently applied to the mineral *chalcocite* on account of its occurrence, among other Cornish localities, at Redruth.

reduced (*Bot.*). Simplified in structure as compared with some probable ancestral form.

reduced apogamy (*Bot.*). The development of a sporophyte from a cell or cells of a gametophyte, without any fusion of gametes, giving a plant whose nuclei have the gametic number of chromosomes.

reduced bearing (*Surv.*). The horizontal angle, less than 90°, between any survey line and the magnetic meridian. Also called QUADRANTAL BEARING.

reduced fertilisation (*Biol.*). The substitution for a normal sexual fusion between male and female gametes or nuclei of some other union, as for instance, the union of two female nuclei.

reduced level (*Surv.*). The elevation of a point above or below datum. See also **altitude.**

reducer (*Photog.*). A solution which acts on the silver image and dissolves it away by chemical or abrasive action, thus reducing contrast.

See **Baskett's—** **Farmer's—**
Belitzski's—

reducer (*Plumb.*). See **reducing socket.**

reducing (*Textiles*). An operation carried out previous to spinning in certain textile industries, in order to attenuate the sliver and roving.

reducing agent (*Chem.*). A substance which is capable of bringing about the chemical change known as reduction.

reducing flame (*Chem.*). The luminous tip of a small Bunsen flame.

reducing screen (*Illum.*). A transparent screen used in photometry to absorb a certain predetermined fraction of the luminous flux falling on it.

reducing socket (or **pipe-joint**) (*Eng.*, *Plumb.*). A pipe socket for connecting pipes of different diameter, the two ends being threaded internally to standard sizes; e.g. 1 in. to ¾ in. gas.

reducing surface (*Illum.*). A prepared surface, used in photometry, which reflects only a certain predetermined proportion of the luminous flux falling on it.

reduc'tases (*Chem.*). Enzymes which bring about the reduction of organic compounds.

reduction (*Chem.*). Any process in which an electron is added to an atom or an ion. Three common types of reduction are the removal of oxygen from a molecule, the addition of hydrogen to a molecule, and the diminution of the positive valency of an atom or ion.

reduction (*Mining*). The extraction of gold from an ore. The *reduction officer* is the official in charge of the mill and extraction plant. [South Africa.]

reduction (*Photog.*). In a negative or print, the reduction of excessive contrast or density that has arisen from over-exposure or over-development.

reduction division (*Cyt.*). See **meiosis.**

reduction factor (*Illum.*). The ratio of the mean spherical candle-power of a light-source to its mean horizontal candle-power.

reduction in area (*Met.*). As applied to the tensile test, a synonym for *contraction in area*. The term is also used in connexion with working operations, to indicate the amount of work performed.

reduction intensity (*Chem.*). See **rH-value.**

reduction of levels (*Surv.*). The process of computing reduced levels from the staff readings made when levelling.

reductive analysis (*Psychol.*). See **direct reductive analysis.**

redundant (*Struct.*). A term applied to a structural framework having more members than it requires in order to be perfect. Also OVER-RIGID.

reduplicate aestivation (*Bot.*). Valvate aestivation in which the edges of the segments are turned outwards.

redu'viid, —vi-id (*Zool.*). Said of Insect eggs in which the micropyle is protected by a porch-like structure.

reed (*Acous.*). A vibrating tongue of wood or metal, for generating air-vibrations in musical instruments. Metal reeds are generally used in organ reed-pipes and cane wood for tongue action, as in the clarinet.

reed (*Weaving*). A comb-like arrangement of flattened steel wires or dents fixed in a frame. Its functions are to keep the warp threads in position, to form a guide for the shuttle, and to beat up the weft to the fell of the cloth. The reed also determines the number of warp threads per inch; a 90 reed usually means 90 threads per inch—an indication of the quality of a fabric.

reeds (*Join.*). A moulding in the form of several side-by-side beads sunk below the general surface.

reed-counting systems (*Textiles*). See **sett systems.**

reed loudspeaker (*Acous.*). A small loudspeaker with a driving mechanism in which the essential element is a magnetic reed, which is drawn into the gap between pole-pieces on a permanent magnet by the currents in the driving coils.

reed marks (*Weaving*). Marks running lengthwise in a piece of cloth; a fault due to the tendency of the warp threads to run in groups, especially when there are three or four ends in a dent.—*adj.* **reedy.**

reed pipe (*Acous.*). An organ pipe in which the pitch of the note is determined by the vibration of a reed, the associated pipe reinforcing the generated note by resonance.

reed (*Zool.*). See **abomasum.**

reef (*Mining*). Originally an Australian term for a *lode* (q.v.). Now used for a gold-bearing tubular deposit or quartz vein.

reef, coral (*Geol.*). See **coral reef.**

reef knolls (*Geol.*). Large masses of limestone formed by reef-building organisms; found typically in the Craven district of Yorkshire where they have weathered out as rounded hills above the lower ground on the shales. These are of Carboniferous age.

reel (*Cinema.*). (1) The standard length of cinematograph film supplied for exposure or for projection in a theatre. The length is 1000 ft., and takes about 11 minutes to project.—(2) By analogy, the length of sub-standard film which takes about 11 minutes to project.

See **feed—** **spiral—** **take-up—**

reel (*Textiles*). A machine consisting of two collapsible frames on which yarn from cops or bobbins is wound in skeins or hanks.

reeling (*Textiles*). (1) The operation of unwinding the silk filaments from a number of cocoons and combing them to form a silk thread.—(2) The operation of winding yarn from cops or bobbins on to a reel to form skeins.

re-entrant (*Surv.*). A term applied to an internal angle. Cf. *salient*.

re-entrant horn (*Acous.*). A horn for coupling a sound-reproducing diaphragm with the outer air. To conserve space, the horn divides at a distance from the throat and, after convolutions, unites before expanding to the flare.

re-entrant winding (*Elec. Eng.*). A term used in connection with armature windings for d.c. machines; a *singly* (or *doubly*) *re-entrant winding* is one containing one (or two) independent closed circuits. The majority of windings are singly re-entrant.

reference equivalent (*Teleph.*). The number of decibels by which a given piece of telephonic apparatus differs from the standardised piece of apparatus in the master transmission reference system.

reference mark (*Surv.*). See Supplement.—(*Typog.*) See **mark of reference.**

reference system (*Teleph.*). See **master telephone transmission reference system.**

reference tone (*Acous.*). See **reftone.**

refined iron (*Met.*). Wrought-iron made by puddling pig-iron.

refiner (*Paper*). See **perfecting machine.**

refining of metals (*Met.*). Operations performed after the crude metals have been extracted from their ores, in order to obtain them in a condition of higher purity. See, e.g., **electrolytic copper, Hoopes process.**

reflected (*Zool.*). Said of a structure, especially a membrane, which is folded back on itself.

reflected ray (*Radio*). See **indirect ray.**

reflecting galvanometer (*Elec. Eng.*). A galvanometer in which the deflection is observed by the reflection of a beam of light projected on to a mirror mounted on the moving element.

reflecting layer (*Radio*). A layer of ionised air existing in the upper atmosphere which reflects radio waves. See **Appleton layer, Heaviside layer.**

reflecting level (*Surv.*). An instrument, used for levelling, which employs the principle that a ray of light which strikes a reflecting plane at right-angles is reflected back in the same direction. In its practical forms, it usually consists of a hanging mirror which takes up a position in the vertical plane, and has an unsilvered part through which a distant staff may be seen and also a reference horizontal line upon it. When the eye is in such a position that the image of the pupil is bisected by the horizontal line, the line of sight to the staff is horizontal.

reflecting telescope (*Astron.*). A form of telescope invented by Newton to overcome the difficulties of chromatic aberration; in it the light is reflected from a polished and figured surface, brought to a focus, and the image there formed magnified by an eye-piece. The three principal forms are named (1) Newtonian, (2) Cassegrainian, (3) Gregorian.

reflection (*Radio*). A phenomenon which occurs when an electromagnetic wave encounters a conductor or a dielectric having a permittivity appreciably different from unity, when a portion of the wave has its direction of propagation deviated. Cf. *refraction.*

reflection factor (*Elec. Comm.*). The ratio which the power flowing into an impedance from a source bears to that which would flow if the impedance of the load matched that of the source.—(*Illum.*) The ratio which the luminous flux reflected from a surface bears to that falling upon it; also called COEFFICIENT OF REFLECTION.

See **regular—** **diffuse—**

reflection gain (*Elec. Comm.*). The gain in power received in a load from a source because of the introduction of a matching network, such as a transformer; measured in decibels.

reflection, laws of (*Phys.*). When a ray of light is reflected at a surface, the reflected ray is found to lie in the plane containing the incident ray and the normal to the surface at the point of incidence. The angle of reflection equals the angle of incidence.

reflection loss (*Elec. Comm.*). The loss, in decibels, of power obtainable from a source into a load because the latter is not matched in impedance to the source.

reflection point (*Elec. Comm.*). The point at which there is a discontinuity in a transmission line, and at which partial reflection of the transmitted electric wave takes place.

reflector (*Illum.*). A device consisting of a bright metal surface shaped so that it reflects in a desired direction light or heat falling upon it.

See **asymmetric—**
concentrating—
industrial—
parabolic—
standard—

reflector arc (*Cinema.*). The same as *mirror arc.*

reflex (*Zool.*). Involuntary; automatic; not under the control of the will.

reflex action (*Zool.*). An automatic or involuntary response to a stimulus.

reflex arc (*Zool.*). A functional unit of the nervous system. It consists of an afferent neurone by which sensory impulses pass to the nerve-centre, and an efferent neurone by which motor impulses pass to some peripheral effector organ, such as a muscle.

reflex camera (*Photog.*). A camera in which the focusing is performed while observing the image formed by the lens on a ground-glass plate, the rays of light being deflected from their path towards the sensitive surface by a mirror, which is removed automatically during exposure.

reflex circuit (*Radio*). A circuit, sometimes employed in radio receivers, in which one or more valves are used for simultaneous high- and low-frequency amplification. Also called DUAL-AMPLIFICATION CIRCUIT.

reflexed (*Bot.*). Turned back abruptly.

reflores'cence (*Bot.*). See **double flowering.**

reflux valve (*Civ. Eng.*). A non-return type of valve used in pipe-lines at rising gradients to prevent water which is ascending the gradient from flowing back in the event of a burst lower down.

refracted (*Bot.*). Bent abruptly backwards from the base.

refracting telescope (*Astron.*). The original form of telescope, invented in the sixteenth century, in which the light from a distant object passes through a converging lens (now always compound) and is brought to a focus on the principal axis, the image being then magnified by a system of diverging lenses (the *eye-piece*).

refraction (*Light*). When a ray of light passes from one medium to another it generally changes its direction, and is therefore said to suffer *refraction* or be *refracted.* The refracted ray lies in the plane containing the incident ray and the normal to the surface separating the two media. The ratio of the sine of the angle of incidence to the sine of the angle of refraction is constant for a given pair of media, and is known as the *index of refraction.* See **aplanatic—*.**

refraction (*Radio*). A phenomenon which occurs when an electromagnetic wave passes from one medium to another having a different permittivity or permeability, when the direction of propagation is altered. Cf. *reflection.*

refraction correction (*Astron.*). That small amount which is to be subtracted from the observed altitude of a heavenly body to allow for the refraction of light by the earth's atmosphere, which so bends the rays that all bodies appear higher than they are by an amount which is a maximum at the horizon and zero at the zenith.

refractive index (*Light*). See **index of refraction.**

refractivity (*Chem.*). *Specific refraction* (q.v.).

refractom'eter (*Light*). An instrument for measuring refractive indices. Refractometers used for liquids, such as the Pulfrich instrument, usually measure the critical angle at the surface between the liquid and a prism of known refractive index. See **Rayleigh refractometer.**

refractor (*Illum.*). A device by which the direction of a beam of light is changed by causing it to pass through the boundary between two substances of different densities; the principle is used in certain types of lighting fittings.

refractories (*Met.*). Materials used in lining furnaces, etc. They have to resist high temperatures, changes of temperature, the action of molten metals, and slags and hot gases carrying solid particles. China clay, ball clay, and fireclay are all highly refractory, the best qualities fusing at above 1700° C. Other materials are silica, magnesite, dolomite, alumina, and chromite. See **silica.**

refractory cement (*Build.*). A form of cement capable of withstanding very high temperatures.

refractory clay (*Geol.*). See **refractories.**

refractory period (*Zool.*). The time interval during which an excitable tissue is incapable of response to a second stimulus, applied after a previous one.

refrigerants. Substances suitable for use as working agents in a refrigerator; e.g. ammonia, carbon dioxide, sulphur dioxide, methyl chloride, etc. See **mechanical refrigerator.**

refrigeration. The artificial production of cold, for food preservation, etc.; most commonly effected by compressing a vapour, condensing it by cooling, and throttling to the original pressure, when it absorbs latent heat at a low temperature. See **refrigerants, throttling.**

refrigerator (*Eng.*). A machine or plant by which mechanical or heat energy is utilised to produce and maintain a low temperature.

See **absorption—** **mechanical—**

refringent (*Bot.*). Refractive.

reftone (*Acous.*). Abbrev. for *reference tone*, the 1000-cycles-per-second tone used as an adjustable reference in measuring the loudness level of noises and other sounds.

refuge (*Civ. Eng.*). See **street refuge.**

refusal (*Civ. Eng.*). A term applied to the resistance offered by a pile to continued driving.

regain (*Textiles*). (1) The increase in the length of a thread taken from a cloth; e.g. if in 100 yards of cloth the warp length is 105 yards owing to its interlacement with the weft, the *regain* is 5%.—(2) The gain in weight of yarn or cloth, previously too dry, by the absorption of moisture when exposed in an atmosphere of normal temperature and humidity.

regattas (*Textiles*). Twill cotton fabrics, generally with blue and white stripes; used for aprons, summer dresses, etc.

regela'tion (*Heat.*). The process by which ice melts when subjected to pressure and freezes again when the pressure is removed. Regelation operates in the forming of a snowball by pressure, in the flow of glaciers, and in the slow cutting through of a block of ice by a weighted loop of wire.

regeneration (*Radio*). See **reaction.**

regeneration (*Zool.*). Renewal or replacement of an organ or structure which has been lost or damaged.

regenerative air heater (*Eng.*). An air heater in which heat-transmitting surfaces of metallic plates or bricks are exposed alternately to the heat-surrendering gases and to the air.

regenerative braking (*Elec. Eng.*). A method of braking for electric motors in which the motors are operated as generators, by the momentum of the equipment being braked, and return energy to the supply.

regenerative furnace (*Eng., Met.*). A furnace in which the hot gases pass through chambers containing fire-brick structures, to which the sensible heat is given up. The direction of gas flow is reversed periodically, and the cold incoming gas is pre-heated in the chambers.

regional metamorphism (*Geol.*). All those changes in the mineral composition and texture of rocks due to compressional and shearing stresses, and to the rise of temperature occasioned by intense earth movements. The characteristic products are the crystalline schists and gneisses.

register (*Build.*). A metal damper to close a chimney.

register (*Photog., Print.*). Exact correspondence of superimposed work, e.g. when the separate colours in colour photography are printed or projected together in order to reproduce the original picture. When two or more colours coincide without overlapping, or when pages, etc., back one another accurately on the paper, they are said to be *in register*. Conversely, faultily superimposed work is said to be *off register* or *out of register*.

register sheet (*Print.*). The sheet used in obtaining correct register or position.

registering instrument (*Elec. Eng.*). A term occasionally used to denote either an integrating instrument or a graphic instrument.

registering pins (*Photog.*). Pins used to register the separate negatives when printing a multi-colour photographic process.

registration (*Acous.*). The selection of stops (*registers*) by an organist while playing.

reg'let (*Arch.*). (1) A flat narrow rectangular moulding.—(2) A *fillet* or *facette* (qq.v.).

reglet (*Typog.*). A thin strip of wood used for spacing; usually six or twelve points in thickness (known as *nonpareil reglet* and *pica reglet* respectively).

reglette (*Surv.*). The short graduated scale attached at each end of the special measuring tape or wire used in base-line measurement.

reg'ma (*Bot.*). A fruit which, when ripe, breaks up into rounded one-seeded portions.

Regnault's hygrometer, ren-yō (*Meteor.*). A type of hygrometer in which the silvered bottom of a vessel containing ether is cooled by bubbling air through the ether, the temperature of which is indicated by a thermometer. The dew-point is the temperature at which dew appears on the silvered surface.

regrating (*Masonry*). The operation of re-dressing the faces of old hewn stone work.

regression (*Biol.*). A tendency to return from an extreme to an average condition, as when a tall parent gives rise to plants of average stature.

regression (*Psycho-an.*). A return to an earlier stage of development, whereby the libido takes up earlier modes of expression and gratification in accordance with the particular phase to which it has regressed; e.g. a regression from adolescence to childhood.

regression coefficient (*Maths.*). The product of the correlation coefficient and the ratio of the standard deviations of two variables which are apparently dependent on each other in some degree.

regressive stain (*Micros.*). A stain with which the best results are obtained by overstaining and subsequent modification, or partial removal of the stain by a differentiating reagent. Cf. *progressive stain.*

regular (*Bot.*). Said of a flower which has its parts so arranged that it can be divided into halves by several longitudinal planes passing through the centre; symmetrical, actinomorphic.

regular-coursed (*Masonry*). Said of rubble walling which is built up in courses of the same height.

regular reflection (*Illum.*). Reflection in which a beam of light appears, after reflection, to proceed from an image of the light source in the reflecting surface, and is reflected at an angle equal to the angle at which the beam falls on the surface. Also called SPECULAR REFLECTION.

regular reflection factor (*Illum.*). The ratio which the luminous flux regularly reflected from a surface bears to the total flux falling on that surface.

regular system (*Crystal*). The *cubic system* (q.v.).

regular transmission (*Illum*). Transmission of light through a surface in such a way that the beam of light, after transmission, appears to proceed from the light source.

regular transmission factor (*Illum*). The ratio which the luminous flux regularly transmitted through a surface bears to the total luminous flux falling on the surface.

regulating switch (*Elec. Eng.*). A switch used for switching the regulating cells of a battery in and out of circuit.

regulation, regulation up (*Elec. Eng.*). The change in voltage which occurs when full rated load, at the rated power factor, voltage, and speed or frequency, is thrown off an electric generator or transformer.

regulation down (*Elec. Eng.*). The change in voltage which occurs when full load is put on to a previously unloaded electric generator or transformer, all other conditions being maintained normal.

regulator (*Elec. Eng.*).
See **field—** **voltage—**

regulator (*Horol.*). (1) A precision long-case clock with a seconds pendulum. The dial has independent hands and zones for the hours, minutes, and seconds.—(2) See **index.**

regulator (*Mining*). A door to regulate the ventilation in underground workings.

regulator cell (*Elec. Eng.*). One of several cells which are arranged at the end of a battery of accumulator cells and are connected to a regulating switch so that they can be cut in or out of circuit in order to adjust the voltage of the battery as a whole. Also called END-CELL.

regulator mixture (*Chem.*). See **buffer solution.**

regulator valve (*Eng*). A valve which is placed in the dome or steam space of a locomotive and operated by a handle in the cab, and serves for controlling the steam supply to the cylinders.

reguline deposit (*Elec. Eng.*). Good electrodeposited metal, as opposed to a burnt deposit.

regulus of antimony (*Met.*). Commercially pure metallic antimony.

regurgitation (*Med.*). (1) The bringing back into the mouth of (undigested) food which has been swallowed.—(2) The flowing of blood in the reverse direction of the circulation in the heart as a result of valvular disease; e.g. *aortic regurgitation.*

reheating, re-superheating (*Eng.*). The process of passing steam, which has been partially expanded in a steam turbine, back to a superheater before subjecting it to further expansion.

reheating furnace (*Met.*). The furnace in which metal ingots, billets, blooms, etc. are heated to bring them to the temperature required for hot-working.

Rehfuss test, rā-foos (*Med.*). Fractional test meal. The analysis of the contents of the stomach at quarter-hourly intervals after the swallowing of a pint of oatmeal mixture, the contents being removed by a small stomach tube.

Reichert-Meissl number, rī'hhert mīsl (*Chem.*). A standard used in butter analysis. A Reichert-Meissl number of *n* means that the soluble volatile fatty acids liberated from 5 gm. of butter fat under specified conditions require *n* cc. of *N*/10 barium hydroxide solution for their neutralisation.

Reil's island, rīl (*Zool.*). In Mammals, a small lobe of the cerebrum situated at the bottom of the Sylvian fissure.

Reimer-Tiemann reaction (*Chem.*). See **Tiemann-Reimer reaction.**

rein (*Civ. Eng.*). See **springer.**

Reinartz circuit, rī'narts (*Radio*). A circuit employing reaction controlled by a variable condenser; used for the reception of short waves.

reinforced concrete (*Civ. Eng.*). Concrete work in which steel bars (*reinforcement*) are embedded in order to provide increased strength.

reinforcement (*Acous.*). The use of a public-address system to augment the loudness of speech in adverse acoustic surroundings.

Reis microphone (or **transmitter),** rīs (*Elec. Comm.*). A primitive speech transmitter in which electric currents were modulated by a make-and-break contact operated by a diaphragm.

Reissner's fibre, ris'ner (*Zool.*). In *Vertebrata,* a wire-like fibre of unknown function running from its attachment at the posterior end of the nerve-tube to the posterior commissure in the roof of the mid-brain, via the cavity of the nerve-tube.

Reissner's membrane (*Zool.*). In Mammals, a delicate connective-tissue membrane which cuts off the outer lower portion of the scala vestibuli of the cochlea.

Reisz microphone, rīs (*Elec. Comm*). A carbon transmitter in which a large quantity of carbon granules between a cloth or mica diaphragm and a solid backing, such as a block of marble, is subjected to the applied sound-wave. Characterised by high damping of the applied vibrational forces, and freedom from carbon noise by virtue of packing amongst the granules.

reiteration (*Surv*). A method of checking angular measurements made with a theodolite (and of securing greater accuracy) by repeating the observations after reversing face. Cf. *repetition.*

reiteration (*Typog*). The second side of a sheet to be printed, usually the outer forme.

rejection filter (*Elec. Comm.*). See **band elimination filter.**

rejector circuit (*Radio*). A parallel combination of inductance and capacity, tuned to the frequency of an interfering transmission, to which it offers a high impedance when placed in series with the antenna circuit of a receiver.

rejointing (*Build., Civ. Eng.*). *Pointing* (q.v.).

rejuvenation (*Geol.*). A term applied to the action of a river system which, following uplift of the area drained by it, is able to resume downcutting, in the manner characteristic of a younger stream, in attempting to attain to the new base level.

rejuvenes'cence (*Biol.*). (1) The conversion of the contents of a cell into one or more cells of a different and usually more active character.—(2) Renewal of growth from old or injured parts.

relapse (*Med.*). The falling back into an illness after an apparent or partial recovery.

relapsing fever (*Med.*). Spirochaetosis. A term applied to a number of diseases which are transmitted by lice or by ticks and are due to infection with various spirochaetes; characterised by recurrent attacks of fever and by enlargement of the liver and spleen.

relative density (*Chem.*). The ratio of the density of a gas to that of hydrogen under similar conditions of pressure and temperature.

relative efficiency (*Eng.*). In an internal-combustion engine, the ratio of the actual indicated thermal efficiency to the efficiency of some ideal cycle, such as the *air standard cycle* (q.v.), at the same compression ratio.

relative hearing loss (*Acous.*). The percentage of the range of hearing which is not appreciated by a deaf ear.

relative humidity (*Meteor.*). The ratio of the amount of water vapour in the air to the amount which would saturate it at the same temperature; or the ratio of the pressure of water vapour present to the saturated vapour pressure at the same temperature. Cf. *humidity*, and see **hygrometer.**

relative sexuality (*Bot.*). The occurrence in a species of strains giving gametes able to fuse with those produced by either of the normal strains.

relative visibility factor (*Light*). The ratio of the apparent brightness of a monochromatic source to that of a source of wavelength 5500 A.U. having the same energy.

relativity, principle of (*Phys.*). A universal law of nature which states that the laws of mechanics are not affected by a uniform rectilinear motion of the system of co-ordinates to which they are referred. Einstein's relativity theory is based on this principle, and on the postulate that the observed value of the velocity of light is constant and is independent of the motion of the observer.

relaxation oscillation (*Radio, Television*). Oscillation which is characterised by a relatively slow variation of current or voltage during a part of the cycle, followed by a much faster return to the starting point. A typical example is that generated by a linear time base.

relay (*Elec. Comm.*). Any piece of apparatus in which a small electrical power is used to control larger electrical power; as a telephone relay which works on magnetic principles, or mercury or neon-filled thermionic valves, which operate on the ionisation principle.

See **differential—**
double-acting—
fast-acting—
jockey—
locking—
neutral-tongue—
non-polarised—
polarised—
shunt-field—
slow-acting—
telephone—
thermionic—
trigger—
two-step—
voice-frequency—

relay (*Elec. Eng.*). A device which, when operated, usually electromagnetically, by the current in one circuit, causes contacts to close or open to control the current in another circuit.

See **balanced-beam—**
differential—
directional—
gas-filled—
impedance—
load-levelling—
over-current—
thermal—
vane—

relay (*Eng.*). See **servomotor.**

relay, band (*Elec. Comm.*). See **band relay.**

relay-set (*Auto. Teleph.*). A group of relays mounted together for a combined purpose, generally with facility for quick detachment and replacement if found faulty.

relay spring (*Elec. Comm.*). The flexible part of a relay which keeps it in an unoperated condition. It is stressed on operation, and restores the relay to normal on cessation of the operating current.

relay system (*Elec. Comm.*). A system which uses a central radio receiver for accepting broadcast programmes, which are then distributed to subscribers. See **radio exchange.**

relay-type graphic instrument (*Elec. Eng.*). A graphic instrument in which the marking device is operated by an auxiliary source of supply controlled by the current to be measured.

release (*Photog.*). The trigger arrangement for releasing the shutter and effecting exposure in a camera. See **antinous release.**

release (*Teleph.*). In automatic telephony, the release of apparatus which has been seized for establishing a connexion. In manual telephony, the positive disengagement of apparatus on cessation of a conversation.

See **called-party—**
calling-party—
calling-subscriber—
first subscriber—
last subscriber—

release print (*Cinema.*). A print of a cinematograph film for public use in cinemas.

release wire (*Auto. Teleph.*). An extra wire in the exchange circuits which is sometimes used solely for releasing selectors and switches when a connexion is to be broken down.

releasing key (*Civ. Eng.*). A tapered piece used to ease shuttering away from the concrete after it has set.

relict (*Ecol.*). A species, whether terrestrial, marine, or fresh-water, which occurs at the present time in circumstances different from those in which it originated.

relief block (*Print.*). A printing block (e.g. line, half-tone) which can be used with normal printing type.

relief process (*Photog.*). Any colour process using matrices.—(*Print.*) See **printing.**

relieving arch (*Build., Civ. Eng.*). One built on the spandrel of a main arch, in order to distribute the load, or over a lintel, to relieve it of the weight of wall above.

relish (*Join.*). The projection of the shoulder from the flanks of the tenon.

reload (*Photog.*). To remove exposed film and insert unexposed film in a camera or magazine in a dark-room or under light-tight conditions (e.g. in a changing bag).

reluctance (*Elec. Eng.*). The ratio which the magnetomotive force acting round a magnetic circuit bears to the flux which it produces.

reluctance, unit of (*Elec. Eng.*). See **oersted.**

reluctivity (*Elec. Eng.*). A term sometimes used to denote the reciprocal of permeability.

Remak's fibres (*Zool.*). In *Vertebrata*, amyelinate fibres occurring in peripheral nerves.

rem'anence (*Elec. Eng.*). The magnetic flux density remaining in a substance after the magnetising force has been removed. Also called RETENTIVITY.

remiges, rem'i-jēz (*Zool.*). In Birds, the large contour feathers of the wing.—*sing.* **re'mex.**

rem'iped (*Zool.*). Having the feet adapted for paddling, as many aquatic Birds.

remission (*Med.*). An abatement (often temporary) of the severity of a disease: the period of such abatement.

remittent (*Med.*). (Of a fever) characterised by remissions in which the temperature falls, but not to normal: remittent fever (malaria).

Remos (*Acous.*). An acoustic absorbing material, consisting of porous boards made from a certain type of dried moss.

remote (*Bot.*). Said of the gills of agarics which do not reach the stipe but leave a free space around it.

remote control (*Elec. Eng.*). The control of apparatus by means of one or more switches, usually of the pushbutton type, situated at some distance from the apparatus.

removes (*Typog.*). Quotations, etc., set in smaller type than the main text. The difference in size is usually two points. Thus a book the text of which is set in 12-point or pica should have its quotations set in 10-point.

re'nal (*Zool.*). Pertaining to the kidneys.

renal portal system (*Zool.*). In some lower Vertebrates, that part of the venous system which brings blood from the capillaries of the posterior part of the body and passes it into the capillaries of the kidneys.

render and set (*Plast.*). Two-coat work on walls.

render, float, and set (*Plast.*). Three-coat work on walls.

rendered (*Plast.*). A term applied to laths which are split rather than sawn, so as to conserve the maximum strength.

rendering (*Plast.*). The operation of covering brick or stonework with a coat of coarse stuff: the coating itself.

ren'iform (*Bot.*). Kidney-shaped, either solid or flat, and having the outline of a kidney cut longitudinally.

rennet (*Zool.*). See **abomasum.**

Rennie dock (*Civ. Eng.*). See **sectional pontoon dock.**

rennin (*Chem.*). An enzyme found in the gastric juice, causing the clotting of milk.

reno- (Latin *renes*, kidneys). A prefix used in the construction of compound terms; e.g. *renopericardial*, pertaining to the kidneys and the pericardium.

rep, repp (*Textiles*). A fabric with a corded surface of cotton, silk, wool, or of silk and wool.

re'pand (*Bot.*). Having a slightly wavy edge.

repeated emergence (*Bot.*). A condition in fungi in which the zoospores, after swimming for a time, encyst and then emerge from the cysts without any change in morphology.

repeater (*Horol.*). A watch which 'repeats the time' by striking a sequence of blows on gongs when a slide that projects from the band of the case is pushed. In a *quarter repeater* the last hour (as shown by the watch) is struck, followed by the number of quarters; a *minute-repeater* strikes, in addition, the number of minutes since the last quarter struck.

repeater (*Teleph.*). The special type of thermionic amplifier for insertion into a telephone circuit at intervals. One of its functions is to overcome the distributed loss in the line.—2·1 REPEATER, a repeater which uses one amplifier only.—2·2 REPEATER, a repeater for two-way operation, in which there are two separate amplifiers for the two directions, the currents in the two directions being separated by hybrid coils.

See **broadcasting—** **impulse—**
cord-circuit— **programme—**
four-wire— **two-wire—**

repeater balance (*Teleph.*). The balancing network associated with the hybrid-coil in a two-way repeater. See **line balance.**

repeater, band (*Elec. Comm.*). See **band relay.**

repeater gain (*Teleph.*). The power delivered by a repeater divided by the power which would be delivered in the absence of the repeater; expressed in decibels.

repeating coil (*Teleph.*). A transformer of low ratio (generally unity) for separating telephonic circuits; e.g. repeaters from their external lines.

repeating selector (*Auto. Teleph.*). A selector which is operated by the first train of impulses received, and also repeats all received impulses for operating further selectors.

repeating work (*Horol.*). The chiming mechanism of a repeater watch.

re'pent (*Bot.*). Lying on the soil and rooting.

repetition (*Surv.*). A method of checking angular measurements made with a theodolite by repeating the observation after unclamping the lower plate and sighting on the back station so that the vernier reading is unaltered, and then sighting forward to get a new reading on the vernier, which should be double the previous reading. Cf. *reiteration.*

repetition compulsion (*Psycho-an.*). A factor in mental life which compels early patterns of behaviour to be repeated, irrespective of the pleasure-displeasure thereby experienced by the individual.

repetition rate (*Teleph.*). The number of times repetition is demanded in a telephone conversation, this being related to the line or transmitter noise, amplitude distortion, and the frequency response of the system.

replaceable hydrogen (*Chem.*). Those hydrogen atoms in the molecule of an acid which can be replaced by atoms of a metal on neutralisation with a base.

re'plete (*Zool.*). See **plerergate.**

rep'licate (*Bot.*). Folded back, as when the edge of an apothecium is turned outwards and downwards.

replicate septum (*Bot.*). A septum in some algae which bears a collar-like appendage projecting into the cavity of the cell.

replic'atile (*Zool.*). Said of a wing which folds over on itself in the resting position.

rep'lum (*Bot.*). A thin wall dividing the fruit into two chambers, formed by an ingrowth from the placentas, and not a true part of the carpellary walls.

report call (*Teleph.*). A call made to ascertain whether a desired subscriber is available for connexion.

repp (*Textiles*). See **rep.**

repression (*Psycho-an.*). The unconscious mental mechanism by which complexes are kept out of consciousness. According to Freud, this repression is formed by the superego or primitive unconscious.

reproduction (*Acous.*).

See **acoustic—** **electrical—**

reproduction (*Biol.*). The process of generation of new individuals whereby the species is perpetuated.—*adj.* **reproductive.**

reproductive organ (*Zool.*). See **gonad.**

reproductive system (*Zool.*). See **genitalia.**

rep'tant (*Bot.*) Repent.

reptile skins (*Leather*). The term includes alligator, crocodile, lizard, and snake skins; these are used, after tanning or tawing, for uppers of ladies' shoes and fancy goods.

Reptilia (*Zool.*). A class of *Craniata* having a scaly integument, cold blood, a right and left aortic arch, a partially divided heart, a single occipital condyle, pulmonary respiration, and pentadactyl limbs.

Reptilian Sandstone (*Geol.*). See **Lossiemouth Beds.**

repug'nato'rial glands (*Zool.*). In *Arthropoda*, glands, usually abdominal in position, which produce a repellent secretion of an odoriferous, pungent, or corrosive nature which can be used in self-defence.

repulsion (*Gen.*, *Cyt.*). The tendency shown by dominant characters to separate.

repulsion-induction motor (*Elec. Eng.*). A single-phase induction motor having, in addition to the squirrel-cage winding on the rotor, a commutator winding with its brushes short-circuited, so that the motor starts as a repulsion motor with a high starting torque and runs with the characteristics of an induction motor.

repulsion motor (*Elec. Eng.*). A type of single-phase commutator motor in which power is supplied to the stator winding, and the armature winding is short-circuited through the brushes. See **compensated repulsion motor.**

repulsion-start induction motor (*Elec. Eng.*). A repulsion motor having a centrifugal device which short-circuits all the commutator bars when the motor reaches a certain speed, so that it runs as a single-phase induction motor, and starts as a repulsion motor with a high starting torque.

requisition. A written order for the supply of materials.

re-radiation (*Radio*). A phenomenon which occurs when a receiver employing reaction on to the antenna circuit is adjusted to the point of oscillation. The signal strength for nearby receivers is thereby increased.

rere arch (*Build.*). A flat soffit arch laid over splayed jambs.

re-recording (*Cinema.*). The practice of using reproduced sound from a record to make a new record, e.g. when an edited film is re-recorded to adjust the levels of the recorded sound so that they may be consistent, although taken on separate occasions; or when a disc record is dubbed up from other previous recordings.

réseau, rā-sō (*Astron.*). A network of parallel lines photographed on to the plates used in certain branches of stellar photography, to facilitate the subsequent measurement of star positions.

réseau (*Photog.*). The mosaic resulting from ruling coloured lines, when making a screen on an emulsion.

resection (*Surg.*). The cutting off of a part of a bodily organ, especially the ends of bones and other structures forming a joint.

resection (*Surv.*). The operation in plane-tabling by which the point located is the station occupied by the table.

reserve buoyancy (*Aero.*). The potential buoyancy of a seaplane or amphibian which is excess of that required for normal floating. The downward force required for complete immersion.

reserve cellulose (*Bot.*). Cellulose present in endosperm or other storage tissues, and subsequently used in the nutrition of the plant.

reserves (*Mining*). Sampled ore, developed, blocked out, or exposed on not less than three sides.

reservoir (*Civ. Eng.*). A basin for the storage of water which is later to be used for purposes of irrigation, or for supply to towns and cities.

reservoir (*Zool.*). In some *Mastigophora*, a non-contractile vacuole which opens into the gullet.

reshabar′ (*Meteor.*). A dry, squally, north-east wind blowing down some mountain ranges of southern Kurdistan.

residual affinity (*Chem.*). The chemical attractive forces which remain after saturation of the normal valencies of the atoms in a molecule. They are responsible for the formation of molecular compounds and for chemisorption.

residual current (*Chem.*). The small current which may be passed through an electrolyte without apparent change at the electrodes.

residual deposits (*Geol.*). Accumulations of rock waste resulting from disintegration *in situ*. They cover the whole range of grain size, from residual boulder beds to residual clays.

residual errors. Errors which remain in an observation despite all attempts to eliminate them.

residual field (*Elec. Eng.*). The magnetic field remaining in a magnetic circuit after the removal of the magnetising force.

residual gas (*Thermionics*). The small amount of gas which inevitably remains in a 'vacuum' tube after pumping. If present to excess, it causes erratic operation of the tube.

residual magnetism (*Elec. Eng.*). The magnetism remaining in a substance after the magnetising force has been removed.

residual voltage (*Elec. Comm.*). The balance of interfering voltage in a communication circuit due to an adjacent power-line, after both lines have been effectively transposed.

residues (*Photog.*). The used photographic solutions, including those of old emulsions, from which noble metals can be recovered economically.

resilience (*Eng.*). The stored energy of a strained material, or the work done per unit volume of an elastic material by a bending moment, force, torque, or shear force, in producing strain.

resilient escapement (*Horol.*). An escapement in which the banking pins yield to any excess pressure due to over-banking, allowing the impulse pin to pass the lever, which has no horns; or one in which the teeth of the escape wheel are so formed as to provide a recoil.

resil′ium (*Zool.*). The elastic hinge joining the halves of a shell in a Bivalve.

resin (*Chem.*). The product from the secretion of the sap of certain plants and trees. Resins are hard, fusible, and more or less brittle, insoluble in water, soluble in certain organic solvents. They consist of resinous matter, i.e. certain highly polymerised acids and neutral substances mixed with terpene derivatives. See also **rosin** and **synthetic resins.**

resin canal (*Bot.*). An intercellular space, often bordered by secreting cells, containing resin or turpentine.

resin esters (*Chem.*). *Ester gums* (q.v.).

resin flux, resino′sis (*Bot.*). An abnormal escape of resin from a plant due to parasitic attack.

resin soaps (*Chem.*). See **soaps.**

resinates (*Chem.*). The calcium, magnesium, aluminium, iron, nickel, cobalt, zinc, tin, manganese, and lead salts of rosin, obtained by the fusion of rosin with the metal oxides. They effect the hardening of the rosin, and are used as driers for varnishes.

resinogenet′ic, resinogen′ic (*Bot.*). Giving rise to resin.

res′inophore groups (*Chem.*). Groups occurring in the molecule of certain substances which make them readily susceptible to polymerisation and resin formation. Resinophore groups are, e.g.

$$-\mathrm{N{:}C{:}N}-$$
$$-\mathrm{CO{\cdot}CH{:}CH}-$$
$$-\mathrm{N{:}\underset{|}{P}{:}N}-$$

resinosis (*Bot.*). See **resin flux.**

resinous electricity (*Elec. Eng.*). An obsolete name for *negative electricity*, derived from the fact that it can be produced by friction on resinous bodies (e.g. sealing-wax).

resinous substances (*Chem.*). A term applied to (*a*) true resins, (*b*) substances resembling true resins in their physical properties.

resist (*Photog.*). A coating of chemically neutral substance placed over a surface when the latter has to be protected at some stage in processing, as in etching or selective dyeing.

resistance (*Acous.*). See **acoustic resistance.**

resistance (*Biol., Med.*). The whole of the characters or properties of an organism which enable it to resist the attacks of a parasite or disease.

resistance (*Elec.*). (1) The property of a substance by virtue of which it resists the flow of an electric current through it.—(2) See **resistor.**

See **ballast—**
contact—
coupling—
direct-current—
earth—
effective—
fault—
insulation—
linear—
non-linear—
ohmic—
radiation—
specific—
aerial (antenna)—*

resistance (*Psycho-an.*). An unconscious barrier in the mind against making unconscious processes conscious. Manifested in psycho-analysis by reluctance and opposition on the part of an individual to accept interpretations from the analyst concerning his unconscious processes.

resistance box (*Elec. Eng.*). A box containing a number of resistors connected to blocks at the top, and arranged so that any of the coils can be included in the circuit by inserting suitable plugs into sockets formed in the blocks.

resistance butt-welding (*Elec. Eng.*). A resistance welding process in which the two parts to be joined are butted together.

resistance-capacity coupling (*Radio*). A form of resistance coupling in which a condenser is interposed between the coupling resistance and the grid of the succeeding valve, to remove the steady component of the P.D. across the resistance from the grid, whilst passing the alternating components. Cf. *battery coupling.*

resistance-coupled amplifier (*Radio*). An amplifier employing resistance coupling between successive stages.

resistance coupling (*Radio*). Coupling between successive stages of an amplifier employing thermionic valves, by which the changes in anode current of one valve produce changes of potential across a resistance included in the circuit, such changes of potential being impressed on the grid of the succeeding valve.

resistance drop (*Elec. Eng.*). The voltage drop produced by a current flowing through the resistance of a circuit; equal to the product of the current and the effective resistance.

resistance flash-welding (*Elec. Eng.*). A resistance welding process in which an arc is struck and maintained between the parts until the correct temperature is attained, after which the current is cut off and the parts are forced together by mechanical pressure.

resistance frame (*Elec. Eng.*). A frame containing a number of resistors connected to a multiple-contact switch at the top, so that any desired number of them can be included in the circuit in which the frame is connected.

resistance furnace (*Elec. Eng.*). See **resistance oven.**

resistance grid (*Elec. Eng.*). A resistance unit generally used for heavy currents. Made up of a cast-iron grid designed so that current enters one end and passes through all the sections in series, before leaving at the other end.

resistance oven (*Elec. Eng.*). An oven in which the heating is carried out by means of heating resistors. Also called a RESISTANCE FURNACE.

resistance percussive welding (*Elec. Eng.*). A resistance welding process in which a heavy electric current is discharged momentarily across the electrodes, and a momentary mechanical force is applied simultaneously.

resistance pyrometer (*Elec. Eng.*). A pyrometer the operation of which depends upon the variation of the resistance of a wire with temperature. Also called a RESISTANCE THERMOMETER.

resistance seam-welding (*Elec. Eng.*). A resistance welding process in which the welding electrodes consist of two rollers, having mechanical pressure between them, moving along the seam to be welded.

resistance spot-welding (*Elec. Eng.*). A resistance welding process in which the electrodes consist of two points and cause welding to take place at a single spot.

resistance thermometer (*Elec. Eng.*). See **resistance pyrometer, platinum thermometer.**

resistance welding (*Elec. Eng.*). Pressure welding, in which the heat to cause fusion of the metals is produced by the welding current flowing through the contact resistance between the two surfaces to be welded, these being held together under mechanical pressure.

See **resistance butt-welding**
resistance flash-welding
resistance percussive welding
resistance seam-welding
resistance spot-welding.

resistant (*Biol., Med*). Not readily attacked by a parasite or disease.

resistivity (*Elec. Eng.*). A term denoting *volume resistivity*, i.e. the resistance of a block of the material in question having unit length and unit cross-sectional area; also called SPECIFIC RESISTANCE. See **mass resistivity.**

resistor (*Elec. Eng.*). A piece of apparatus used on account of its possessing resistance. Also called a RESISTANCE.

See **charging—**
earthing—
heating—
inductive—
non-inductive—

resolution (*Chem.*). The separation of an optically inactive mixture or compound into its optically active components.

resolution (*Med.*). Retrogression of the phenomena of inflammation; the subsidence of inflammation.

resolve (*Med.*). To remove inflammation by resolution.

resolving power (*Light*). The ability of a microscope or telescope to separate the images of close objects, or of a spectroscope to distinguish between nearly equal wavelengths. The limit of resolution in a good instrument is determined by the diffraction fringes surrounding each point in the image; it is therefore dependent on the aperture of the instrument.

resolving power of the eye (*Photog.*). The angle subtended by a small object which can just be determined visually.

resolving power of a lens (*Photog.*). The ability of a lens to register fine detail on a fine-grained emulsion. Measured by the circle of confusion.

resonance (*Acous.*). The phenomenon of minimum mechanical or acoustical impedance as the frequency of the applied disturbing force is varied, resulting in a maximum velocity of motion. Rods or plates are potentially vibrating systems with several modes of vibration, the frequencies of resonance generally not being exactly harmonic. The sharpness of resonance is measured by the ratio of the dissipation to the inertia of the system, a coefficient which also measures the rate of decay of the motion of the vibrating system when it is impulsed. See **decay factor.**

See also **acoustic—**
cavity—
current—
electrical—
Helmholtz—
mechanical—
pipe—
voltage—

resonance (*Chem.*). A state of a molecule which is intermediate between those represented by two bond formulae which are theoretically possible; e.g. the benzene molecule shows resonance.

resonance (*Eng.*). In any vibrating system, such as an engine-driven generator or screw propeller, the synchronism of some harmonic of the forcing impulses, due to non-uniform driving torque, with the natural frequency of vibration of the system. This leads to excessive vibration amplitudes which may result in shaft failure. See also **critical speed.**

resonance (*Radio*). A state of balance between positive (inductive) and negative (capacitative) reactance of a circuit. It is accompanied by the appearance of large currents and voltages resulting from relatively small e.m.f.'s.

resonance amplifier (*Radio*). An amplifier using the frequency-selective and magnifying properties of a resonant circuit.

resonance curve (*Radio*). A curve showing the variation of current in a resonant circuit connected in series with a generator of e.m.f., as the relation between the resonance frequency and the frequency of the generator is varied through unity, the e.m.f. of the generator remaining constant.

resonance radiation (*Light*). A case of *fluorescence* (q.v.) in which the exciting radiation is of the same frequency as that of fluorescence. If sodium D light is passed through a vessel containing sodium vapour at a low pressure, the path of the beam is seen to glow with light which is found, by spectroscopic examination, to give the D lines.

resonance step-up (*Radio*). The ratio of the voltage appearing across the condenser of a parallel tuned circuit to the e.m.f. acting around the circuit (usually induced in the coil) when the circuit is resonant at the applied frequency. See **Q.**

resonant circuit (*Radio*). A circuit comprising an inductance coil and a condenser in series or parallel. The series circuit has an impedance which falls to a very low value at the resonant frequency, whilst that of the parallel circuit rises to a very high value.

resonant frequency (*Radio*). The frequency at which the reactances of a series resonant circuit, or the susceptances of a parallel resonant circuit, balance out. It is numerically equal to $1/2\pi\sqrt{LC}$ cycles per second, where L is the inductance in henries and C the capacitance in farads.

resonant line (*Radio*). A parallel wire or concentric transmission line open or short-circuited at the ends and an integral number of quarter-wavelengths long. Used for stabilising the frequency of short-wave oscillators, and in antenna systems.

resonant shunt (*Elec. Eng.*). A tuned circuit placed in parallel with certain pieces of apparatus, in order to absorb harmonic currents of the frequency for which the circuit is tuned.

resonator (*Acous.*). Any acoustic enclosure, such as a pipe or cavity, which exhibits acoustic resonance, particularly if the latter is sharp.

See **Helmholtz—**
pipe—

resonator (*Radio*). Any device exhibiting a sharply defined resonance effect, such as a piezo-electric crystal or resonant circuit. Originally, a circular wire ring containing a small spark-gap, used by Hertz for the detection of electromagnetic waves.

resor′cinol or **resor′cin** (*Chem.*). $C_6H_4(OH)_2$, *m*-dihydroxy-benzene, a dihydric phenol, colourless crystals, m.p. 119° C., b.p. 276° C. Used as a lotion in certain skin diseases.

resorption (*Geol.*). The partial or complete solution of a mineral or rock fragment by a magma, as a result of changes in temperature, pressure, or composition of the latter.

respiration (*Bot.*, *Zool.*). The interchange of oxygen and carbon dioxide associated with katabolic processes in an aerobic organism: the corresponding processes in an anaerobic organism.

respiratory cavity, respiratory chamber (*Bot.*). A large intercellular space lying immediately beneath a stoma.

respiratory centre (*Zool.*). In Vertebrates, a nerve-centre of the hind-brain which regulates the respiratory movements.

respiratory chromogen (*Bot.*) A colourless substance which gives rise to a coloured substance on oxidation or reduction and may play a part in respiration.

respiratory heart (*Zool.*). In Birds and Mammals, the auricle and ventricle of the right side of the heart, which supply blood to the lungs. Cf. *systemic heart*.

respiratory index (*Bot.*). The number of milligrams of carbon dioxide set free from one gram of plant material (weighed as dry) when the temperature is 10° C., when the amount of respirable material is unlimited, and when oxygen is present in the same proportions as in the ordinary atmosphere.

respiratory movements (*Zool.*). The muscular movements associated with the supply of air or water to the respiratory organs.

respiratory organs (*Zool.*). The specialised structures which enable an organism to obtain a sufficient supply of oxygen for its needs.

respiratory pigment (*Zool.*). A substance contained in the blood of an organism by whose agency a sufficient amount of oxygen is conveyed to the tissues. See **chlorocruorin, haemocyanin, haemoglobin.**

respiratory quotient, respiratory ratio (*Bot.*, *Zool.*). The ratio between the volume of carbon dioxide given off and that of oxygen taken in, during a given time. It is approximately unity when an organism is respiring at the expense of carbohydrates, but is less than unity when fatty material is being utilised.

respiratory system (*Zool.*) See **respiratory organs.**

respiratory trees (*Zool.*). In *Holothuroidea*, a pair of elaborate tubular diverticula of the cloaca, the ultimate branches of which end in small spherical ampullae; believed to have a respiratory and hydrostatic function.

respiratory trumpets (*Zool.*). In the pupae of *Culicidae* (Mosquitoes, etc.), a pair of tubes projecting from the thorax which allow air to pass to the spiracles.

respiratory tube (*Zool.*). In some *Cyclostomata*, a median ventral tube by which water passes from the gullet to the gills.

respiratory valve (*Zool.*). In some Fish, e.g. Trout, a pair of transverse membranous folds, one attached to the floor, the other to the roof of the mouth, which prevent water from escaping through the mouth during expiration.

respond (*Build.*). (1) A pilaster which forms a pair with another.—(2) A *reveal* (q.v.).

response (*Elec. Comm., etc.*). The response, for a given frequency, of a transmission system (or a part thereof) is precisely defined as the ratio of the output level to the input level, these being defined in such special ways that the response of the complete system is the sum of the responses of its separate parts, the scale being logarithmic, and the power-levels expressed in decibels.

See **axial—**
frequency—
loudspeaker—
mean-spherical—
microphone—
polar—
random—
receiver—
reverberation—
total—

response curve (*Elec. Comm.*). The curve which exhibits the trend of the response of a communication system or a part thereof, for the range of frequency over which the system or part of the system is intended to operate. The response is expressed in decibels, and, for acoustic purposes, on a logarithmic frequency base.

rest bend (*San. Eng.*). A right-angle bend off a horizontal drain-pipe, fitted with a flat seating for connexion to a vertical pipe.

restiform (*Zool.*). Rope-like.

restiform bodies (*Zool.*). In some Fish, a pair of lateral extensions of the medulla oblongata which lie behind the cerebellum.

resting nucleus (*Cyt.*). A nucleus which is not dividing.

resting period, resting stage (*Bot.*). Any time in the life of a plant, or plant organ, when no growth or other activity appears to be in progress.

resting spore (*Bot.*). A thick-walled spore able to endure drought or other unfavourable conditions, and normally remaining quiescent for some time before it germinates.

restitution, coefficient of (*Mech.*). The ratio of the relative velocity of two elastic spheres after direct impact to that before impact. If a sphere is dropped from a height on to a fixed horizontal elastic plane, the coefficient of restitution is equal to the square root of the ratio of the height of rebound to the height from which the sphere was dropped. See **impact.**

restorative (*Med.*). Capable of restoring to health or to consciousness: any remedy which does this.

restrainer (*Photog.*). A chemical which reduces the rate of action of a developer or reducer in photographic work. Cf. *accelerator*. See also **light restraint.**

restriking voltage (*Elec. Eng.*). The high-frequency transient voltage which appears across the contacts of a switch, circuit-breaker, or fuse immediately after it has interrupted a circuit, and which is superimposed on the recovery voltage.

resue (*Mining*). To mine sufficient barren rock to allow of the subsequent removal of a narrow vein or lode, unmixed with country rock.—*n.* **resuing.**

resultant (*Mech.*). The resultant of two or more forces acting on a body is that single force which, when replacing the original forces, will produce in the body the same effect. Generally the resultant of a number of vector quantities is their vector sum. See **parallelogram of forces.**

resultants (*Chem.*). See **reaction products.**

re-superheating (*Eng.*). See **reheating.**

resu'pinate (*Bot.*). Reversed in position, usually through 180°, so that orientation is abnormal. The fruit bodies of some fungi with the hymenium on the upper surface are regarded as being resupinate, and in some flowers, those of orchids for example, the flower stalks or the ovaries twist during development, so that the open flower is really upside down.

resurgent gases (*Geol.*). Superheated steam and other volatiles which play an active rôle in volcanic action, and which were derived from the water included in sedimentary rocks at the time of their accumulation.

resuscitation (*Med.*). Restoration to consciousness or to life of one who is unconscious or apparently dead.

retaining wall (*Civ. Eng.*). A wall built to support earth at a higher level on the one side than on the other.

retakes (*Cinema.*). Additional takes of a shot, executed because faults have been noticed in the rushes of the regular takes, none of which are acceptable for editing purposes.

retardation (*Med.*). Arrest of mental development: abnormal slowness of mental activity.

retardation coil (*Elec. Comm.*). A coil of high inductance used to separate alternating from direct current, particularly when the latter is taken from a common supply.

retardation, phase (*Elec. Comm.*). See **phase retardation.**

retardation test (*Elec. Eng.*). A method of determining the iron, friction, and windage losses of electrical machinery by determining the rate at which it retards under the influence of these losses after being run up to speed and then disconnected from the supply.

retarded potential (*Radio*). A quantity occurring in electromagnetic wave theory, defined as the instantaneous electric potential at a point due to the distribution of charges and currents at a source which existed at a time x/c seconds earlier, where x is the distance of the point from the source and c the velocity of wave propagation.

retarder (*Build.*). A substance which delays or prevents the setting of cement.

retarder (*Chem.*). A negative catalyst which is added to a reacting system to prevent the reaction from being too vigorous.

retarder or **wagon retarder** (*Rail.*). An arrangement of braking surfaces placed alongside, and parallel with, the running rails in a shunting yard; operated from a signal-box by electric, pneumatic, or hydraulic means.

retarding field (*Thermionics*). An electric field such as exists between a positively charged grid and a negatively charged outer electrode of a three-electrode thermionic vacuum tube. Electrons entering this region from the cathode tend to have their direction of motion reversed.

retarding field detector (*Radio*). A form of detector employing a retarding field tube; particularly used for ultra-high frequencies.

retarding field tube (*Thermionics*). A thermionic tube in which the electrons from the cathode pass through the meshes of a positively charged electrode to enter a region where the electric field is in a direction opposing their forward motion, causing them to return to the electrode.

Retardo (*Build.*). Trade-name for a retarder.

rete, rēt (*Zool.*). A net-like structure.—*pl.* **re'tia.**

rete Malpig'hii (or **muco'sum**) (*Zool.*). See **Malpighian layer.**

rete mirabile, —ab'il-e (*Zool.*). (1) A network of small blood-vessels, as in the so-called *red glands* (q.v.) of Fish.—(2) In *Holothuroidea*, a vascular plexus which connects the dorsal vessel with the intestine.

rete ova'rii (*Zool.*). In the female Mammal, a structure homologous with the rete testis of the male, joining the epoöphoron to the medullary cords.

rete testis (*Zool.*). In Mammals, a network of intercommunicating vessels within the mediastinum.

ret'ene (*Chem.*). $C_{18}H_{18}$, methyl-*iso*propyl-phenanthrene; it occurs in the coal-tar fraction boiling above 300° C. and crystallises in white plates which sublime without decomposition.

retention (*Med.*). The abnormal keeping back in the body of matter (e.g. urine) normally evacuated.

retention wall (*Build.*). A thin wall built alongside an external wall of a building so as to leave a ½ in. to 1 in. cavity between, which is later filled with waterproofing material to form a vertical damp-proof course.

retentivity (*Elec. Eng.*). See **remanence.**

retic'ular (*Med., Zool.*). Resembling a net: of or pertaining to the reticulo-endothelial system, e.g. reticular cells.

reticular tissue (*Zool.*). A form of connective tissue in which the intercellular matrix is replaced by lymph; it derives its name from the network of collagenous fibres which it shows.

retic'ulate (*Bot., Zool.*). (1) Forming a network.—(2) Having the surface marked by a network of fine upstanding ridges.

retic'ulated (*Masonry*). A term applied to a variety of rusticated work distinguished by irregularly shaped sinkings separated by narrow margins of regular width.

reticulated (*Pot.*). Said of pottery having a surface decoration of false pierced work, produced either by impasto overclay (deep), addition of slip (shallow), or by stamping.

ret'icule (*Surv.*). A cell carrying cross-hairs and fitting into the diaphragm of a surveying telescope. Also called a GRATICULE.

retic'ulin (*Chem., Zool.*). A collagen, containing phosphorus, occurring in reticular fibrous tissues.

reticuli'tis (*Vet.*). Inflammation of the reticulum.

retic'ulocyte (*Zool.*). A variety of erythrocyte having a granular or reticular appearance; usually occurring in small numbers, but more numerous in young animals and in adults after haemorrhage.

retic'ulocyto'sis (*Med.*). An increase in the number of reticulocytes in the blood, as in pernicious anaemia.

reticulo-endothe'lial system (*Zool.*). A system of special phagocytic cells which show a special affinity for certain colloidal dyes (such as pyrrhol blue), fine suspended particles, and lipoid matter introduced into the circulation.

retic'ulum (*Zool.*). In ruminant Mammals, the second division of the stomach, or honeycomb bag: more generally, any net-like structure.—*adj.* **reticular.**

ret'iform (*Bot., Zool.*). Having the appearance of being netted.

retiform tissue (*Zool.*). See **reticular tissue.**

ret'ina (*Anat., Zool.*). The light-sensitive layer of the eye in all animals.—*adj.* **ret'inal.**

retinac'ulum (*Zool.*). In *Cirripedia,* a small hooked process which retains the egg-sac: in *Collembola,* the partially fused, rudimentary appendages of the third abdominal somite which retain the furcula in position: in *Lepidoptera,* a locking mechanism of the fore wing which retains the frenulum in position.

retinal fatigue (*Optics*). Retention of images after removal of excitation; due to chemical changes in the retina.

ret'inerved (*Bot.*). Net-veined.

retini'tis (*Med.*). Inflammation of the retina.

retinitis pigmento'sa (*Med*) A familial and hereditary disease in which chronic and progressive degeneration of the choroid occurs in both eyes, with progressive loss of vision.

ret'inoblas'toma (*Med.*). A tumour of the retina composed of small round cells, arising from embryonic retinal cells; it is locally destructive and forms metastases.

ret'inochoroidi'tis (*Med.*). Inflammation of the retina and of the choroid.

ret'inophore (*Zool.*). One of the crystal cells or vitrellae of an ommatidium.

retinos'copy (*Med.*). Skiascopy; shadow test. A method of estimating the refractive state of the eye by reflecting light on to it from a mirror and observing the movement of the shadow across the pupil.

retin'ulae (*Zool.*). In *Arthropoda,* the visual cells of the compound eye, forming the base of each ommatidium.

retort. A vessel used in distillation.—(*Met.*) A metallic or refractory vessel used in the distillation of metals, e.g in extraction of zinc from its ores, and in eliminating mercury from gold amalgams.—(*Gas*) A closed chamber of refractory material, heated by producer gas on the outside, in which charges of coal are carbonised. Retorts are mostly of the continuous vertical type, the other types being horizontal retorts and intermittent vertical retorts.

retort bench (*Gas*). See **bench.**

retouching (*Photog*). The manual manipulation of a negative with suitable pencil-work, in order to alter light and shade and so cover blemishes; applied particularly in portrait work.

retractable radiator (*Aero.*). A liquid cooler for an aero-engine, capable of being withdrawn out of the air stream into a protected part, as a means of controlling the temperature of the cooling liquid.

retrac'tile (*Zool.*). Capable of being withdrawn; as the claws of most *Felidae.*

retrac'tor (*Zool.*). A muscle which by its contraction draws a limb or a part of the body back or towards the body. Cf. *protractor.*

retreating systems (*Mining*). Systems in which the removal of ore or coal is commenced from the boundary of the property.

retree' (*Paper*). Slightly damaged paper from reams. It is marked XX in Gt. Britain and R in the U.S., and is invoiced at a lower rate than 'good.'

retro- (Latin *retro,* backwards, behind). A prefix used in the construction of compound terms; e.g. *retrocaecal,* behind the caecum.

retroaction (*Radio*). See **reaction.**

retrobul'bar neuritis (*Med.*). Inflammation of that part of the optic nerve situated behind the eyeball.

retrocae'cal, retroce'cal (*Med.*). Situated or occurring behind the caecum.

ret'roflexed, ret'rocurved (*Bot.*). Bent backwards.

retroflexed (*Med.*). Said of the uterus when its body is bent back on the cervix.—*n.* **retroflexion.**

retrograde motion (*Astron.*). The term applied to any westward motion in the ecliptic, but specially to the apparent motion of a planet in the sky when, owing to the combined effect of its own motion with that of the earth, it appears to move from east to west among the stars.

retrograde vernier (*Surv.*). A vernier in which n divisions on the vernier plate correspond in length to $(n+1)$ divisions on the main scale.

retrogression (*Zool.*). Degeneration; the assumption of features characteristic of lower forms.

retrogressive metamorphism (*Geol.*). The changes involved in the conversion of a rock of high metamorphic grade to one of lower grade, through the advent of metamorphic processes less intense than those which determined the original mineral content and texture of the rock.

ret'romorpho'sis (*Zool.*). Tendency to degeneration during development.

ret'roperitone'al (*Med*). Situated or occurring behind the peritoneum.

ret'ropharynge'al (*Med.*). Situated or occurring in the tissues behind the pharynx.

retropul'sion (*Med.*). The running backwards of a patient with paralysis agitans or Parkinsonism; the patient's centre of gravity is displaced backwards, the rigidity of his posture making it difficult for him to recover his balance.

retrorse' (*Bot., Zool*). Pointing backwards: pointing or facing contrary to the normal direction; as, in some Birds, feathers which incline forwards when the general direction of the plumage is backward.

retroser'rate (*Bot.*). Having marginal teeth strongly directed backwards.—(*Zool.*) Having backwardly directed teeth.

ret'roverse (*Bot., Zool.*). Retrorse.

retroversion (*Med.*). The abnormal displacement backwards of the uterus, with or without retroflexion.

retting or **rotting** (*Linen*). The process of soaking flax straw in water containing bacteria, in order to loosen the flax fibres from the woody tissue, which is removed later by scutching.

Rettinger's law (*Eng*). The work done in grinding coal or other substances is proportional to the area of the new surface produced; not yet confirmed by experiment.

return (*Weaving*). The same as *point draft.*

return bead (*Join.*). A double-quirk bead formed on the exterior angle of a timber.

return crank (*Eng.*). A short crank which replaces an eccentric in the *Walschaert's valve gear* (q.v.) on outside cylinder locomotives. It is fixed to the outer end of the main crank pin.

return electrons (*Cathode Ray Tubes*). Those electrons which, having impinged on the fluorescent screen, are on their way back to the anode.

return feeder (*Elec. Eng.*). See **negative feeder.**

return line (*Cathode Ray Tubes*). The faint trace formed on the screen of a cathode ray tube by the beam during the flyback period.

return wall (*Civ. Eng.*). A short length of wall built out from one end of a longer wall.

retuse' (*Bot.*). Having a bluntly rounded apex with a central notch.

Ret'zius' fibre-cells (*Zool.*). Thin rigid nucleated cells occurring between the hair-cells of the cochlea.

Reuleaux valve diagram, roo-lō' (*Eng.*). See **valve diagram.**

revalé, re-val-ā (*Masonry*). Said of a cornice, moulding, etc. finished when the work is in position.

reveal (*Build.*). The depth of wall revealed, beyond the frame, in the sides of a door or window opening.

reve′hent (*Zool.*) Carrying back.

reverberation absorption factor (or **coefficient**) (*Acous.*). The sound absorption factor of a large plane uniform surface when the incident sound-wave is of random intensity and direction, as in the reverberant field in an enclosure.

reverberation bridge (*Acous.*). A method of measuring the reverberation time in an enclosure; the rate of decay of the sound intensity is balanced against the adjusted and known decay of the discharge of a condenser through a resistance.

reverberation response (*Acous.*). The response of a microphone for reverberant sound, i e. for the simultaneous arrival of sound-waves of random phase, magnitude, and direction. Substantially equal to the mean-spherical response at each frequency of interest.

reverberation response curve (*Acous.*). The response of a microphone to reverberant sound-waves, as plotted with the response in decibels as ordinates, on a logarithmic frequency-base.

reverberation time (or **period**) (*Acous.*). The time, in seconds, required for the decay of the sound-intensity in an auditorium over an amplitude range of one million, or 60 decibels, there being no emission of sound-power during this decay.

rever′beratory furnace (*Met*). A furnace in which the charge is melted on a shallow hearth by flame passing over the charge and heating a low roof. Firing may be with coal, pulverised coal, oil, or gas. Much of the heating is done by radiation from the roof. Has numerous applications.

reversal of spectrum lines (*Light*). The appearance of a line as a broad, diffuse bright line with a narrow dark line down the centre. The effect is caused by cool vapour surrounding a hot source such as an electric arc, which produces a narrow absorption line on the short range of continuous spectrum given by the same vapour, at a high temperature, at the centre of the arc. Only certain lines are thus affected.

reversal process (*Photog.*). A method whereby the original film, which otherwise would be a negative, is reversed in black and white chemically, and so becomes a positive transparency suitable for projection; useful and economical in amateur cinematography.

reverse (*Bot.*). The under side of a fungal colony.

reverse (*Build.*). A *templet* (q.v.); so called from the fact that it is cut to the reverse profile of the work for which it is to be used as a reference.

reverse coupling (*Radio*). See **reverse reaction, negative feedback.**

reverse-current relay (*Elec. Eng.*). A relay for use in electric circuits, arranged to operate when the current is in the opposite direction to normal.

reverse curve (*Surv.*). A curve composed of two arcs, of the same or different radii, having their centres on opposite sides of the curve.

reverse feedback (*Radio*). See **negative feedback.**

reverse grid current (*Thermionics*). Current which flows away from the grid of a thermionic tube through the external circuit in the direction of the cathode, i.e. in the opposite way to the normal direction of current flow. It is caused by electronic emission from the grid, due to heating or bombardment, or by the presence of positive ions in the interelectrode space.

reverse plating (*Hosiery*). An arrangement made in a knitting machine to effect the transference of threads of different kinds or colours from the back to the front of the fabric so as to form the desired pattern or effect. See **plated fabrics.**

reverse-power relay (*Elec. Eng.*). An electric-circuit relay which operates when power is flowing in the direction opposite to normal.

reverse reaction (*Radio*). Reaction in such a way as to oppose the production of self-oscillation; sometimes used to neutralise the effects of inter-electrode capacity coupling.

reversed (*Zool.*). Inverted, as a spiral shell with a sinistral coil instead of a dextral coil, or vice versa.

reversed arch (*Civ. Eng.*). An *inverted arch* (q.v.).

reversed-charge (*Teleph.*). The practice of charging the whole or part of the fee for a trunk or toll-call to the called subscriber, instead of to the calling subscriber, which is normal practice.

reversed cleavage (*Zool.*). See **spiral cleavage.**

reversed drainage (*Geol.*). A phenomenon associated with river-capture, manifested by the flowing of a stream in a direction contrary to that which would be normally consistent with the existing geological structure.

reversed fault (*Geol.*). A type of *fault* (q.v.) in which compression has forced the strata on the side towards which the fracture is inclined to over-ride the strata on the downthrow side. Cf. *normal fault.*

reversed image (*Television*). An image in which the picture appears white where it should be black, and vice versa (*negative image*); or in which the left-hand (or upper) portions appear at the right-hand (or lower) side, and vice versa (*lateral inversion*).

reversed negative (*Photog*). In some mechanical photographic processes the negative has to be reversed, or turned from left to right, so that the final print is correctly orientated. Such a negative is termed a *reversed negative.*

reversed ogee (*Arch.*). A *cyma reversa* (q.v.).

reverser (*Elec. Eng.*). On traction vehicles, the switch used for altering the connexions of the traction motors in order to reverse the direction of running.

reversible absorption current (*Diel.*). A current which decreases with time much less rapidly than the 'geometrical' charging current (which is exponential), and is returned on short-circuiting the electrodes.

reversible cell (*Chem.*). A galvanic cell in which the interconversion of chemical and electrical energy is a reversible process.

reversible colloid (*Chem.*). See **lyophilic colloid.**

reversible level (*Surv.*). A form of level whose distinguishing characteristic is that the line of sight of the telescope may be reversed end for end.

reversible pistons (*Acous.*). Button- or toe-keys on an organ console which are used for reversing the position of couplers.

reversible potentiometer-type field rheostat (*Elec. Eng*). A potentiometer-type field rheostat used for controlling the field current of an electric machine and arranged so that the field current may be reversed.

reversible reaction (*Chem.*). A chemical reaction which can take place in both directions, and which is therefore incomplete, a mixture of reactants and reaction products being obtained, unless the equilibrium is disturbed by removing one of the products as rapidly as it is formed. Examples of reversible reactions are the formation of an ester and water from an alcohol and an acid, the dissociation of vapours, e.g. ammonium chloride, and the ionic dissociation of electrolytes.

reversing commutator (*Elec. Eng.*). Any form of reversing switch, but more particularly the type in which the contacts form two halves of a cylinder upon which bear two brushes.

reversing face (*Surv.*). The process of transiting a theodolite telescope, thereby changing its position from face left to face right, or vice versa.

reversing field (*Elec. Eng.*). In a commutator machine, a field of opposite polarity to that in which an armature coil had previously been moving; designed to produce a reversed e.m.f. to assist commutation. The field may be produced by a compole, or by shifting the brushes from the neutral axis.

reversing gear (*Eng.*). See **Joy's valve-gear, link motion, Walschaert's valve-gear.**

reversing layer (*Astron.*). The name given to the lower part of the sun's chromosphere where the absorption lines of the solar spectrum are formed by 'reversal' from bright emission lines to dark absorption lines.

reversing mill (*Met.*). A type of rolling-mill in which the stock being rolled passes backwards and forwards between the same pair of rolls, which are reversed between each pass. See **continuous mill, pull-over mill, three-high mill.**

reversing switch (*Elec. Eng*). A switch for reversing the connexions in an electrical circuit.

reversion, reversionary (*Biol.*). See **atavism, atavistic.**

reverting call (*Teleph.*). A call between subscribers on a party line or on a remotely operated local automatic telephone exchange. So called because it has to be established by impulsing back over a junction to a switching centre.

rever'tose (*Chem.*). A disaccharose obtained by the action of maltase on *d*-glucose.

revet'ment (*Civ. Eng.*). A retaining wall.

revise (*Typog.*). A second or third proof supplied in order that corrections made on the preceding proof may be checked over: to prepare and submit such a proof.

revivification (*Chem.*). The reactivation of charcoal.

rev'olute (*Bot.*). Rolled backwards and, usually, downwards, as the apex or margins of a leaf.

revolution (*Astron.*). The term generally reserved for orbital motion, as of the earth about the sun, as distinct from *rotation* (q.v.) about an axis.

revolution (*Geol.*). A period (usually regarded as of relatively short duration) of intense change in the disposition of sea and land, and of the surface configuration. The chief revolutions in the geological history of Britain were the *Caledonian, Armorican,* and *Alpine* (qq.v.).

revolver (*Small Arms*). A pistol in which the ammunition is carried by a rotating magazine, having its axis parallel to the bore.

revolving boilers (*Paper*). Large vessels in which rags, wood pulp, etc., are digested. Non-cellulose portions are thereby loosened and removed.

revolving flats (*Cotton Spinning*). An endless chain in a revolving-flat carding engine. It consists of metal bars extending across the machine and faced with fine wire teeth set in the opposite direction to those on the main cylinder. The flats move slowly, the cylinder rapidly, both in the same line of direction, while carding the cotton.

rewinding (*Cinema.*). The operation of winding back the reel of film after it has been projected, so that it is ready for the next time of projection. In a cinema, this is done in a *rewinding room*, adjacent to the projection box.

Rexilite (*Build.*). Trade-name for a bituminous roofing felt.

Rexoid (*Build.*). Trade-name for a bituminous roofing felt.

Reynolds' number (*Aero.*). A non-dimensional ratio used for comparing the conditions for similar motions in fluids. The product of any typical length of a body and the velocity, divided by the kinematic coefficient of viscosity of the fluid.

r.f. (*Radio*). Abbrev. for *radio frequency* (q.v.).

R.F.S. (*Build.*). Abbrev. for *render, float, and set.*

Rh (*Chem.*). The symbol for *rhodium.*

_r_H-value (*Chem.*). The logarithm, to the base 10, of the reciprocal of the hydrogen pressure which would produce the same electrode potential as that of a given oxidation-reduction system, in a solution of the same *p*H-value. The greater the oxidising power of a system, the greater the *r*H-value.

rhab'dites (*Zool.*). Small rod-like bodies, of doubtful function, secreted by certain cells of the epidermis or parenchyma in *Turbellaria.*

rhabdi'tiform (*Zool*). (Of *Nematoda*) having a short straight oesophagus with a double bulb.

Rhabdi'tis-form (*Zool.*). A free-living sexual stage in the life-history of certain parasitic *Nematoda*; e.g. *Rhabdonema.*

rhabdi'toid (*Zool*). Resembling *Rhabditis*; said of a type of nematode larva in which the buccal cavity resembles that of *Rhabditis* (i.e. is narrow with parallel sides).

Rhabdocoe'lida (*Zool*). An order of small aquatic *Turbellaria* of carnivorous habit; they have a sac-like gut.

rhab'dolith (*Zool.*). In some *Protozoa*, a small calcareous skeletal rod.

rhab'dom (*Zool.*). In the compound eyes of *Arthropoda*, a rod-like refractive body secreted by the retinulae and forming part of each ommatidium.

rhab'domere (*Zool.*). One of the constituent portions of a rhabdom, secreted by a single visual cell.

rhabdomyo'ma (*Med.*). A tumour composed of voluntary or striped muscle fibres.

rhabdomy'osarco'ma (*Med.*). A malignant rhabdomyoma.

rhachi-, rhachio-. See **rachi-.**

rhachis, rā'kis. See **rachis.**

rhachit'omy (*Zool.*). See **temnospondyly.**

Rhae'tic Series (*Geol.*). The series of marine shales and limestones found at the base of the Jurassic System and above the Triassic rocks. Some writers recognise it as a complete system.

rhagades, rag'a-dēz (*Med.*). Ulcerated fissures or cracks in the skin, especially those at the angles of the mouth occurring in congenital syphilis.

rhagad'iose (*Bot.*). Deeply marked by cracks or fissures.

rha'gon (*Zool.*). A form of Sponge colony in the shape of a flattened pyramid attached by its base, opening at the apex by an osculum, and having flagellated chambers in the upper wall only.

rham'nazin (*Chem.*). 3,5,4′-Trihydroxy-7,3′-dimethoxyflavone, a dye occurring in nature in the form of glucosides.

rham'netin (*Chem.*). 3,5,3′,4′-Tetrahydroxy-7-methoxyflavone, a dye occurring in nature in the form of glucosides.

rham'nose (*Chem.*). *Iso*dulcite, $CH_3\cdot(CHOH)_4\cdot CHO$, a methyl-pentose obtained from several glucosides, which crystallises with 1 H_2O, m.p. 93° C. On distillation with sulphuric acid it yields *a*-methyl-furfuraldehyde.

rham'phoid (*Zool.*). Shaped like a beak.

rham'phothe'ca (*Zool.*). In Birds, the horny coverings ensheathing the upper and lower jaws.

rhaphe (*Bot.*). See **raphe.**

rhe'nic acid (*Chem.*). See **rhenium oxides.**

Rhenish bricks (*Build.*). Very light bricks made of calcareous material bound together with dolomitic lime. Also called FLOATING BRICKS.

rhe'nium (*Chem.*). Symbol, Re. A metallic element in the seventh group of the periodic system, in the sub-group manganese, masurium, rhenium. At. no. 75, at. wt. 186·31. A very rare element, occurring in molybdenum glance, gadolinite, and other ores. The sp. gr. of the metal is 10·4, m.p. about 3450° C. A small percentage increases the electrical resistance of tungsten.

rhenium oxides (*Chem.*). Four oxides of rhenium have so far been found: Re_2O_7, ReO_3, ReO_2, and Re_2O_3. The volatile oxide Re_2O_7 is formed when the metal or its compounds are heated in air. Rhenium trioxide is the anhydride of rhenic acid H_2ReO_4. The heptoxide dissolves in water to form perrhenic acid, which forms metallic perrhenates.

rheomor'phism (*Geol*). Term proposed by H. G. Backlund for the process by which a pre-existing rock is converted into magma by the introduction of migrating volatiles or liquids, with concomitant rise of temperature.

rheoph'ily (*Ecol.*). The tendency shown by some aquatic animals to place themselves in a current, generally facing up it.

rhe'ostat (*Elec. Eng.*). A resistor arranged so that the value of the resistance in circuit may be varied.

See **balancer field—**
field—
field diverter—
potentiometer-type field—
shunt-field—
speed-adjusting—

rheostatic braking (*Elec. Eng.*). A method of braking used with electric motors; the motors are allowed to run as generators supplying power to resistances.

rheostatic controller (*Elec. Eng.*). A controller for varying the amount of resistance in an electric circuit.

rheostatic starter (*Elec. Eng.*) A rheostat arranged for starting an electric motor.

rheostriction (*Elec. Eng.*). See **pinch effect.**

rheotax'is, rheotro'pism (*Biol*). Response or reaction of an organism to the stimulus of a current.—*adj.* **rheotactic.**

rheumatic (*Med.*). Pertaining to or affected with rheumatism.

rheumatic fever (*Med.*). An acute disease characterised by fever, multiple arthritis, and a liability of the heart to be inflamed; due undoubtedly to a microbic infection, although the causative organism has not been isolated.

rheumatism (*Med.*). A term loosely applied to a number of conditions characterised by pain and stiffness of muscles and of joints, some inflammatory and others degenerative in origin.

rheumatoid arthritis (*Med.*). A disease characterised by inflammation and swelling of several joints (especially the small joints of the extremities) affecting the periarticular tissues, synovial membranes, and joint cartilages; it may start as an acute illness, and is probably the result of infection; finally there is much deformity, with stiffness of joints and wasting of muscles.

rhexig'enous (*Bot.*). See **lysigenous.**

rhex'is (*Med.*). Rupture of a bodily structure, especially of a blood-vessel.

rhin-, rhino- (Greek *rhis*, gen. *rhinos*, nose). A prefix used in the construction of compound terms; e.g. *rhinopharyngitis* (q.v.).

rhi'nal (*Zool.*). Pertaining to the nose.

rhinenceph'alon (*Zool.*). The olfactory lobes of the brain in Vertebrates.

rhini'tis (*Med.*). Inflammation of the mucous membrane of the nose.

rhi'nocoele, —sēl (*Zool.*). The cavity of the rhinencephalon; the olfactory ventricle of the craniate brain.

Rhinog Grits, rĕn'og (*Geol.*). A group of massive bedded unfossiliferous grits, arkoses, and conglomerates; part of the Harlech Series of the Cambrian System; seen typically in the Rhinog Mountains in Merioneth, N. Wales.

rhi'nopharyngi'tis (*Med.*). Inflammation of the nose and of the pharynx.

rhi'nophore (*Zool.*). In certain *Mollusca*, an olfactory organ, usually borne on the tentacles, consisting of a patch of sensory epithelium which is sometimes developed into a pit with folded walls.

rhinophy'ma (*Med.*). Overgrowth of the subcutaneous tissue and the skin of the nose as a result of chronic vascular congestion, associated with dyspepsia.

rhi'noplasty (*Surg.*). The repair of a deformed, diseased, or wounded nose by plastic surgery.

rhinorrhoe'a, rhinorrhe'a (*Med.*). Discharge of mucus from the nose.

rhinosclero'ma (*Med.*). A disease, occurring in eastern Europe, in which hard granulomatous swellings appear in the nose, pharynx, and larynx, the characteristic feature of the swellings being the presence of large, round, clear cells, often containing bacilli.

rhi'noscope (*Med.*). A speculum for viewing the interior of the nose.

rhinospo'ridio'sis (*Med.*). A chronic disease due to infection with the vegetable mould (formerly thought to be a protozoon) *Rhinosporidium Seeberi*; characterised by the appearance of polypi in the nose and conjunctiva and of papillomata on the cheek.

rhinothe'ca (*Zool.*). The horny sheath enclosing the upper part of the beak of a Bird.

rhinot'omy (*Surg.*). Incision into the nose.

rhip'idate (*Zool*). Fan-shaped.

rhipid'ium (*Bot.*). A fan-shaped cymose inflorescence.

rhipidos'tichous (*Zool.*). Having the peripheral somactids of the fin arranged in a fan-like manner. Cf. *orthostichous*, *rachiostichous*.

rhiz-, rhizo- (Greek *rhiza*, root). A prefix used in the construction of compound terms; e.g. *rhizanthous* (q.v.).

rhizanth'ous (*Bot.*). Apparently forming flowers from the root.

rhi'zine (*Bot.*). The rhizoid of a lichen; it may be single or it may be a strand of rhizoids.

rhizocar'pic, rhizocar'pous (*Bot.*). Producing flowers underground as well as in the normal position.

rhi'zocaul (*Zool.*). In hydroid colonies, the hydrorhizae or creeping stolons.

Rhizoceph'ala (*Zool.*). An order of *Cirripedia* the members of which are parasitic on other *Crustacea* although there is a free-swimming larva; there is a mantle, but both appendages and alimentary canal are lacking, the latter being replaced by a system of absorptive processes.

rhi'zocorm (*Bot.*). A stout fleshy rhizome.

rhi'zoder'mis (*Bot.*). See **piliferous layer.**

rhizogen'ic, rhizogenet'ic (*Bot.*). Producing roots.

rhi'zoid (*Bot.*). (1) A short fungal hypha serving to attach the fungus to the substratum, and to collect nutritive material.—(2) A short hair-like organ formed by liverworts and mosses, serving the same functions as above.

Rhi'zomastigi'na (*Zool.*). An order of *Zoömastigina*, the members of which have one or two flagella and numerous pseudopodia.

rhi'zome (*Bot.*). An underground stem consisting of more than one year's growth, usually lying horizontally in the soil, having a superficial resemblance to a root, but bearing scale leaves and one or more buds.

rhi'zomorph (*Bot.*). A densely packed strand of fungal hyphae, looking like a root.

rhizoph'agous (*Zool.*). Root-eating.

rhi'zophi'lous (*Bot.*). Growing on roots.

rhi'zoplast (*Bot.*). A very delicate thread running between the centrosome and the blepharoplast.—

(*Zool.*) In *Mastigophora*, a thread, or bunch of threads, connecting the basal granule to the nucleus or to the parabasal body.

rhizopo'dia (*Zool.*). Root-like pseudopodia which branch and anastomose.

rhi'zosphere (*Bot.*). The region in the soil surrounding the root system of a plant and affected by its excretions.

Rhizo'ta (*Zool.*). An order of *Rotifera* in which the adults are of sessile habit and are attached by the truncated end of the non-retractile tail.

rhod-, rhodo- (Greek *rhodon*, rose). A prefix used in the construction of compound terms; e.g. *rhodochrosite* (q.v.).

rho'damines (*Chem.*). Dyestuffs of the triphenylmethane group, closely related to fluorescein. They are obtained by the condensation of phthalic anhydride with *N*-alkylated *m*-aminophenols in the presence of sulphuric acid.

rhodanising. The process of electroplating with rhodium, especially on silver, to prevent tarnishing.

rho'deose (*Chem.*). $C_6H_{12}O_5$, a methyl-pentose sugar, an isomer of rhamnose.

rhodium (*Met.*). A metallic element of the platinum group. Symbol, Rh. At. wt. 102·91, at. no. 45, sp. gr. at 20° C. 12·5, m p. 1966° C.; specific electrical resistivity 5 1 microhms per cm. cub. Alloyed with platinum to form positive wire of the platinum-rhodium-platinum thermocouple. Used for plating silver and silverplate to prevent tarnishing.

rhodochro'site (*Min.*). Carbonate of manganese which crystallises in the trigonal system, occurring as rose-pink rhombohedral crystals. It is a minor ore of manganese. Also called MANGANESE SPAR.

Rhodoid (*Plastics*). A non-thermosetting plastic of the cellulose acetate type. See **Celastoid.**

rho'donite (*Min.*). Metasilicate of manganese, crystallising in the triclinic system. It is rose-coloured, and is sometimes used as an ornamental stone.

rho'dophane (*Zool.*). A coloured oily substance, globules of which are found in the cones of Birds and in parts of the retina in some other forms.

Rho'dophy'ta, Rhodophy'ceae (*Bot.*). A group of algae, mostly marine, distinguished by the prevalence of a red colour masking the chlorophyll. None are known to have motile reproductive organs. Simpler forms are filamentous; larger forms have complicated thalli. Red seaweeds.

rho'doplast (*Bot.*). Chromatophore of red algae.

rhodop'sin (*Chem.*). A purple pigment, believed to be a conjugated protein containing vitamin A, found in the rods of the retina and required for the appreciation of low intensities of light, i.e. for night vision. It is destroyed by bright light. Lack of rhodopsin, due to some congenital defect or to vitamin A deficiency, causes night blindness.

rho'dospo'rous (*Bot.*). Having pink spores.

rhomb-porphyry (*Geol.*). A medium-grained rock of intermediate composition, usually occurring in dykes and other minor intrusions; characterised by numerous phenocrysts of anorthoclase which are rhomb-shaped in cross section, set in a finer-grained groundmass. Related to laurvigite among the coarse-grained, and to kenyte among the fine-grained rocks.

rhomb-spar (*Min.*). An old-fashioned synonym for *dolomite*.

rhomb'enceph'alon (*Zool.*). See **hind-brain.**

rhombic antenna (*Radio*). A directional antenna comprising an equilateral parallelogram of conductors, each several quarter-wavelengths long, usually arranged in a horizontal plane. The wires are connected together through a resistance at one apex at the end of the longer diagonal, and to the transmitting or receiving apparatus at the other end. The maximum directive effect is along the longer diagonal.

rhombic sulphur (*Chem.*). *Octahedral sulphur* (q.v.).

rhombic system (*Crystal.*). See **orthorhombic system.**

rhombohe'dral class (*Crystal.*). A class of the trigonal system, a characteristic form being the *rhombohedron* (q.v.), which is exhibited by crystals of quartz, calcite, dolomite, etc.

rhombohedron (*Crystal.*). A crystal form of the trigonal system, bounded by six similar faces, each a rhombus or parallelogram.

rhomboi'dal (*Bot.*). Quadrangular, but not square, and attached by one acute angle.

rhomboi'deus (*Zool.*). In higher *Vertebrata*, a muscle connecting the scapula with the spinal column.

Rhometal (*Met.*). An alloy of Permalloy type. Contains 64% of iron and 36% of nickel. Used in high-frequency electrical circuits.

rhonchus (*Med.*). A harsh, prolonged sound, heard on auscultation, produced by the passage of air over secretions in the bronchial tubes; indicative of bronchitis.—*adj.* **rhonchal.**

rhone (*Build.*). An eaves gutter. (Local.)

rhum'batron (*Thermionics*). A toroid of one conducting turn, which functions as a tuned circuit of minute inductance and small capacity; used for velocity-modulating a space-current of electrons, which is projected axially through holes in capacity discs which otherwise close the centre. See **buncher.**

rhyac'olite (*Min.*). A glassy type of orthoclase found in the lavas at Vesuvius.

rhyncho-, rink'ō- (Greek *rhynchos*, beak, snout, proboscis). A prefix used in the construction of compound terms; e.g. *rhynchocoel* (q.v.).

Rhynchobdel'lida (*Zool.*). An order of *Hirudinea* the members of which are all marine or fresh-water forms parasitic on Snails, Fish, Reptiles, and aquatic Birds; they lack botryoidal tissue and possess a protrusible proboscis without jaws; the blood is colourless.

Rhynchocepha'lia (*Zool.*). An order of *Reptilia* having amphicoelous vertebrae, upper and lower temporal arcades, an imperforate palate, abdominal ribs, and a pineal eye; New Zealand (islands of Cook Strait). Tuateras.

rhyn'chocoel (*Zool.*). In *Nemertea*, the cavity in which the proboscis lies.

rhyncho'daeum (*Zool.*). In *Nemertea*, that part of the proboscis in front of the brain.

rhyn'chodont (*Zool.*). Having a toothed beak.

rhynchoph'orous (*Zool.*). Having a beak.

rhyn'chostome (*Zool.*). In *Nemertea*, the anterior terminal pore via which the proboscis is everted.

Rhynie Chert (*Geol.*). A silicified peaty bed containing well-preserved plant remains as well as spiders, scorpions, and insects; discovered at Rhynie, Aberdeenshire, in the Middle Old Red Sandstone (i.e. Devonian age).

rhy'olite (*Geol.*). The general name for fine-grained igneous rocks having a similar chemical composition to granite, commonly occurring as lava flows, though occasionally as minor intrusions, and generally containing small phenocrysts of quartz and alkali-feldspar set in a glassy or cryptocrystalline groundmass. Sometimes called LIPARITE. See also **obsidian, pitchstone, pumice, pyromeride** (nodular rhyolite), **nevadite.**

rhythmic crystallisation (*Geol.*). A phenomenon exhibited by rocks of widely different composition but characterised by the development of orbicular structure. See **corsite.**

rhythmic sedimentation (*Geol.*). A regular interbanding of two or more types of sediment or sedimentary rocks due to a seasonal change in the conditions of sedimentation, such as the alternation of wet and dry periods. See, for example, **varve clays.**

rhythmic (or **vernier**) **time-signals** (*Radio*). Special time-signals sent out regularly by high-powered radio stations for the determination, with accuracy, of navigational and surveying data, particularly longitude. The signals differ slightly from the exact second, so that their coincidence with local seconds can be more accurately observed.

rhy'tidome (*Bot.*). An external covering to a plant member made up of alternating sheets of cork and dead cortex or dead phloem.

ria, rē'a (*Geol.*). A normal valley drowned by a rise of sea-level relative to the land. Cf. *fjord*, in the production of which glacial action plays an essential part. A good example of a ria type of coastline is S.W. Ireland, the rias being long synclinal valleys lying between anticlinal ridges.

rib (*Aero.*). A light structural member, of aerofoil shape, which maintains the covering material of a plane or a control surface in the correct form under the pressure of the air load upon it.—COMPRESSION RIB, a rib which also acts as a compression member between the spars of an aeroplane wing structure.

rib (*Bot.*). One of the larger veins of a leaf.

rib (*Build., Civ. Eng*). (1) A curved member of a centre or ribbed arch.—(2) A moulding projecting for purposes of ornamentation from a ceiling or vault surface.

rib (*Textiles*). A prominent line running lengthwise, across, or diagonally in a fabric, and forming a cord effect.

rib (*Zool.*). A small ridge or rib-like structure: in Vertebrates, an element of the skeleton in the form of a curved rod connected at one end with a vertebra; it serves to support the body walls enclosing the viscera.

rib and panel (*Build*). A term applied to a vault formed of separate ribs and panels, the latter being supported upon the former.

rib fabric (*Hosiery*). A type of fabric in which the reverse-side stitches alternate in a vertical direction with the face stitches, forming vertical furrows and rows. This results in contraction of the fabric, but also renders it elastic and suitable for the extremities of garment parts.

rib mesh (*Build., Civ. Eng.*). See **expanded metal.**

rib'and (*Carp.*). A flat rail fixed across posts in a palisade.

ribbed arch (*Civ. Eng.*). An arch composed of side-by-side ribs spanning the distance between the springings.

ribbed flutings (*Build.*). Flutings which are separated by a flat or slightly convex listel.

ribbing (*Dec., Furn.*). Surface ornament consisting of a series of ribs, ridges, and depressions.

ribbon (*Cinema.*). The loop of stretched Duralumin in the light-valve, which is opened by the passage of modulation currents.

ribbon microphone (*Acous.*). A microphone in which an electromotive force is generated by the motion of a thin metallic ribbon in the gap of a magnet, the motion of the ribbon being determined by the pressure-gradient in the applied sound-wave.

ribbon multiple (*Auto. Teleph.*). In the rotary automatic machine-switching system, the multiple in which the multiple wiring between the switches is effected by wires woven in the form of a ribbon, the fabric with which the wires are woven forming the insulation.

ribbon ring (*I.C. Engs.*). A ring fitted round a piston, to retain a floating gudgeon pin without any other locking means (U.S.).

ribbon saw (*Carp.*). A thin, narrow band-saw having a width of not more than two inches.

ribbon strip (*Carp.*). A horizontal timber attached to vertical timbers as a support for joists. Also called GIRT STRIP, LEDGER BOARD.

ribbonite (*Plumb.*). Soft lead in the form of slender ribbons, used for caulking pipe-joints.

Ribmet (*Build.*). A registered form of expanded steel reinforcement used for concrete flooring, roofing, plaster ceilings, partitions, etc.

ri'bose (*Chem.*). $C_5H_{10}O_5$, a pentose, a stereoisomer of arabinose. *d*-Ribose occurs in certain nucleic acids.

Ric'carton Group (*Geol.*). A group of graptolitic shales with conglomerates occurring near Moffat in the Southern Uplands of Scotland and belonging to the Wenlockian stage of the Silurian System.

rice (*Mining*). See **birdseye.**

rice-grain (*Pot*). Decoration formed by pressing rice or other seeds in thin, raw clay objects, then glazing and firing. The seeds are burnt to ashes in the kiln, leaving transparent designs.

rice paper. The finely cut pith of ***Fatsia*** *papyrifera*. It is not a true paper.

rice weaves (*Textiles*). Fancy weaves formed by breaking and reversing certain regular twills, usually the $^{3}—_{3}$ and $^{4}—_{4}$ twills.

rich lime (*Build.*). *Fat lime* (q.v.).

rich mixture (*I.C. Engs.*). A combustible mixture in which the fuel is either in excess of that chemically correct for the air, or exceeds some required ratio thereto.

Ricinulei, ris-in-ū'lē-i (*Zool.*). An order of *Embolobranchiata* having a uniform prosoma and a segmented opisthosoma joined by a hidden pedicle; there is no telson; the pedipalpi are of moderate size, and chelate; there are no eyes; respiration is by tracheae; the metatarsus and tarsus of the third leg of the male are modified as a sexual organ; small tropical forms of limited distribution and great rarity.

rickers (*Timber*). Round timber of less than 2½ in. diameter in the middle.

rickets (*Med.*). A nutritional disease of childhood characterised by defective ossification and softening of bones; due to deficiency in the diet of vitamin D, there being a failure to absorb and utilise calcium salts.

Ricket'tsia (*Med.*). Small bacteria-like bodies found in lice and ticks and in the blood and tissues of patients suffering from typhus and other diseases resembling typhus.

rictal (*Zool.*). (In Birds) pertaining to the mouth aperture.

riddle (*Build., etc.*). A sieve.

ride (*Carp., etc.*). To rock or touch upon another part; e.g. a door which touches the floor in opening.

rider (*Chem.*). A small piece of platinum wire used on a chemical balance as a final adjustment in accurate weighing.

rider (*Mining*). (1) A *horse*, i.e. mass of country rock occurring in a mineral deposit.—(2) A thin seam of coal above a thick one.—(3) A guide for a bowk, in sinking.

rider shore (*Carp.*). An inclined baulk of timber used in a system of raking shores for a high building. It abuts at its lower end against a length of timber laid along the back of the outer raking shore, instead of against the ground.

rider's bone (*Med.*). Ossification at either end of one of the adductor muscles of the thigh, following upon injury as a result of riding.

ridge (*Build., Civ. Eng.*). The summit-line of a roof; the line on which the rafters meet.

ridge-board (*Carp.*). A horizontal timber at the upper ends of the common rafters, which are nailed to it.

ridge capping (or **covering**) (*Build.*). The covering applied over a ridge to protect the intersection of the sloping roof surfaces.

ridge course (*Build.*). The last (i.e. the top) course of slates or tiles on a roof, cut to length as required.

ridge pole, ridge-piece (*Build.*, *Civ. Eng.*). A timber member laid horizontally along the ridge of a roof.

ridge roll (*Build.*). A ridge piece, of rounded section, over which a lead flashing is secured as a covering.

ridge roof (*Build.*). A pitched roof whose sloping surfaces meet to form an apex or ridge.

ridge stop (*Build.*). A piece of sheet-lead shaped over the junction between a roof ridge and a wall; used in cases where the one runs into the other and a watertight joint has to be made

ridge tile (*Build.*). A purpose-made tile specially shaped for use as a covering over the ridge of a roof.

ridging (*Agric.*). The process of forming ridges in the surface soil so that as much as possible of the latter is exposed to weathering.

ridging (*Build.*). The operation of covering the ridge of a roof with specially shaped ridge tiles or other material.

Ridgway Conglomerate (*Geol.*). A conglomerate, varying in thickness from 0 to 1000 ft., occurring in the Old Red Sandstone of the westerly parts of S. Wales, above the typical Dittonian Stage.

riding lamps (*Aero.*). Lamps displayed at night by an aircraft when moored or at anchor. Colours and positions as laid down in the Maritime Code.

riding shore (*Carp.*). See **rider shore.**

Ridley sheeting (*Build.*). A patented form of steel dovetail shuttering capable of being adapted to any kind of circular work.

rie'beckite (*Min.*). Metasilicate of sodium and iron occurring in soda-rich igneous rocks as black monoclinic prismatic crystals.

Riedel's disease (*Med.*). Chronic thyroiditis. A chronic inflammation of the thyroid gland, which becomes enlarged and hard as the result of excessive formation of dense fibrous tissue.

Riedel's lobe (*Med.*). An anomalous downward prolongation of the right lobe of the liver.

Riffel loudspeaker (*Acous.*). A loudspeaker in which the radiating element takes the form of two sheets curved to an edge, on which is located the driving element, the latter being a current-carrying conductor in the longitudinal gap of a magnet. The arrangement provides for radiation in a horizontal plane with restricted vertical radiation.

riffle (*Mining*). A groove in the bottom of a sluice, or a strip of wood fixed across a sluice, or on a table, to catch heavy mineral.

riffler (*Eng.*). (1) A file bent so as to be capable of operating in a shallow depression.—(2) A device for dividing a stream of crushed material, e.g. coal, into truly representative samples.

rifle (*Small Arms*). A firearm having spiral grooves in the surface of the bore as guides for projections on the projectile, to which it imparts rotation for the purpose of increasing the accuracy of the weapon.

rifle grenade (*Ammunition*). A grenade which is projected from a rifle by means of a rod fitted into the barrel, or by means of a detachable discharger cup.

rifling (*Artillery*). The term used for the spiral grooves in the bore of a gun which are engaged by the driving band of a projectile, thus causing rotation of the latter.

rift and grain (*Geol.*). The two directions, approximately at right-angles to one another, along which granite and other massive igneous rocks can be split; rift being the easier of the two.

rift sawing (*Timber*). See **quarter sawing.**

rig (*Textiles*). (1) A division made up the centre of a fleece, for convenience in sorting.—(2) The form given to a piece of cloth by suspending it down the centre, to facilitate cutting. See **rigging and folding machine.**

rigaree (*Glass*). A name given to a broken design produced by a small ridged metal wheel; applied to raised bands or collars of glass as a decoration.

rigging (*Aero.*). (1) The operation of adjusting and aligning the various components of an aeroplane.—(2) In airships and balloons, the system of wires or cords by which the weight to be lifted is distributed over the envelope or gas-bag.

rigging and folding machine (*Woollen*). This consists of a table of triangular section over which cloth is drawn to divide it equally down the centre, before passing to the folding motion where it is cuttled and measured.

rigging angle of incidence (*Aero.*). See **angle of incidence.**

rigging diagram (*Aero.*). The drawing giving the designer's instructions as to the positioning and aligning of the various components of an aeroplane.

rigging position (*Aero.*). The position in which an aeroplane is set up in the workshop for the adjustment and alignment of the various parts, i.e. with the lateral axis and an arbitrarily chosen longitudinal datum line horizontal.

right-angled folding (*Bind.*). *Square folding* (q.v.).

right ascension (*Astron.*). The primary coordinate referred to the celestial equator, of which declination is the secondary; measured eastwards from the First Point of Aries along the equator to the foot of the body's declination circle. It runs from 0° to 360°, or from 0 hours to 24 hours, being generally expressed in time.

right circular cone. See **cone.**

right-hand rule (*Elec. Eng.*). See **Fleming's rule.**

right-hand twine (*Textiles*). See **openband twine.**

rigid arch (*Civ. Eng.*). A continuous arch without hinges or joints, the arch being rigidly fixed at the abutments.

rigid support (*Elec. Eng.*). A support for an overhead transmission line designed to withstand, without appreciable bending, a longitudinal load as well as transverse and vertical loads.

rigidity, modulus of (*Mech.*). See **modulus of rigidity, elasticity of shear.**

rigor (*Bot.*). An inert condition assumed by a plant when conditions for growth are unfavourable.

rigor (*Med.*). A sudden chill of the body, accompanied by a fit of shivering, which heralds the onset of fever.—RIGOR MORTIS, the stiffening of the body following upon death.

rigor (*Zool.*). A state of rigidity and irresponsiveness into which some animals pass on being subjected to a sudden shock; it is the result of *reflex action* (q.v.) and is known popularly as 'shamming dead.'

rill stoping (*Mining*). Overhand, inclined, or pyramidal stoping, such that the miners can rise on the pyramidal heap of broken ore formed.

rim (*Bot.*). The overhanging part of a wall about a bordered pit.

rim-fire cartridge (*Small Arms*). A form of cartridge which is fired by striking the rim and by a central cap.

rim lock (*Join.*). A form of lock distinct from the *mortise lock* (q.v.) in that, in its metal case, it is screwed to the face of the door.

rim rock (*Mining*). The rock round the rim or edge of a placer or alluvial deposit.

rim wheel (or **pulley**) (*Cotton Spinning*). A large pulley on the rim shaft of the mule, which transmits power to the tin roller driving the spindles.

ri'ma (*Zool.*). A narrow cleft.—*adjs.* **rimate, rimose, rimiform.**

rima glot'tidis (*Med.*). The gap in the larynx between the vocal cords in front and the arytenoid cartilages of the larynx behind.

rime (*Build.*). A rung of a ladder.

rimming (or **rimmed**) **steel** (*Met.*). Steel that has not been completely deoxidised before casting. Gas is evolved during solidification and bubbles are entrapped. Ingots contain blowholes but no pipe. See also **killed steel.**

ri'mose (*Bot.*). Having the surface marked by a network of intersecting cracks.—*dim.* **rimulose.**

rind (*Bot.*). (1) The outer layers of the fruit body, or the sclerotium of a fungus.—(2) The outer layers of the bark of a tree.

rinderpest (*Vet.*). An acute contagious disease of cattle due to infection by a filterable virus.

ring (*Bot.*). See **annulus.**

ring (*Teleph.*). The centre one of the three contacts on the terminating plugs of the flexible cords of an operator's cord circuit. See **R-wire.**

rings (*Bot.*). A series of chromosomes arranged end to end so that they form a ring.

ring armature (*Elec. Eng.*). An electric-machine armature having a ring winding. Also called a GRAMME RING ARMATURE.

ring bark (*Bot.*). Bark which splits off in more or less complete rings.

ringbone (*Vet.*). Osteoarthritis of the coronary joint of horses, or exostosis on the os suffraginis above the joint.

ring canal (*Zool.*). (1) The circular canal of a medusa which runs around the periphery of the umbrella.—(2) A circular vessel of the water-vascular system in Echinoderms.

ring complex (*Geol.*). See **ring dyke.**

ring course (*Build.*). The course farthest from the intrados of an arch.

ring doffer (*Spinning*). A junior operative who removes full bobbins from a ring frame, and supplies the empty bobbins required before spinning can proceed.

ring dyke (*Geol.*). An almost vertical intrusion of igneous rock which rose along a more or less cylindrical fault which has an approximately circular outcrop. In certain Tertiary instances (e.g. Ardnamurchan) several successive ring dykes, separated by 'screens' of country rock and approximately concentric, form 'ring complexes.'

ring filament (*Illum.*). The usual form taken by the filament of an electric filament lamp; the ring lies in a plane at right-angles to the axis of the lamp.

ring fire (*Elec. Eng.*). Thin streaks of fire appearing round the commutator of an electric machine; due to small particles of copper or carbon which have become embedded in the mica between the commutator and are raised to incandescence by the current. The presence of ring fire indicates that the commutator needs cleaning.

ring frame (*Cotton Spinning, etc.*). A spinning machine which imparts twist by means of a mechanically driven bobbin and a traveller mounted on a ring on the lifter rail. Used for cotton and worsted yarns; tending to supersede the mule spinning frame. See **ring spinning.**

ring gauge (*Eng.*). A hardened steel ring having an internal diameter of specified size within very small limits of error; used to check the diameter of finished cylindrical work.

ring latch (*Join.*). A latch in which the fall bar is operated by a handle in the shape of a ring, pivoted at the top so that it always falls into the vertical position.

ring main system (*Cables*). A distribution system in which the cables form a closed ring. In the event of a single fault all consumers have a path of supply.

ring-porous (*Bot.*). Said of wood which contains more vessels, or larger vessels, in the spring wood than elsewhere, so that it is marked in cross-section by rings, or portions of rings, of small holes.

ring shake (*Timber*). See **cup shake.**

ring spinning (*Worsted*). A method of spinning which produces a smooth yarn. Twisting is imparted by means of a positively driven bobbin and a metal eyelet or traveller, through which the yarn passes to the bobbin, guided by the lifter rail.

ring traveller (*Cotton Spinning*). A metal eyelet mounted on the ring in the lifter rail of a ring spinning frame.

ring vessel (*Zool.*). A vessel in the form of a ring; as the vessel in the scolex of *Cestoda* which connects the longitudinal excretory trunks.

ring watch (*Horol.*). A watch mounted in a ring for wear on the finger.

ring winding (*Elec. Eng.*). (1) A helical winding arranged on a ring of iron or other material. Also called a TOROIDAL WINDING.—(2) A form of armature winding in which the armature core is a hollow cylinder with each turn of the winding threaded through the centre. Also called a GRAMME WINDING or GRAMME RING WINDING.

ringworm (*Med.*). Tinea. A contagious disease characterised by the formation of ring-shaped patches on the skin; due to infection with moulds, especially of the three genera *Microsporon, Trichophyton,* and *Epidermophyton.*

rings and brushes (*Light*). The name applied to the patterns produced when convergent or divergent plane-polarised light, after passing through a doubly refracting crystal cut perpendicular to the optic axis, is examined by an analyser. Also commonly known as an INTERFERENCE FIGURE.

rings of Saturn (*Astron.*). See **Saturn.**

rin'gent (*Bot.*). Said of a corolla consisting of two distinct, widely gaping lips.

ringers (*Geol.*). See under **Lingula Flags.**

ringing (*Radio*). The persistence of currents in a resonant circuit after the removal of the e.m.f. which originally set them in motion.

ringing (*Teleph.*). The application of alternating current to a telephone circuit, causing the distant operation of apparatus which attracts the attention of operators or subscribers—in the former instance by operating a relay and lighting a lamp, and in the latter by ringing a bell.

See **interrupted— manual—**
keyless— power—
machine—

ringing current (*Teleph.*). The alternating current which is put on a subscriber's line to operate his trembler bell, or which is placed on a trunk line to light a lamp at the distant exchange.—SUPERPOSED RINGING CURRENT, an interrupted alternating current, superposed on a direct current, for ringing purposes.

ringing engine (*Civ. Eng.*). A simple form of *pile driver* (q.v.) for driving small piles.

ringing key (*Teleph.*). The non-locking lever key used by a telephone operator to put ringing current on a subscriber's line.

ringing tone or **ringing signal** (*Teleph.*). See **audible ringing tone.**

Rinmann's green (*Chem.*). The product obtained by adding a solution of cobalt nitrate to zinc oxide and reheating the compound on charcoal with or without sodium carbonate.

rip (*Carp.*). To saw timber along the direction of the grain.

rip-cord (*Aero.*). A cord for releasing a free parachute from its pack. Operated manually by the user of the parachute after falling clear of the aircraft.

rip-rap (*Civ. Eng.*). A foundation formed in water, or on a bed of soft material, by depositing broken stones loosely.

rip-saw, ripping saw (*Carp.*). A saw designed for cutting timber along the grain.

ripa'rian, riparious, riparial (*Bot., Zool.*). Living or growing on the banks of rivers and streams.

ripid'olite (*Min.*). A species of the chlorite group of minerals, crystallising in the monoclinic system. It is essentially a hydrated silicate of magnesium and aluminium with ferrous iron.

ripping saw (*Carp.*). See **rip-saw.**

ripple (*Elec. Eng.*). A term often used to denote the higher harmonics (e.g. 11th or above) in an alternating current or voltage wave, and also similar variations which sometimes occur in direct currents or voltages. See Supplement.

See **commutator—** **slot—**

ripples (*Phys.*). Small waves on the surface of a liquid for which the controlling force is not gravity, as for large waves, but surface tension. The velocity of ripples diminishes with increasing wavelength, to a minimum value which for water is 23 cm. per sec. for a wavelength of 1·7 cm.

ripple cloths (*Textiles*). Plain cotton cloths of low quality, having a nap resembling ripples; used for inexpensive dressing-gowns.

ripple control (*Elec. Eng.*). A method of controlling street lighting or other equipment from some central point by means of a high-frequency ripple superimposed on the current-carrying conductors of an electric power system.

ripple marks (*Geol.*). Undulating ridges and furrows found on the bedding planes of certain sedimentary rocks, due to the action of waves or currents of air or water on the sediments before they were consolidated. Such ripple and rill marks can be seen in the process of formation today on most sandy beaches, on sand dunes, and in deserts.

rippling (*Linen*). Removal of the seed balls and leaves, etc. from flax by means of iron combs.

rise (*Build., Civ. Eng.*). (1) The vertical distance from the centre of span of an arch in the line of the springings to the centre of the intrados. Also called the VERSED SINE.—(2) The vertical height from end supports to ridge of a roof.—(3) The height of a step in a staircase. *

rise (*Mining*). See **raise.**

rise-and-fall pendant (*Illum.*). A pendant lighting fitting the height of which can be adjusted by means of a pulley and counterweight.

rise-and-fall system (*Surv.*). A system of reduction of levels in which the staff reading at each successive point after the first is compared with that preceding it, and the difference of level entered as a *rise* or a *fall*. See **collimation system.**

rise and run (*Carp.*). A term applied to the amount of any given slope quoted as a given *rise* (vertical distance) in a given *run* (horizontal distance).

rise of floor line (*Ship Constr.*). A line joining the extremities of the flat of keel to the ship's bilge curve tangent.

rise of tide. The vertical distance of high-water level, at a given place, above a fixed datum (usually low water of ordinary spring tides at the place).

risen moulding (*Join.*). A moulding decorating a panel and projecting beyond the general surface of the surrounding framing.

riser (*Build.*). The vertical part of a step.

riser (*Elec. Eng.*). See **commutator lug.**

riser (*Foundry*). In a mould, a passage up which the metal flows after filling the mould cavity. It allows dirt to escape, indicates that the mould is full, and supplies metal to compensate for contraction on solidification. Also called OUT-GATE.

rising and setting (*Astron.*). The positions of a heavenly body when it is exactly on the great circle of the observer's horizon, east or west of the meridian respectively.

rising and falling saw (*Carp.*). A circular saw whose spindle can be moved in relation to the position of the working table, so that more or less of the saw can be made to project for cutting grooves of different depths.

rising arch (*Civ. Eng.*). An arch whose springing line is not horizontal.

rising butt hinge (*Join.*). A butt hinge with a loose leaf which, when opened, rises on the centre pin due to helical bearing surfaces on the two leaves. This enables a door, on opening, to rise above a carpet, and to close automatically.

rising front (*Photog.*). A sliding panel for carrying the lens in a camera; used so that pictures of elevated objects may not suffer distortion in perspective when registered.

rising mains (*Elec. Eng.*). In an electrical installation, a mains circuit which runs from one floor of a building to another.

rising shaft (*Civ. Eng.*). A shaft which is excavated from below upward. Cf. *sinking.*

ri'sus sardon'icus (*Med.*). Wrinkling of the forehead and retraction of the angles of the mouth due to spasm of the facial muscles (as in tetanus), giving the appearance of a grin.

Ritter's disease (*Med.*). Dermatitis exfoliativa infantum. Severe pemphigus of infants, in which the horny layer of the skin separates from the underlying layer over wide areas of the body.

river-bottom disease (*Vet.*). *Anaemia* (q.v.) of horses.

river-capture (*Geol.*). The beheading of a stream by a neighbouring stream which has greater power of erosion.

river wall (*Civ. Eng.*). A wall built as a side boundary to the flow of a river, thereby confining it to a definite path.

rivers, geological work of (*Geol.*). This involves (1) corrasion (wearing away) of their banks and beds, largely through the sediment suspended in the water and pushed along their beds; (2) transportation of immense quantities of rock waste produced by the agents of denudation in the high ground drained by the rivers, and of salts carried in solution.

rivet (*Eng.*). A headed shank for making a permanent joint between two pieces. It is inserted in a hole drilled or punched through both pieces, and 'closed' by forming a head on the projecting part of the shank by hammering or other means. The head may be rounded, flat, or pan-shaped.

rivet test (*Eng.*). A rough test for determining the suitability of steel bar for rivets. The bar should stand bending through 180°, and should be able to be riveted over a hard steel plate without cracking.

riveted joint (*Eng.*). See **butt joint, lap joint.**

riveting machine (*Eng.*). See **hydraulic riveter, pneumatic riveter.**

riv'ulose (*Bot.*). Marked with lines, giving an appearance of rivers as shown on a map.

R.M.S. (r.m.s.) load (*Elec. Eng.*). See **R.M.S. value.**

R.M.S. (r.m.s. or rms) value (*Elec. Eng.*). The *root mean square value* of an alternating current or voltage. It is the square root of the mean value of the squares of the instantaneous values taken over a complete cycle. When an alternating current or voltage is specified it is almost invariably the R.M.S. value that is used. The term is sometimes used also in connexion with quantities which alternate periodically over longer periods of time, e.g. a month or year. Also called EFFECTIVE VALUE.

Rn (*Chem.*). The symbol for *radon.*

ro. (*Build.*). Abbrev. for *rough.*

Roach Bed (*Geol.*). A bed of cavernous limestone found in the Portlandian of Southern England; of Upper Jurassic age and full of fossil casts.

road bed (*Rail.*). The foundation carrying the sleepers, rails, chairs, points, and crossings, etc. of a railway track.

road metal (*Civ. Eng*). Broken stone for forming the surfaces of macadamised roads. Also called METAL, METALLING.

road tar (*Civ. Eng.*). See **gas tar.**

roak (*Met.*). A *seam* (q.v.).

roan (*Leather*). Sheepskin, dyed and finished with a smooth grain; used in bookbinding.

roaring (*Vet.*). Inspiratory dyspnoea of horses, due to paralysis of the recurrent laryngeal nerve.

roast-sintering (*Met*). See **blast-roasting.**

roasting (*Met.*). The operation of heating sulphide ores in air to convert to oxide. Sometimes the sulphur-bearing gases produced are used to make sulphuric acid.

roasting furnace (*Met*). A furnace in which finely ground ores and concentrates are roasted to eliminate sulphur. Heat is provided by the burning sulphur. The essential feature is free access of air to the charge. This is done by having a shallow bed which is continually rabbled Many types have been devised; *multiple-hearth* is the most widely used.

robbings (*Worsted*). Wool fibres, longer than noil, removed during combing.

Roberts test (*Chem.*). A test for proteins, the reagent consisting of a mixture of 1 part concentrated nitric acid and 5 parts of a saturated magnesium sulphate solution.

Robeston Wathen Limestone (*Geol.*). A thin limestone found in the Caradocian Series of the Ordovician System in South Wales: one of the Bala Limestones.

Robinson cement (*Build*) A slow- but hard-setting plaster used for interior work. It is fire-resisting and does not expand or contract in setting.

Robinson direction-finder (*Radio*). A rotating-loop direction-finding system having an auxiliary loop, which can be reversed in series with the main loop and so permits an audible signal to be balanced by switching, instead of nodalising the signal amid noise.

Robinson-Adcock direction-finder (*Radio*). A rotating Adcock direction-finding system provided with additional aerials which, by balancing on reversing the signal from one pair of aerials in series with the signal from the main pair, permit the determination of the direction of arrival of a wave by observing an audible signal instead of zero signal.

rocaille, rok-ī′ (*Dec., Furn.*). A style of decoration, painted or in relief, in which rocks, shells, and seaweed predominate.

Rochelle salt, ro-shel′ (*Chem*). Sodium potassium tartrate, $KNaC_4H_4O_6+4H_2O$. Used as a cement for joining two metal surfaces together by applying in the hot plastic condition. See articles under **piezo-.**

roche moutonnée, rosh moo-ton-ā (*Geol.*). A mound of bare rock which is usually smoothed on the upstream side and roughened by plucking on the downstream side, as a result of a moving ice-sheet.

Roche's limit (*Astron.*). A critical value, according to the researches of Roche, for the radius of the secondary star, in a binary system, in terms of that of the primary, to ensure stability.

Rochester Shales (*Geol.*). A member of the Silurian succession typically exposed in the Niagara Gorge, between the Lockport Limestone and Dolomite above and the Clinton Limestone and Shales below. Approximately equivalent to the Wenlock Shales of England.

rock (*Geol.*). An aggregate of mineral particles forming part of the earth's crust (lithosphere). In igneous and metamorphic rocks, it consists of interlocking crystals; in sedimentary rocks, of closely packed mineral grains, often bound together by a natural cement.

rock crystal (*Min*). The name given to colourless quartz, whether in distinct crystals or not; particularly applicable to quartz of the quality formerly used in making lenses.

rock drill (*Civ. Eng.*). A tool specially adapted to the boring of holes through rock.

rock face (*Masonry*). The form of face given to a building-stone which has been *quarry-faced* (q.v.).

rock fever (*Med.*). See **undulant fever.**

rock flour (*Geol.*). A term used for finely comminuted rock material found at the base of glaciers and ice-sheets. It is mud-like and is composed largely of unweathered mineral particles.

rock-forming minerals (*Geol.*). The minerals which occur as the dominant constituents of igneous rocks, including quartz, feldspars, feldspathoids, micas, amphiboles, pyroxenes, and olivine.

rock meal (*Min.*). A white and light variety of calcium carbonate, resembling cotton; it becomes a powder on the slightest pressure.

rock milk (*Min*). A very soft white variety of calcium carbonate which breaks easily in the fingers; it is sometimes deposited in caverns or about sources holding lime in solution. Also called AGARIC MINERAL.

rock-phosphate (*Min.*). See **phosphorite.**

rock salt (*Min.*). See **halite.**

rock soap (*Min.*). Steatite.

rocker (*Mining*). A short rocking trough or cradle for washing concentrates and gold-bearing sand or gravel.

rocker arm (*Eng.*). See **valve rocker.**

rocker gear (*Elec. Eng.*). The hand-wheel or other device whereby the brush rocker of an electrical machine may be moved.

rocket tester (*San. Eng.*). A special rocket giving off clouds of dense smoke when lit. Used inside a drain which is being tested for leaks.

rocking bar (*Horol.*). A pivoted bar carrying the intermediate wheels in a keyless mechanism. It connects the winding stem direct to the barrel for winding, or else to the motion work for hand setting.

Rockwell hardness test (*Met.*). A method of determining the hardness of metals by indenting them with a hard steel ball or a diamond cone under a specified load and measuring the depth of penetration. See **Brinell hardness test.**

Rocky Mountain fever (*Med.*). Blue disease; black fever; spotted fever. A disease, more or less limited to certain States of the U.S.A., characterised by fever, headache, muscular pains, enlargement of the spleen, and a macular eruption on the skin; the disease is spread by a tick and is associated with infection by a Rickettsia organism.

Rocky Point effect (*Thermionics*). An effect of obscure origin occasionally occurring in high-voltage transmitting valves; characterised by a transient but violent discharge between the electrodes. First observed at Rocky Point radio station.

roco′co (*Dec.*). An exaggerated phase of *rocaille* (q.v).

rod (*Bricks*). A unit of brickwork which measures 16½ ft. by 16½ ft. by 1½ brick thick=806 cu. ft. or 11⅓ cu. yd. It contains about 4500 bricks plus about 75 cu. ft. of mortar. Since 1 rod=5 metres, 1 rod of brickwork=25 sq. m. 1½ bricks thick, which is approx. 10 cu. m.

rod-cell (*Zool.*). One of the photosensitive cells of the retina of which the percipient structure is rod-shaped.

rod epithelium (*Zool.*). A form of epithelial tissue in which the cells appear to be striated.

rod fibre (*Zool.*). The fibre with which a retinal rod is connected internally.

rods and cones (*Zool.*). The photosensitive cells of the retina: the percipient structures of these cells.

rodding (*San. Eng.*). The operation of clearing a stoppage in a pipe by inserting a rod to break down the obstruction or remove it.

rodding eye (*San. Eng.*). An *access eye* (q.v.).

rodent ulcer (*Med.*). A slowly growing ulcerating cancer of the skin which usually affects the upper part of the face; arises from the basal cells of the skin and is of low malignancy.

Roden'tia (*Zool.*). An order of small Mammals most of which are terrestrial, though a few are arboreal or aquatic; plantigrade forms with prominent incisor teeth growing from persistent pulps, no canines, and lophodont or bunodont grinding teeth; collar-bones are developed; the glenoid articulation of the lower jaw is longitudinally directed. Squirrels, Beavers, Rats, Mice, Porcupines, Chinchillas, Hares, and Rabbits.

Ro'dinal (*Photog.*). Trade-name for an alkaline solution of *p*-aminophenol containing a little sodium sulphite; used as a photographic developer suitable for all normal purposes.

rodman (*Surv.*). A staffman (U.S.).

Roentgen rays, rent'gen (*Phys.*) See **X-rays.**

Rog (*Paint.*). Trade-name of a paint adapted for use on new cement surfaces.

rogue (*Bot.*). A sport.

Rok (*Build.*). A weatherproof roof-covering material, made from wool-felt saturated with an elastic waterproofing compound and coated with a natural bitumen.

Rokalba (*Build.*). Asbestos-surfaced Rok.

roke (*Met.*). A *seam* (q v.).

Rokitan'sky's tumour (*Med.*). Compound hydrops folliculorum. An ovarian tumour formed by the aggregation of a number of Graafian follicles distended with fluid (see **hydrops folliculi).**

roll (*Aero., Ships*). See **rolling.**

roll (*Plumb.*). A joint between the edges of two lead sheets on the flat, the edges being overlapped over a 2-in. diameter wood roll fastened to the surface to be covered with lead.

rolls (*Bind.*). Tools having small wheels on the periphery of which are engraved designs to be impressed on the cover of a book.

roll boiling (*Textiles*). An old process for producing a permanent lustre on fine woollen fabrics, after raising, by steeping them vertically, wound on a wooden or perforated metal cylinder, in a tank of cold water, to which steam is admitted.

roll-capped (*Build.*). Said of ridge tiles which are finished with a roll or cylindrical projection along the apex.

roll film (*Photog.*). Film, with protecting paper, wound on a spool; much used by amateurs. The opaque paper, fitting closely to the end-cheeks of the spool, excludes light sufficiently to allow of loading and unloading cameras in daylight.

roll holder (*Photog.*). An adapter for using roll film, in the place of plates in slides, in a plate camera.

rolled gold (*Met.*). Composite sheet made by soldering or welding a sheet of gold on to both sides of a thicker sheet of silver, and rolling the whole down to the thickness required.

rolled steel sections (*Eng.*). Steel bars rolled into I-shaped, channel, T, angle, or cruciform cross-sections for different applications in structural work, each section being made in graded standardised sizes. See also **H-beam.**

roller (*Acous.*). In the mechanism of an organ, a cylindrical rod for transmitting motion by rotation, the forces being applied at the ends of radial pegs.

roller-bearing (*Eng.*). A shaft-bearing consisting of inner and outer steel races between which a number of steel rollers are located by a cage; suitable for heavier loads than is the *ball-bearing* (q.v.).

roller blind (*Build.*). An inside blind made of various materials and fitted to roll up around a wooden or sheet-metal drum.

roller chain (*Eng.*). A driving chain in which the links consist of rollers and sideplates, the rollers being mounted on pins which connect the sideplates. See **driving chain.**

roller delivery motion (*Cotton Spinning*). Mechanism for driving the rollers of a mule so as to deliver a short length of yarn as the carriage makes its inward run.

roller, safety (*Horol.*). The roller mounted on the balance staff of a lever escapement, against the edge of which the guard pin acts when the safety action is brought into play.

rolling (*Aero.*). The angular motion of an aircraft tending to set up a rotation about a longitudinal axis. One complete revolution is called a *roll*; one half-revolution (i.e. over on to its back), a *half-roll*; a rapid revolution is a *flick roll.* —(*Ships*) The phenomenon of a ship's behaviour in waves, wherein she changes her angle of heel. The time of complete reversal of heel from port to starboard (or vice versa) is the *rolling period.*

rolling instability (*Aero.*). That form of lateral instability that causes an aircraft to develop increasing oscillations of a rolling type, following a lateral disturbance.

rolling lift bridge (*Struct.*). A type of bascule bridge in which the bascule or cantilever part has, at the shore end, a surface of segmental profile rolling on a flat bearing.

rolling load (*Struct.*). See **moving load.**

rolling locker (*Lace*). A traverse net machine having a double tier of carriages which swing in an arc by means of reciprocating rollers with which they engage.

rolling mills (*Met.*). Sets of rolls used in rolling metals into numerous intermediate and final shapes, e.g. blooms, billets, slabs, rails, bars, rods, sections, plates, sheets, and strip.

rolling moment (*Aero.*). The component of the couple about the longitudinal axis acting on an aircraft in flight.

rolling period (*Ships*). See **rolling.**

rolling stock (*Rail.*). A general and collective term for all coaches, trucks, etc. which run along a railway track.

rolling-up curtain weir (*Civ. Eng.*). A form of frame weir in which the wooden barrier consists of a curtain, composed of a series of horizontal wooden laths increasing in thickness downwards and connected by watertight hinges, which is rolled up from the bottom.

roman (*Typog.*). Ordinary upright type, as distinct from *italic*, or sloping.

Roman cement (*Civ. Eng.*). A natural hydraulic cement made by calcining nodules found in the London Clay which contain about 66% chalk, 25% clay, and some ferrous oxide. It was much used for under-water work but is now largely superseded by Portland cement, whose ultimate strength is two or three times as great. Also called PARKER'S CEMENT.

Roman mosaic (*Build.*). See **tessellated pavement.**

Romberg's sign (*Med.*). This sign is present when a patient, standing with his feet close together and his eyes closed, sways more than when his eyes are open; it indicates disease of the sensory tracts in the spinal cord (as in tabes dorsalis).

ro'meite (*Min.*). Naturally occurring antimonite of calcium.

Röntgen rays, rént'gen (*Phys.*). X-rays.

röntgeno-. A prefix equivalent to *radio-.* See **radiotherapy,** etc.

roof (*Build., Civ. Eng.*). See **roof truss.**

roof boards (*Carp.*). Boards laid on a roof to provide a foundation and an undercovering to the covering materials proper, such as slates, tiles, etc.

roof covering (*Build., Civ. Eng.*). The material applied to the framework of a roof in order to form the outer upper covering of a building.

roof guard (*Build.*). A device fitted to a roof to prevent snow from sliding off it.

roof pendant (*Geol.*). A mass of country rock projecting downwards, below the general level of the roof, into an intrusive rock-body.

roof tree (*Carp.*). A common rafter.

roof truss or **roof** (*Build., Civ. Eng.*). The structural framework built to support the roof covering for a building. Also called a PRINCIPAL.

roofers (*Carp.*). *Roof boards* (q.v.).

roofing slate (*Geol.*). A term widely applied to rocks of fine grain in which regional metamorphism has developed a good slaty cleavage. Cf. *Collyweston Slate, Stonesfield Slate.*

room-noise (*Acous.*). The general ambient noise arising in enclosures, or filtering through from outside. Of importance in telephony, because the local room-noise operates the microphone, and, through side-tone, tends to mask the reproduction of the distant voice in the local receiver. Room-noise is reduced in telephone exchange switch-rooms by treating the ceiling acoustically.

room paper (*Build*) *Wallpaper* (q.v.).

root (*Bot.*). The branching lower portion of the axis of a higher plant; it fixes the plant in the soil, and by means of its tips collects water and mineral material.

root (*Carp.*). The section of a tenon in the plane of the shoulders.

root (*Civ. Eng.*). The part of a dam or weir which runs into the natural ground surface at each end.

root cap (*Bot.*). A hollow cone of cells covering the growing tip of a root and protecting the meristematic cells from damage as the tip is pushed through the soil.

root climber (*Bot.*). A plant which climbs by means of adventitious roots.

root hair (*Bot.*). A tubular outgrowth from a superficial cell of a young root, serving for the absorption of water and mineral salts from the soil. Its cavity is continuous with that of the cell from which the root hair springs.

root-mean-square value (*Elec. Eng.*). See **R.M.S. value.**

root pressure (*Bot.*). A pressure sometimes demonstrable in roots, and shown by the exudation of fluid when the stem is cut just above ground-level.

root pulper (*Agric. Mach.*). A machine comprising a rotating steel disc furnished with cutters, to which roots that have been cleared of soil are fed.

rootstock (*Bot.*). See **rhizome.**

root tuber (*Bot.*). A swollen root containing reserve food material.

root tubercle (*Bot.*). A swelling on a root, inhabited by symbiotic bacteria.

rooter (*Elec. Comm.*). An arrangement of thermionic valves for obtaining an output amplitude which is proportional to the square-root of the input amplitude. Required in compressors for reducing contrast in sound reproduction.

Roots blower (*Eng.*). An air compressor for delivering large volumes at relatively low pressure ratios; in it a pair of hour-glass-shaped members rotate with a small clearance within a casing, no valves being required.

rope brake (*Eng.*). An absorption dynamometer consisting of a rope encircling a brake drum or flywheel, one end of the rope being loaded by weights and the other supported by a spring balance. The effective torque absorbed is obtained by multiplying the drum radius by the difference of the tensions.

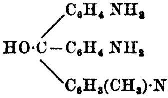
rope-scouring machine (*Textiles*). A machine for scouring woollens and worsteds, in which the ends of the pieces under treatment are sewn together to form an endless band and the material twisted like a rope.

ropy lava (*Geol.*). A lava flow, particularly basalt, the surface appearance of which resembles loose coils of rope. This is the characteristic surface appearance of flows of fluid lava. Cf. *block lava,* which results from consolidation of a very viscous lava from which the included gases had been boiled off before extrusion.

rosacea (*Med*). See **acne rosacea.**

rosa'ceous (*Bot.*). Having the characters of a rose: related to a rose.

rosan'iline (*Chem.*). Triamino-diphenyl-tolyl-hydroxy-methane, a base of the fuchsine dyes. It has the formula



$$\mathrm{HO{\cdot}C}\begin{cases}\mathrm{C_6H_4\,NH_2}\\ \mathrm{C_6H_4\,NH_2}\\ \mathrm{C_6H_3(CH_3){\cdot}NH_2}\end{cases}$$

It is obtained by the oxidation of an equimolecular mixture of aniline, *o*-toluidine and *p*-toluidine.

roscoelite, ros'ko— (*Min.*). This mineral is essentially *muscovite* (q.v) in which vanadium has partly replaced the aluminium. Its colour is clove-brown to greenish-brown.

rose (*Build.*). A decorative circular escutcheon through which the spindle of a door-handle passes.

rose cutter (*Horol.*). A small hollow milling cutter used on the lathe for rapidly producing pivots, screws, etc.

rose opal (*Min.*). A variety of opaque common opal having a fine red colour. Cf. the transparent *fire opal.*

rose-quartz (*Min.*). Quartz of a pretty rose-pink colour, due probably to titanium in minute quantity. The colour is destroyed by exposure to strong sunlight. See also **Bohemian ruby.**

rose-topaz (*Min.*). The yellow-brown variety of topaz changed to rose-pink by heating. These crystals often contain inclusions of liquid carbon dioxide.

rose, wind (*Aero.*). See **wind rose.**

rose window (*Build.*). A circular window with radial bars. Also called CATHERINE WHEEL, MARIGOLD WINDOW.

Rose crucible (*Chem.*). A crucible the lid of which is fitted with an inlet tube. It is used for igniting substances in a current of gas.

Rosebrae Bed (*Geol.*). A fine-grained yellow sandstone, containing fossil fishes, occurring near Elgin, Scotland, in the Upper Old Red Sandstone.

Rosendale cement (*Build.*). A natural cement manufactured from a rock quarried near Rosendale, N.Y.

Ro'senmüller's organ (*Zool.*). See **epididymis.**

rose'ola (*Med.*). Any rose-coloured rash.

rosette (*Bot.*). (1) A group of leaves lying close together on or near the surface of the soil, and radiating out from the apex of a short stem.—(2) Four cells in the embryo of a pine tree, lying just above the suspensor.

rosette (*Zool.*). Any rosette-shaped structure: in some *Oligochaeta,* a large ciliated funnel by which the contents of the vesiculae seminales pass to the exterior: in some *Crinoidea,* a thin calcareous plate (*rosette plate, rosette ossicle*) formed by the coalescence of the basal plates.

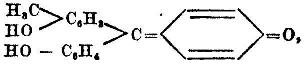
rosin (*Chem.*). Colophony. The residue from the distillation of turpentine. The colour varies from colourless, to yellow, red, brown, and black. Sp. gr. 1·08, m.p. 100°-140° C. Wood-rosin is obtained by the extraction of long-leaf pine wood; chief sources, U.S.A. and France. Used as a soldering flux, in varnish, soap, and size manufacture, and (in the form of resinates) as a drier in paint. See **resinates.**

ros'inates (*Chem.*). *Resinates* (q.v.).

Rosiwal method (*Geol.*). A method used in quantitative petrography involving the estimation of the volumes of the component minerals in a rock by the measurement of aggregate intercepts on a polished surface or on a microscope slide.

Roslin Sandstone (*Geol.*). A yellow sandstone found in the Midland Valley of Scotland; of Carboniferous age, falling partly in the Lower, and partly in the Upper Carboniferous; it is the Scottish equivalent of the English *Millstone Grit.* Named from the type-locality, Roslin Glen, S. of Edinburgh.

rosol'ic acid (*Chem.*). The quinonoid anhydride of *p*-trihydroxydiphenyl-*m*-tolylcarbinol,



an acidic dyestuff of the triphenylmethane series, obtained by oxidising a mixture of phenol and *p*-cresol with arsenic acid and sulphuric acid. Green glistening crystals, insoluble in water, dissolving in alkalis with a red colour.

rostel'lum. A beak-shaped process.—(*Bot.*) A beak-like outgrowth from the column in the flower of an orchid.—(*Zool.*) A small rostrum: in *Cestoda*, the hook-bearing projection at the top of the scolex: in *Cephalopoda*, a process of the shell.—*adjs.* **rostellar, rostellate.**

ros'trate (*Bot.*). Ending in a long, and usually hard, point.

rostrum (*Build.*). A raised platform for speakers.

rostrum (*Zool.*). In Birds, the beak: a beak-shaped process: in *Cirripedia*, a ventral plate of the carapace: in some *Crustacea*, a median anterior projection of the carapace.—*adjs.* **rostral, rostrate.**

ros'ula (*Bot.*). A rosette of leaves.

ros'ulate (*Bot.*). Forming a small rosette.

rot (*Vet.*). See **distomiasis.**

rotagravure (*Print.*). A photogravure printing process effected on a *rotary machine* (q.v.).

ro'taplane (*Aero.*). A heavier-than-air aircraft which derives its lift or support from the aerodynamical reaction of freely rotating rotors which have axes substantially vertical. See **Autogiro.**

rotary arc (*Illum.*). An arc lamp in which one or both carbon electrodes are rotated automatically by a motor, as well as being fed, so that the carbons are consumed regularly and the arc is steady.

rotary convertor (*Elec. Eng.*). See **synchronous convertor.**

rotary discharger (*Radio*). See **rotary spark gap.**

rotary engine (*Aero.*). An early type of aero engine in which the crankcase and radially disposed cylinders revolved round a fixed crank; not to be confused with the modern radial engine.

rotary field (*Elec. Eng.*). See **rotating field.**

rotary machine (*Print.*). A printing machine in which the printing surface is a revolving cylinder. Curved stereo plates are used, and the paper is fed from a roll. Very high speeds are attained on rotary presses. See **printing.**

rotary phase convertor (*Elec. Eng.*). See **phase changer.**

rotary pump (*Eng.*). A pump, similar in principle to a *gear pump* (q.v.), in which two specially shaped members rotate in contact; suited to large deliveries at low pressure. See **Roots blower.**

rotary regenerative heater (*Eng.*). An air heater consisting of a slowly revolving rotor made up of concentric rings of corrugated and flat plates, which pass alternately and continuously through the hot gases and the air drawn across opposite halves of the rotor.

rotary shutter (*Cinema.*). The rotating vanes which cut off the light from the screen while the frames are being moved and located in the picture gate of a projector. To increase the flicker frequency, each frame may also be interrupted once, twice, or, in certain sub-standard projectors, three times.

rotary spark gap (*Radio*). A rotating disc or wheel having a series of projections on its periphery which pass close to two fixed electrodes. A spark, of short duration, takes place from one electrode to the disc and thence to the other electrode each time the projections come opposite to the electrodes. Used in some forms of quenched spark system.

rotary strainer (*Paper*). A machine which removes foreign material from the pulp before it travels on to the paper-making machine.

rotary switch (*Elec. Eng.*). A switch operated by a rotating handle capable of rotation in one direction only.

rotary transformer (*Elec. Eng.*). See **dynamotor.**

rotary valve (*I.C. Engs.*). A combined inlet and exhaust valve in the form of a ported cylinder rotating on cylindrical faces in the cylinder head, usually parallel with the crankshaft.

rotate (*Bot.*). Said of a sympetalous corolla having a very short tube, the petals spreading like the spokes of a small wheel or like a star.

rotating beacon (*Radio*). A radio beacon in which the transmitted beam is slowly revolved by mechanical or electrical means. By transmitting a special signal when the beam points true north, a receiving station can obtain its bearings without the use of direction-finding apparatus.

rotating colour disc (*Cinema.*). The rotary colour filters which turn in synchronism with the frames in a projector, so that alternate frames are projected with their correct colour illumination.

rotating crystal method (*Crystal.*). A widely used method of X-ray analysis of the atomic structure of crystals. A small crystal, less than a millimetre in maximum size, is rotated about an axis at right-angles to a narrow incident beam of X-rays. The diffraction of the beam by the crystal is recorded photographically on a flat plate or on a film bent into a cylinder round the axis.

rotating field (*Elec. Eng.*). A magnetic field produced by polyphase currents flowing in the polyphase winding of an electric machine. The field has a direction which rotates around the axis in the same way as that produced by ordinary rotating field magnets.

rotating field magnet (*Elec. Eng.*). The rotating portion of an electric machine, usually a synchronous motor or generator, in which the field poles rotate and the armature is stationary.

rotating scanner (*Television*). Any form of mechanical scanner in which the moving parts revolve, as in a Nipkow disc, as opposed to one in which the motion is oscillatory.

rotation (*Astron.*). The term generally confined to the turning of a body about an axis passing through itself; e.g. *rotation* of the earth about its polar axis in one sidereal day.

rotation (*Bot.*). The movement of the protoplasm in a cell in a constant direction.

rotation (*Elec. Eng.*). See **curl.**

rotation axes of symmetry (*Crystal.*). Symmetrically placed lines rotation about which caused every atom in a crystal structure, as revealed by X-ray analysis, to occupy identical positions a given number (2, 3, 4, 6) of times. Cf. *screw-axes.*

rotation of the plane of polarisation (*Light*). A property possessed by optically active substances. See **optical activity.**

rotational field (*Elec. Eng.*). A field in which the *circulation* (q.v.) is, in some parts, not always zero.

rotator (*Zool.*). A muscle which by its contraction turns a limb or a part of the body on its axis.

rotatory dispersion (*Light*). The variation of the rotation of the plane of polarised light with wavelength for an optically active substance.

rotatory power (*Phys.*). See **specific rotation.**

Rötheln, rét'eln (*Med.*). German measles. See **rubella.**

Rothera test (*Chem.*). A test for the presence of acetone or diacetic acid, based on the appearance of a dark violet colour in the presence of an ammoniacal solution of sodium nitroprusside.

Rotif'era (*Zool.*). A class of *Trochelminthes* in which the pre-oral region forms a disc or crown with two rings of cilia, the pharynx is modified to form a mastax with chitinous jaws, and the anus, urinary and genital ducts open into a cloaca; there is a long tail; the sexes are separate; fresh-water or marine. Rotifers, Wheel Animalcules.

rotor (*Aero.*). Any system of revolving planes whose air reactions produce lift.

rotor (*Elec. Eng.*). The rotating part of an electric machine; the term is usually applied only to a.c. machines.

rotor core (*Elec. Eng.*). That portion of the magnetic circuit of an electric machine which lies in the rotor.

rotor starter (*Elec. Eng.*). A motor starter used for slip-ring induction motors; it cuts out resistance previously inserted in the rotor circuit.

rottenstone (*Geol.*). A material used commercially for polishing metals; formed by the weathering of impure siliceous limestones, the calcareous material being removed in solution by percolating waters.

rotting (*Linen*). See **retting.**

rot'ula (*Zool.*). In higher *Vertebrata*, the kneecap: in *Echinoidea*, one of five radially directed bars running inwards from the junctions of the epiphyses and forming part of *Aristotle's lantern* (q.v.).

rotund (*Bot.*). Approximately circular.

rotunda (*Build.*). A building or room which is circular in plan and is covered by a dome.

rotun'date (*Bot.*). Orbicular.

rouge. Hydrated oxide of iron in a finely divided state; used as a polish for metals.

Rouget cells, roo-zhā (*Zool.*). In Vertebrates, cells found lying against the walls of the capillaries; the power of contraction of the capillaries was formerly ascribed to these.

rough arch (*Build.*). An arch built of uncut bricks, wedge-shaped joints being used. They are usually segmental, with a rise of about one-eighth of the span.

rough ashlar (*Masonry*). A block of freestone as taken from the quarry.

rough brackets (*Carp.*). Pieces of wood nailed to the sides of the *carriage* (q.v.), to provide intermediate support for the treads of a wooden staircase.

rough-cast (*Plast.*). A rough finish given to a wall by coating it with a plaster containing gravel or small stones.

rough coat (*Plast.*). The first coat of plaster applied to a wall surface.

rough grounds (*Join.*). Unplaned strips of wood used as *grounds* (q.v.) when the attached joinery will entirely cover them.

rough plate (*Glass*). Plate glass that has not been ground and polished after the rolling operation.

rough-string (*Carp.*). See **carriage.**

roughing (*Linen*). The process of straightening and cleaning scutched flax by drawing it in handfuls through a series of pins.

roughing-in (*Plast.*). The first coat of three-coat plaster work applied on brick.

roughing-out (*Carp., etc.*). The preliminary operation of roughly shaping a piece before finally reducing it to the required shape and size.

roughing tool (*Eng.*). A lathe or planer tool, generally having a round-nosed or obtuse-angled cutting edge, used for roughing cuts.

roughness integrator (*Civ. Eng.*). An instrument for measuring the roughness of a road surface. Also called a CORRUGMETER OF PROFILOMETER.

rouleaux, roo-lō (*Zool.*) Aggregations of red blood-corpuscles resembling piles of plates.

roulette' (*Photog.*) A steel wheel, having pointed projections, used for retouching copper plates which have been etched.

roumanite (*Min.*). Opal, of gemstone quality, obtained from Roumania.

round (*Build.*). A rung of a ladder.

rounds (*Join.*). The general name for planes having a concave sole and cutting iron, used for forming rounded surfaces. Cf. *hollows.*

round key (*Eng.*). A circular bar or pin fitted in a hole drilled half in the shaft and half in the boss, parallel to the shaft axis; used for light work to avoid fitting. See **key.**

round of beam (*Ship Constr.*). A synonym for *camber.*

round step (*Build.*). A step finished with a semicircular end.

rounding (*Bind.*). The process of giving the back of a book a convex shape before casing, usually performed along with *backing* (q.v.).

rounding (*Leather*). Removing from the hide, before or after tanning, the shoulder, belly, and neck parts.

rounding plane (*Join.*). See **rounds.**

rounding-up tool (*Horol.*). A tool for correcting the size and shape of the teeth of a toothed wheel.

roup (*Vet.*). Fowl pox.

Rous's sarcoma (*Med.*). A tumour, occurring in fowls, which can be transmitted to other fowls by inoculation of a cell-free filtrate of the tumour, which is therefore thought to be the result of infection with a filter-passer.

Rousay Flags, row'zā (*Geol.*). A group of blue and calcareous flags with sandy beds which belong to the Middle Old Red Sandstone of the Devonian System; found in the North of Scotland and in Orkney.

Rousseau diagram, roo-sō (*Elec. Eng.*). A diagram by the use of which the total output (in lumens) of a light source can be obtained, if the polar curve of the lamp about the vertical axis is known.

Roussin's salts (*Chem.*). Formed when sodium trisulphide is added to a solution of ferrous chloride saturated at −2° C. with nitric oxide, and converted by sodium sulphide into so-called *Roussin's red salt*; by treatment with dilute acids this is converted into *Roussin's black salt.*

rout, rowt (*Carp., Join.*). To cut out wood from the bottom of a sinking with a router plane.

router (*Join.*). (1) A plane adapted to work on circular sash; operated in the manner of a spokeshave.—(2) The side wing of a *centre-bit* (q.v.), which removes the material in forming the hole.

router plane (*Carp.*, *Join.*). A plane having a central projecting cutting iron, adapted to smoothing the bottom of a recess.

routiner, roo-tē'ner (*Auto. Teleph.*). Apparatus which tests, as a routine, all machine-switching apparatus in an exchange, so that faults may be rapidly detected and rectified, and contacts kept clean.

routing machine (*Print.*). A machine having a revolving point which removes unwanted metal from printing plates.

Röver effect (*Eng.*). The stress increase on the inside of the coils of a loaded helical spring, above that deduced by assuming the wire to be in pure torsion.

roving or **rove** (*Textiles*). A thread or strand of textile fibres, in a continuous length, which has been reduced to a size suitable for spinning.

roving frame (*Cotton Spinning*). See **fly frames.**

R.O.W. & P.F. (*Build.*) Abbrev. for *rake out, wedge, and point flashings.*

rowelling scissors (*Vet.*). See **scissors (rowelling).**

Rowland circle (*Light*). A circle having the radius of curvature of a concave diffraction grating as diameter. It has the property that, if the slit is placed anywhere on the circumference of the circle, the spectra of various orders are formed in exact focus also round the circumference of the circle. This fact is used in designing mountings for the concave grating.

rowlock (*Build.*). A term applied to a course of bricks laid on edge.

rowlock-back (*Build.*). A term applied to a wall whose external face is formed of bricks laid flat in the ordinary manner, while the back is formed of bricks laid on edge.

Roxor (*Build.*). A stone-cleaning process involving the use of soft soap and steam.

royal (*Paper*). A standard size of printing paper, 20 × 25 in.; also writing and drawing, 19 × 24 in.

royal pair (*Zool.*). The pair of sexually perfect reproductory individuals which are the founders of a termite colony. See **Isoptera.**

royalette' (*Textiles*). A fabric with a sateen finish, cotton warp and fine Botany worsted weft.

R.R. alloys (*Met.*). Properly HIDUMINIUM R.R. ALLOYS. A series of aluminium alloys of the Duralumin type (sp. gr. approx. 2·75) composed of aluminium with the following elements in percentages varying between the limits shown:—copper 0·8-3·0, magnesium up to 4·0, silicon 0·6-2·8, nickel 0·5-2·0, iron 0·6-1·5, titanium 0·02-0·3.

R.S.F. (*Build.*). Abbrev. for *rough sunk face.*

R.S.J. (*Build.*). Abbrev. *for rolled steel joist.*

R.U. (*Chem.*). An abbrev. for *raies ultimes.*

Ru (*Chem.*). The symbol for *ruthenium.*

Ruabon (*Build.*). A term applied to hard, smooth-surfaced, impervious facing-bricks resembling red terra-cotta.

rubber (*Chem.*). Commercial rubber consists of caoutchouc, a polymerisation product of isoprene, of resin-like substances, nitrogenous substances, inorganic matter, and carbohydrates. The caoutchouc portion of rubber is soluble in CS_2, CCl_4, chloroform or benzene, forming a viscous colloidal solution. When heated, rubber softens at 160° C., and melts at about 220° C. Rubber easily absorbs a large quantity of sulphur either by heating or in the cold by contacting with S_2Cl_2, etc. This process is called *vulcanisation* (q.v.). Carbon black, in a fine state of division, is used as a reinforcing filler; other substances, produced by the condensation of aldehydes with amines, retard the oxidation of vulcanised rubber.—(*Diel.*) Rubber is used for insulating copper wires. A layer of pure rubber is put on the copper and vulcanised; rubber forms the main insulation. See **crepe—*, synthetic—.**

rubber blanket (*Print.*). See **set-off blanket.**

rubber gloves (*Elec. Eng.*). Gloves made of good quality rubber; worn when working on live circuits.

rubber line (*Acous.*). In gramophone disc-record manufacture, the terminating mechanical resistance in the sound-recording mechanism used for driving the stylus in making the wax record. By using concentric tubes of rubber, a substantially pure mechanical resistance over the required range of frequency is obtained.

rubbers (*Build.*). See **cutters.**

rubbing leathers (*Textiles*). Endless leather belts or aprons, one above another, which travel with an oscillating movement and convert the ribbon-shaped slivers in the condenser, or passing from a ring-doffer, into thread-like forms (roving or condensed slivers) suitable for drafting. Also called CONDENSER LEATHERS.

rubbing stone (*Build.*). An abrasive stone on which the bricklayer rubs smooth the bricks which he has cut to a special shape. See **gauged arch.**

rubble (*Masonry*). Rough uncut stones, of no particular size or shape, used for rough work, for filling between facing walls, etc.

rubble concrete (*Civ. Eng.*). A form of masonry often used on massive works such as solid masonry dams; composed of very large blocks of stone set about 6 in. apart in fine cement concrete and faced with squared rubble or ashlar.

rubefa'cient (*Med.*). Producing reddening of the skin: any agent which does this, a counter-irritant.

rubel'la (*Med.*). German measles; Rötheln. An acute infectious disease distinct from measles; characterised by slight fever, enlargement of glands in the neck and at the back of the head, and a pink papular-macular rash.

rubel'lite (*Min.*). The red transparent variety of tourmaline, used as a semi-precious gemstone.

rube'ola (*Vet.*). Swine fever.

Ruberoid (*Build.*). A very light-weight roof-sheeting material, lap-jointed with cement and nails. It is airtight, acid and alkali proof, and unaffected by moist heat.

rubes'cent (*Bot.*). Turning pink or red.

ru'bicelle (*Min.*). A yellow or orange-red variety of spinel; an aluminate of magnesium.

rubid'ium (*Chem.*). Symbol, Rb. A metallic element in the first group of the periodic system, one of the alkali metals. At. no. 37, at. wt. 85·48. The element is widely distributed in nature, but occurs only in small amounts; the chief source is carnallite. The metal is slightly radioactive, m.p. 38·5° C., b.p. 690° C., sp. gr. 1·532.

rubig'enous (*Bot.*). Rust-coloured.

ruby (*Min.*). The blood-red variety of the mineral corundum, the oxide of aluminium (Al_2O_3), which crystallises in the trigonal system. Also called TRUE RUBY (to distinguish it from the various types of *false ruby*, q.v.) and ORIENTAL RUBY, though the adjective *Oriental* is quite unnecessary, since it merely stresses the fact that rubies come from the East (Burma, Siam, Ceylon, Afghanistan). See also **Balas ruby, ruby spinel.**

ruby (*Typog.*). The old name for a type size, about 5½-point.

ruby light (*Photog.*). The so-called safe-light for use when manipulating orthochromatic films in the dark-room.

ruby pin (*Horol.*). The impulse pin of a lever escapement.

ruby silver ore (*Min.*). See **proustite, pyrargyrite.**

ruby spinel (*Min.*). That variety of magnesian spinel, $MgAl_2O_4$, which has the colour, but none of the other attributes, of true ruby. Also known as SPINEL RUBY, a deceptive misnomer.

rudder (*Ship Constr.*). A broad, flat device, varying in form, hinged vertically to, or behind, the stern-post of a vessel; the rudder serves to change the vessel's course when it is moved from a position in line with the keel.—(*Aero.*) A similar movable surface in a vertical plane for control of an aeroplane in angles of yaw (i.e. movement in a horizontal plane about a vertical axis). Usually located at the rear end of the body and controlled by the pilot through a system of rods or wires.

rudder bar (*Aero.*). A foot bar through which the pilot actuates the rudder, so controlling the aeroplane in angles of yaw.

rudder pedals (*Aero*). A device for the pilot's control of the rudder of an aeroplane, sometimes used as an alternative to a rudder bar.

ruden'ture (*Arch.*). A cylindrical moulding carved in imitation of a rope.

ru'deral (*Bot.*). A plant which grows usually on rubbish heaps or waste places.

rudiment (*Bot., Zool.*). The earliest recognisable stage of a member or organ.

rudimentary (*Bot., Zool.*). Incompletely or imperfectly developed; in an early stage of development; vestigial.

Rudis'tes (*Geol.*). A group of heavily built aberrant lamellibranchs characteristic of the Cretaceous rocks formed in the southern ocean (the Tethys) of the period; it includes the genera *Hippurites*, *Requienia*, and *Monopleura*. Rudistids also occur in the Cretaceous Trinity Series of Texas and Mexico.

rufes'cent (*Bot.*). Becoming reddish-brown.

Ruffini's organs, roo-fē̆'nē (*Zool.*). In Vertebrates, a type of sensory nerve-ending in which the nerve gives rise, within a cylindrical capsule, to small ramifications which end in flattened expansions.

ruffling (*Bot.*). A faint crumpling of a leaf attacked by a virus disease.

ru'fous (*Bot.*). Red-brown.

ru'gose (*Biol.*). Having a wrinkled surface.—*dim.* **ru'gulose.**

Ruhmkorff coil (*Elec. Eng.*). An early name for a self make-and-break *induction coil* (q.v.).

rule (*Build.*). See **floating rule.**

rule (*Typog.*). A strip of brass or type metal, of varying thickness and design, and in height equal to that of the type: a dash or score (see **em rule, en rule**).

rule border (*Typog.*). A frame of rules, usually brass, fitted around an advertisement or other displayed matter.

ruling (*Stationery*). The operation of making lines on writing, account-book, and ledger paper, etc.; the paper is conveyed on an endless belt and makes contact with suitably adjusted inked discs or pens.

ruling gradient (*Civ. Eng.*). The maximum gradient permissible for any given section of road or railway.

ru'men (*Zool.*). The first division of the stomach in Ruminants and *Cetacea*, being an expansion of the lower end of the oesophagus used for the storage of food; the paunch.

rumenot'omy (*Vet.*). The operation of cutting into the rumen.

Rumford's photometer (*Light*). A *photometer* (q.v.) consisting of a rod standing vertically in front of a white screen on which are cast shadows of it by the two light sources whose intensities are to be compared. When the shadows are of equal darkness the ratio of the intensities of the sources equals the square of the ratio of their distances from the screen.

ru'minant (*Zool.*). See **rumination.**

ruminate (*Bot.*). Mottled, as if composed of a mixture of two or more differently coloured parts; said of endosperm.

rumination (*Med.*). See **merycism.**—(*Zool.*) The regurgitation of food that has already been swallowed, and its further mastication before re-swallowing.—*adj.* and *n.* **ruminant.**

run (*Build.*). A gangway, especially for the passage of wheelbarrows.

run (*Horol.*). The movement of the lever, in a lever escapement, to the banking pins, due to draw.

run (*Plumb.*). That part of a pipe or fitting which is in the same straight line as the direction of flow in the pipe to which it is connected.

run (*Surv.*). In a level tube, the movement of a bubble with change of inclination.

run (*Textiles*). A batch of material run through the same set of machines.—(2) The American unit of length in counting woollen yarns, viz. 100 yards.

run on (*Typog.*). An indication that a new paragraph is not to be made. Marked in copy and proof by a line running from the end of one piece of matter to the beginning of the next.

run-out (*Cinema*). The end-trailer of a print, i.e. the length of film between the last effective frame and the end.

run-out (*Foundry*). See **break-out.**

runway (*Aero.*). A hard path, suitably surfaced, to facilitate landing and taking off. Laid in the direction of the prevailing wind, if only one is provided.

run'cinate (*Bot.*). Said of a leaf having a lamina composed of lobes with their points backwardly directed.

rung (*Build.*). A bar connecting the two side posts of a ladder and serving as a step.

ru'nic texture (*Geol.*). An alternative term suggested by A. Johannsen for *graphic texture*, since the intergrown quartz and feldspar resemble runic characters.

ru'nite (*Geol.*). A term suggested by A. Johannsen as an alternative to *graphic granite*.

runner (*Bot.*). A prostrate shoot which roots at the end and there gives rise to a new plant.

runner (*Eng.*). The rotor or vaned member of a *water turbine* (q.v.).

runner (*Moulding*). The vertical passage into the interior of a mould through which the metal is poured. Also called RUNNER-GATE. See **in-gate.**

runners (*Civ. Eng.*). A form of sheet pile much used for timbering wide excavations. It consists of short planks shaped to a chisel point at one end and usually shod with thin steel strip, so that as each runner is driven in, it wedges up against its neighbour.

runners (*Furn.*). Devices to assist sliding motion, as in drawers, etc.

runners (*Horol.*). The cylindrical sliding pieces which support the work in a pair of turns.

runner bush (*Moulding*). A small cast-iron box, without a bottom, lined with sand; placed over a runner gate to act as a funnel and reservoir for the metal during pouring.

runner stick (*Moulding*). See **gate stick.**

running (*Plast.*). The operation of forming a plaster moulding, cornice, etc. in situ, by running a horsed mould along the material while it is still plastic.

running bond (*Build., Masonry*). The same as *stretching bond*.

running charge (*Elec. Eng.*). A term commonly used in connexion with the cost of an electricity supply to denote that part of the cost which is approximately proportional to the number of kWh generated or consumed.

running commentary (*Radio*). A broadcast description of an event by an eye-witness.

running-in (*Eng.*). Running a new engine or machine under light load for some time to allow proper clearances to become established and friction-surfaces to be polished.

running rule (*Plast.*). A wood strip fixed temporarily to serve the same purpose as a running screed.

running screed (*Plast.*). A band of plaster laid on the surface of a wall as a guide to the movement of a horsed mould in the process of running a moulding.

running shoe (*Plast.*). The zinc part of a horsed mould, giving protection to the wood and facilitating running.

running trap (*San. Eng.*). See **siphon trap.**

Rupert's drop (*Glass*). A piece of molten glass dropped into water, so that it is rapidly chilled outside. Great stresses are set up inside, but are more or less balanced. If, however, the 'tail' of the drop is pinched off, the release of stress causes such a violent readjustment that the drop is shattered with a loud report.

rupes'cent, rupes'tral (*Bot.*). Growing on walls and rocks.

ru'pia (*Med.*). A syphilitic ulcer of the skin which is covered by a layer of crusts formed by dried secretion and dead tissue.

rupture (*Med.*). (1) Forcible breaking or tearing of a bodily organ or structure.—(2) To break or to burst (said of a blood-vessel or viscus).—(3) *Hernia* (q.v.).

rupturing capacity (*Elec. Eng.*). See **breaking capacity.**

rural automatic exchange (*Teleph.*). A small automatic exchange for a limited area; dependent on a main exchange for its extensions to other areas.

rushes (*Cinema.*). The first prints from the exposed cinematograph film in motion-picture production. These prints are usually made overnight, but it is possible to complete them in a few hours. All editing is done on rushes, and the negative is not cut until the final sequences with rushes are approved.

Rushton Schists (*Geol.*). A quartz-mica-schist found locally in Shropshire; of Pre-Cambrian age.

russel cord (*Textiles*). A dress fabric of plain weave, with a cord effect; made from cotton warp and worsted or mohair weft, the warp being in tapes.

Russell's test (*Elec. Eng.*). A method of determining the insulation resistance of a three-wire d.c. distribution network. The value is obtained by calculation from readings of an electrostatic voltmeter connected between the neutral wire and earth, both with and without a known resistance in parallel.

Russia leather (*Leather*). Formerly a special product of Russia made from calf's skin; now made by tanning skins in the usual way and imparting the familiar smell, by means of birch bark oil, in the finishing processes.

Russian cord (*Textiles*). A cloth with a plain ground which has, at intervals, prominent cords running the length of the piece. The cords are of special type for the production of which a gauze harness is required.

Russian cotton (*Textiles*). A strong cotton of about 1 in. staple, but rather harsh. Used chiefly in Russia. Quality and staple are very variable from year to year.

rust fungi (*Bot.*). See **Uredinales.**

rust joint (*Build.*). A watertight joint between adjoining lengths of guttering or pipes, formed by packing the socket with a mixture of iron filings and crushed sal-ammoniac.

rustic joint (*Masonry*). A sunken joint between adjacent building-stones.

rusticated ashlar (*Masonry*). Ashlar work in which the face stands out from the joints, at which the arrises are bevelled. The face may be finished rough or smooth or tooled in various ways.

rustication (*Masonry*). A general term for a surface treatment of ashlars, in which the faces are left rough, while the joints are sunk so that the stone projects.

rustics (*Build.*). Bricks having a rough-textured surface, often multi-coloured.

rustle (*Acous.*). A low-level random and irregular noise, such as is caused by the movement of leaves on a tree.—(*Cinema.*) See **valve rustle.**

rut (*Zool.*). The noise made by certain animals, as Deer, when sexually excited; oestrus: to be sexually excited, i.e. to be in the oestrous period: to copulate.

Ruth's accumulator (*Eng.*). A steam accumulator of variable pressure type for smoothing fluctuations of demand on a boiler. It consists of a large insulated vessel containing water into which steam is injected at a high pressure, to be liberated later when the pressure is reduced.

ruthe'nium (*Chem.*). Symbol, Ru. A metallic element in the eighth group of the periodic system. At. no. 44, at. wt. 101·7. The metal is silvery-white, hard, and brittle; m.p. above 1950°, sp. gr. 12·06. It occurs with the platinum metals in osmiridium.

ru'tilant (*Bot.*). Brightly coloured in red, orange, or yellow.

rutilated quartz (*Min.*). See **needle stone.**

ru'tile (*Min.*). Dioxide of titanium which crystallises as reddish-brown prismatic crystals in the tetragonal system. It is found in igneous and metamorphic rocks, and is a source of titanium.

Ruysch's penicil'li, rė'us (*Zool.*). In Vertebrates, tufts of capillary arterioles opening into the interstices of the spleen pulp.

R.W.P. (*Build.*). Abbrev. for *rain-water pipe.*

ryb'at (*Masonry*). An inband or outband.

Rydberg constant (*Light*). A constant (R or N) which occurs in the Balmer and Rydberg formulae. For hydrogen, $R_H = 109677{\cdot}8$ cm.$^{-1}$. For an infinitely massive atomic nucleus, the value of the constant would be $R_\infty = 109722{\cdot}4$ cm.$^{-1}$.

Rydberg formula (*Light*). A formula, similar to that of Balmer, for expressing the wave-numbers (ν) of the lines in a spectral series:

$$\nu = R\left[\frac{1}{(n+a)^2} - \frac{1}{(m+b)^2}\right],$$

where n and m are integers and $m > n$, a and b are constants for a particular series, and R is the *Rydberg constant* (q.v.).

s (*Chem.*). A symbol for *solubility.*

s- (*Chem.*). An abbrev. for .—(1) Symmetrically substituted; (2) *secondary*, i.e. substituted on a carbon atom which is linked to two other carbon atoms; (3) *syn-*, i.e. containing the corresponding radicals on the same side of the plane of the double bond between a carbon and a nitrogen atom or between two nitrogen atoms.

σ (*Chem.*). A symbol for the diameter of a molecule.

S (*Chem.*). The symbol for *sulphur.*

S (*Chem.*). In names of dyestuffs, a symbol for *black.*

S-acid (*Chem.*). 1-Amino-8-naphthol-4-sulphonic acid, an intermediate for dyestuffs.

2S-acid (*Chem.*). 1-Amino-8-naphthol-2:4-disulphonic acid, an intermediate for dyestuffs.

S-wire (*Teleph.*). The sleeve-wire which is added to a subscriber's pair in its passage through an exchange; it is connected to the sleeves of the plugs of the cord circuit.

Sa (*Chem.*). An alternative symbol for *samarium.*

Sabellifor'mia (*Zool.*). An order of *Cryptocephala*, of tubicolous habit, in which the palps are large, subdivided, and highly vascular, acting as respiratory and sensory organs.

sabin (*Acous.*). The unit of acoustic absorption; equal to the absorption, considered complete, offered by one square foot of open window to reverberant sound-waves in an enclosure.

Sabine reverberation formula (*Acous.*). The earliest formula for connecting the period of reverberation of an enclosure, *T* seconds, with the volume, *V* in cubic feet, and the total acoustic absorption in the exclosure, *aS* in sabins, where *a* is the coefficient of each area *S* sq. feet. The formula is $T = V/20 \cdot aS$

sab'inene (*Chem.*). A terpene derivative occurring in marjoram oil; b p. 163°-165° C., sp. gr. 0·848, refractive index 1·4675.

Sabinite (*Build.*). Trade-name of a plaster having special acoustic properties.

sable (*Furs*). The dressed skin of the sable, an animal related to the marten. The skins of the true sable come from Siberia and are a dark rich brown; the tail is bushy and the paws are black. The fur of the N. American marten closely resembles sable.

sab'ulose, sab'uline (*Bot.*). Growing in sandy places.

sac (*Bot., Zool.*). Any bag-like or pouch-like structure.

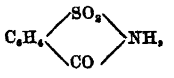
saccate fruit (*Bot.*). A fruit having a bag-like envelope around it.

sac'charase (*Chem.*). See **invertase.**

saccharim'eter (*Chem.*). A special type of polarimeter adapted for use with white light; used in sugar analysis.

saccharim'etry (*Chem.*). The estimation of the percentage of sugar present in solutions of unknown strength, especially by measurements of optical activity.

sac'charin (*Chem.*). *o*-Sulpho-benzimide,



$$C_6H_4\langle{}^{SO_2}_{CO}\rangle NH,$$

a white crystalline powder, three hundred times as sweet as sugar, not very soluble in water. The imido-hydrogen is replaceable by Na, forming a salt which is readily soluble in water. It is used in medicine in cases where sugar is harmful, e.g. in diabetes.

saccharine (*Bot.*). Having a surface covered with shining grains and looking as if sprinkled with sugar.

saccharobi'ose (*Chem.*). Cane-sugar or sucrose.

saccharoi'dal textures (*Geol.*). Granular textures which resemble loaf sugar; found especially in limestones and marbles.

saccharolyt'ic (*Bacteriol.*). Said of bacteria which use simple carbohydrates and starches as sources of energy.

saccharom'eter (*Chem.*). A hydrometer which is used to determine the concentration of sugar in a solution.

sac'charoses (*Chem.*). *Carbohydrates* (q.v.), which according to their complexity are usually divided into *mono-*, *di-*, *tri-*, and *poly-saccharoses.*

saccif'erous, sac'ciform, sak-sif— (*Bot., Zool.*). *Adjs.* from *sac* (q.v.).

saccule, sac'culus (*Zool.*). A small sac: the lower chamber of the auditory vesicle in *Vertebrata.*—*adj.* **sac'culate.**

saccu'liform (*Biol.*). Shaped like a little bag.

saccus (*Zool.*). A sac or pouch-like structure: in male Insects, the ninth abdominal sternite.

sack-pusule (*Bot.*) See **pusule.**

sacr-, sa'cro- (Latin *sacer*, sacred). A prefix used in the construction of compound terms; e.g. *sacro-caudal*, pertaining to the sacrum and the tail region.

sa'cral ribs (*Zool.*). Bony processes uniting the sacral vertebrae to the pelvis, distinct in *Reptilia* but fused to the transverse processes in other *Tetrapoda.*

sacral'gia (*Med.*). Pain in the sacral region.

sacralisation (*Med.*). A developmental anomaly in which one or both transverse processes of the fifth lumbar vertebra become abnormally large and strong, thus appearing to form part of the sacrum.

sa'crum (*Zool.*). The vertebrae to which the pelvic girdle is attached —*adj.* **sa'cral.**

sacs (*Furs*). The term for a number of furs sewn together.

saddening-down (*Paint.*). Loss of gloss or brilliance in a painted or varnished surface.

saddle (*Civ. Eng.*). A block surmounting one of the towers of a suspension bridge, providing bearing or fixing for the suspension cables.

saddle (*Elec. Eng.*). A U-shaped cleat for securing screwed or other lighting conduit to a flat surface.

saddles (*Pot.*). Supports placed in saggars for holding articles to be fired in the glost oven.

saddle-back board (*Join.*). A narrow board, chamfered along each of the upper edges, which is fixed on the floor across the threshold of a doorway so that the gap beneath the door shall be small when the latter is shut and large enough when it is open to accommodate a carpet.

saddle-back coping (*Masonry*). A coping-stone whose upper surface slopes away on both sides from the middle.

saddle bar (*Build.*). A metal bar fixed across a window to give support to glazing secured in lead cames.

saddle boiler (*Build.*). An inverted U-shaped boiler fitted in a kitchener to supply the hot-water system.

saddle coils (*Cathode Ray Tubes*). Rectangularly formed coils which are bent around the neck of a cathode ray tube; used for magnetic deflection of the beam.

saddle key (*Eng.*). A key sunk in a key-way in the boss, but having a concave face which bears on the surface of the shaft, which it grips by friction only. See **key.**

saddle scaffold (*Build.*). A scaffold erected over a roof from standards on both sides of the building; used for repair work on, for example, a chimney at the middle of the roof.

saddle-stitching (*Bind.*). A method of wire-stitching in which the book is placed astride a saddle-shaped support and stitched through the back.

saddle stone (*Build.*). An apex stone.

sa'dism (*Psycho-path.*). Sexual perversion in which physical gratification is obtained by inflicting pain, mental or physical, on another person. In this condition, as also in masochism, there is a high degree of fusion between the sexual and aggressive instincts. (Named from the Marquis de Sade, 1740-1814, who both practised and wrote on sadism.)

safeguard (*Rail.*). A *check-rail* (q.v.).

safe-lights (*Photog.*). Special light-filters used for lighting dark-rooms, the colour passed being adjusted to the types of emulsions employed. The filters may be of glass, gelatine, or dye solutions in glass boxes.

safe load (*Eng.*). See **factor of safety.**

safety action (*Horol.*). The action in a lever escapement that ensures that the notch in the lever is always in its correct position for the reception of the impulse pin.

safety arch (*Build.*). A *discharging arch* (q.v).

safety cage (*Mining*). A cage fitted with a 'safety catch' to prevent it from falling if the hoisting-rope breaks.

safety coupling (*Eng.*). A friction coupling adjusted to slip at a predetermined torque, to protect the rest of the system from overload.

safety cut-out (*Elec. Eng.*). An overload protective device in an electric circuit.

safety factor (*Eng.*). See **factor of safety.**

safety (or **non-flam**) **film** (*Cinema.*). Negative or positive film with cellulose acetate base. Obligatory for sub-standard sizes, but not used in sound-film studios or theatres, because it is not quite so transparent and does not wear so well as the nitrate film. So called because of its inability to flare up when ignited; after several years of dry storage, however, acetate film loses its non-flam properties.

safety finger (*Horol.*). The pin or finger attached to the end of the lever adjacent to the notch. It butts against the edge of the safety roller if the escapement is subject to a jerk, or when setting the hand back, in the case of a watch. Also called GUARD PIN and sometimes DART.

safety fuse (*Demolitions*). A train of slow-burning gunpowder, enclosed in waterproofing composition, by means of which detonators can be fired from a distance.

safety fuse (*Elec. Eng.*). A protective fuse in part of an electric circuit.

safety glass (*Glass*). (1) Laminated glass, formed of a sandwich of a 'plastic' material such as cellulose nitrate or acetate between two glass sheets, certain intermediate layers being used to facilitate adhesion.—(2) Toughened glass, formed by heating a sheet of glass to the point of incipient softening and then chilling it rapidly to a certain extent, but not sufficiently to cause fracture. The glass is in fact a kind of Rupert drop. The stresses have the effect of importing a considerably greater resistance to shock.—(3) Glass reinforced with wire mesh incorporated in the body.

safety island (*Civ. Eng.*). See **street refuge.**

safety lamp (*Mining*). A miners' lamp which will not immediately ignite firedamp or gas in a coal-mine; e.g. a *Davy lamp.* Also used for detecting gas.

safety lintel (*Build.*). A lintel doing the work of a relieving arch, and serving to protect another more decorative lintel used for architectural reasons.

safety plug (*Eng.*). See **fusible plug.**

safety rail (*Rail.*). See **check-rail.**

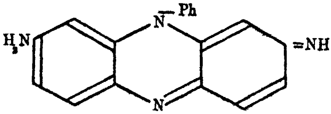
safety roller (*Horol.*). See **roller (safety).**

safety switch (*Elec. Eng.*). See **emergency stop.**

safety valve (*Eng., etc.*). A valve, spring or dead-weight loaded, fitted to a boiler or other pressure vessel, to allow steam to escape to the atmosphere when the pressure exceeds the maximum safe value.

safflo'rite (*Min.*). Essentially, diarsenide of cobalt (cf. *smaltite*) but with usually a considerable amount of iron and more rarely a small amount of nickel. It crystallises in the orthorhombic system.

saf'ranines (*Chem.*). A group of azine dyestuffs. They are 2,8-diamino derivatives and have also a phenyl or a substituted phenyl group attached to the nitrogen in position 10. Phenosafranine has the formula:



safranine (*Photog.*). A basic dye used for desensitising emulsions, so that they can be developed with appreciable light.

saftcanal'chen, —hhen (*Zool.*). See **trophospongium.**

sag. To bulge downwards under load (as a surveying tape under its own weight): to hang downwards (as a door whose supports have yielded): the amount of such movement: the vertical distance between the lowest point on an overhead line and a point of suspension.

sag correction (*Surv.*). A correction applied to the observed length of a base line, to correct for the sag of the measuring tape.

sagger or **saggar** (*Pot.*). A fire-clay box in which pottery is packed for firing in biscuit and glost ovens.

sagging moment (*Ships*). The moment of the stress to which a ship is subjected when the ends are water-borne and the hollow of the wave lies amidships.

sagit'ta (*Civ. Eng.*). (1) *Keystone* (q.v.).—(2) *Versed sine* (q.v.).

sagittal, saj'— (*Zool.*). Elongate in the median vertical longitudinal plane of an animal; as the *sagittal* suture between the parietals, the *sagittal* crest of the skull; used also of sections.

Sagitta'rius (*Astron.*). Archer. Ninth sign of the *Zodiac* (q.v.).

sagittate, saj'— (*Bot.*). Having the form of a barbed arrow-head, with two basal lobes pointing backwards.

Sahara sandals (*Boots and Shoes*). Shoes of this type are made from a very wide-cut sole which is moulded to form a complete covering for the foot.

sail-over (*Build.*). To project over. See **over-sailing courses.**

sailing course (*Build.*). An *oversailing course* (q.v.).

St. Andrew's Cross bond (*Build.*). *Dutch bond* (q.v.).

St. Anthony's fire (*Med.*). *Erysipelas* (q.v.).

St. Bees Sandstone (*Geol.*). Pebbly sandstones of considerable thickness (up to 2000 ft.), of Bunter facies and Triassic age, occurring in northern England west of the Pennines, particularly in Cumberland; also in the Isle of Man and probably Arran.

St. Elmo's fire (*Meteor.*). A glow that appears at the ends of masts and spars of ships during thunder-storms at night. The effect is caused by an electrical brush discharge between the ship and a charged thunder-cloud.

St. Erth Beds (*Geol.*). Small patches of sand and gravel occurring east of Land's End in Cornwall; most probably belonging to the Pliocene System.

St. Louis Limestone (*Geol.*). A marine limestone, containing abundant corals and echinoids, resting upon continental beds of Middle Mississippian age in the Mississippi valley.

St. Petersburg standard (*Timber*). See **Petersburg standard.**

St. Vitus dance (*Med.*). *Chorea* (q.v.).

saixe (*Tools*). A *sax* (q.v.).

sal ammoniac (*Min*). Chloride of ammonium, which crystallises in the cubic system. It is found as a white encrustation around volcanoes such as Etna and Vesuvius. It is used in chemical analysis, in medicine, in dry batteries, as a soldering flux, and in textile printing.

sal volatile, vō-lat′il-e (*Chem.*). Ammonium carbonate.

Salamander (*Build*) Trade-name of a fire-resisting decorative building-board made from pulped asbestos.

Salem (or **Spergen**) **Limestone** (*Geol*). A member of the Middle Mississippian Series of the Mississippi valley, consisting partly of oölites, partly of cross-bedded lime-sand (dune-limestone)

sal′empores (*Textiles*). Cotton fabrics, with bars of colour across the piece; made for S American and African markets

sal′icin (*Chem*), $C_{13}H_{18}O_7$ A glucoside found in varieties of *Salix*. It is hydrolysed to saligenin and dextrose.

salicyl′ic acid (*Chem.*). $HO\ C_6H_4{\cdot}COOH$, *o*-hydroxybenzoic acid, colourless four-sided, monoclinic prisms, m.p. 155° C., insoluble in cold water, soluble in hot water. Ferric chloride colours its aqueous solution violet. It is an antiseptic and an important intermediate for a number of derivatives, e.g. aspirin. It can be prepared by heating sodium phenolate to 180°-220° C. in a stream of CO_2.

salient (*Surv.*). (1) A jutting-out piece of land.—(2) A term applied to an external angle. Cf *re-entrant*.

salient pole (*Elec. Eng*). A type of field pole protruding beyond the periphery of the circular yoke in the case of a stator field system, or the circular core in the case of a rotor field system.

salient-pole generator (*Elec. Eng.*). An alternating-current generator whose rotor field system is of the salient-pole type, e.g. in the case of slow-speed water-turbine-driven generators.

Salientia, sā-li-en′shi-a (*Zool.*). An order of *Amphibia* lacking scales, a tail, gills, or gill-slits in the adult state; having four pentadactyl limbs. Frogs and Toads.

saligenin, sal-ij′— (*Chem.*). See **phenolic alcohols.**

saline lakes (*Geol.*). See **salt lakes.**

Salin′ian (or **Sali′na**) **formation** (*Geol.*). A series of non-marine strata which succeed the Niagara Stage in the Silurian System of N. America. Red shale and lime-mud deposits containing rock salt and gypsum are included; these form the basis of the salt industry in New York (Syracuse), Michigan, and Pennsylvania.

salinom′eter (*Phys.*). A *hydrometer* (q.v.) for measuring the density of sea water, the stem being scaled in arbitrary units; used by engineers for estimating the amount of dissolved solids in feed-water.

sali′va (*Zool.*). The secretion, produced by the salivary glands, which facilitates the swallowing of the food, and sometimes also contains digestive ferments; in Mammals it consists of a dilute watery solution of mucin and enzyme (ptyalin).

sali′vary glands (*Zool.*). Glands present in many land animals, the ducts of which open into or near the mouth. See **saliva.**

Salkowski's test, —kov′ske (*Chem.*). A colour test for cholesterol, based on the appearance of a red colour in chloroform and of a green colour in concentrated sulphuric acid when these liquids are shaken up in the presence of cholesterol.

sally (*Carp.*). A re-entrant angle cut into the end of a timber, so as to allow it to rest over the arris of a cross-timber.

salmine (*Chem.*). A protamine isolated from fish testicles.

salmon ladder (*Civ. Eng.*). A special construction provided at a dam site to enable salmon to pass upstream for breeding purposes.

salmonello′sis (*Vet*). Disease of animals and birds due to infection by the *Salmonella* group of bacteria.

Sal′ol (*Chem.*). Trade-name for phenyl salicylate, $HO{\cdot}C_6H_4{\cdot}CO{\cdot}OC_6H_5$, colourless crystals, m.p. 42° C., used as an antiseptic.

Salopian (*Geol.*). The name which is sometimes applied to the Middle and Upper Series of the Silurian System. This is now subdivided into the Wenlockian and Ludlovian Series.

Sal′pida (*Zool.*). An order of *Thaliacea* having a free tailed larval stage, a free well-formed oözoid, soft gelatinous test, pharynx without lateral walls; the muscular rings of the body-wall are usually incomplete ventrally.

salping-. A prefix from the Greek *salpinx* (gen. *salpingos*), trumpet. See **salpinx.**

salpingec′tomy (*Surg*). Surgical removal of a Fallopian tube.

salpingi′tis (*Med.*). Inflammation of a Fallopian tube.

salpingo-oöphorec′tomy (*Surg.*) Surgical removal of a Fallopian tube and of the ovary on the same side.

salpingo-oöphori′tis (*Med*). Inflammation of both the Fallopian tube and the ovary.

salpingor′rhaphy (*Surg.*).· The suturing of a Fallopian tube to the ovary on the same side, after a part of the latter has been removed.

salpingos′tomy (*Surg*). The operative formation of an opening into a Fallopian tube whose natural opening has been closed by disease.

salpingot′omy (*Surg.*). Surgical incision into a Fallopian tube.

sal′pinx (*Anat., Zool.*). The Eustachian tube: the Fallopian tube: a trumpet-shaped structure.—*adj.* **salpin′gian.**

salsu′ginous (*Bot.*). Growing on a salt marsh.

salt (*Chem.*). A compound which results from the replacement of one or more hydrogen atoms of an acid by metal atoms or electropositive radicals. Salts are generally crystalline at ordinary temperatures, and form positive and negative ions on dissolution in water, e.g. chlorides, nitrates, carbonates, sulphates, silicates, and phosphates. For *common* or *rock salt* see **halite.**

salt bath (*Met.*). A bath of molten salts used for heating steel, for hardening or tempering. Salt baths give uniform heating and prevent oxidation. Certain salts are employed only to transmit heat to the immersed material, and different salts are used for different temperatures. For *tempering* baths, sodium and potassium nitrate are used. For *hardening* baths, sodium cyanide, and sodium, potassium, barium, and calcium chlorides are used. An electric salt-bath furnace is a conductor-type electric furnace in which the salt is melted by the passage of the current.

salt gland (*Bot.*). A hydathode from which a saline exudation oozes, the salts drying on the outside of the leaf.

salt glaze (*Pot., etc.*). The glaze on drain pipes and similar types of earthenware. Produced by covering the article with salt in the kiln. The salt volatilises and attacks the surface of the clay article, producing a glass-like covering.

salt (or saline) lakes (*Geol.*). Enclosed bodies of water in areas of inland drainage, whose concentration of salts in solution is much higher than in ordinary river water. See **soda lakes.**

saltant (*Biol.*). A changed form of a species, developed suddenly, and differing from the original in morphology or in physiological properties.

saltation (*Biol.*). A sudden discontinuous variation; a sport; a mutation.

saltato'rial, sal'tatory (*Zool.*). Used in, or adapted for, jumping; as the third pair of legs in Grasshoppers.

sal'tigrade (*Zool.*). Progressing by jumps, as Grasshoppers.

salting (*Photog.*). When printing papers are being prepared before sensitisation, the preliminary soaking in a solution of a chloride, with added size or colloid, to regulate the subsequent contrast.

salting-out (*Chem.*). The removal of an organic compound from an aqueous solution by the addition of a salt.

saltpetre, —pē'ter (*Min.*). See **Chile nitre, potassium nitrate, soda nitre.**

salvage. The whole of the operations involved in rescuing a ship or cargo or a property from wreck, fire, etc.: the compensation paid for such rescue.

salvage (*Mining*). A layer or parting of clay or pug occurring on the wall of a vein.

Sal'varsan (*Chem.*). 3,3'-Diamino-4,4'-dihydroxyarsenobenzene hydrochloride, a yellow, crystalline powder, easily soluble in water, methyl alcohol, and glycerine. It is easily oxidised by exposure to the air to the more toxic amino-hydroxyphenylarsine oxide. It is of great therapeutic value, especially against syphilis. Known as No. 606.

salver-shaped (*Bot.*). Said of a corolla which has the lower part long and tubular and the upper part spreading horizontally; hypocrateriform.

samar'a (*Bot.*). A single-seeded, dry, indehiscent fruit, bearing a wing-like extension of the pericarp; ash keys provide a familiar example.

samar'iform (*Bot.*). Winged, like an ash key.

sama'rium (*Chem.*). Symbol, Sm or Sa. A metallic element, a member of the rare earth group. At. no. 62, at. wt. 150·4; found in allanite, cerite, gadolinite, and samarskite. The metal is hard and brittle; m.p. above 1300°, sp. gr. 7·7.

sam'el bricks (*Build.*). See **grizzle bricks.**

sand (*Geol.*). A term popularly applied to loose, unconsolidated accumulations of detrital sediment, consisting essentially of rounded grains of quartz. Restricted in sedimentary petrology to sediments whose grains lie between 1 mm. and 0·1 mm. diameter; cf. *grits.* (See Supplement.) In Coral Sand the term implies a grade of sediment the individual particles of which are fragments of coral, not quartz.

sand (*Moulding*). See **moulding sands.**

sands (*Met.*). Particles of crushed ore of such a size that they settle readily in water and may be leached by allowing the solution to percolate. See also **slimes.**

sand binder (*Bot.*). A plant which forms a mat of rhizomes and roots, and holds sand down so that it is not readily moved by the wind.

sand-blasting. A method of cleaning metal surfaces by means of sand, steel shot, or grit directed from a nozzle at high velocity; also used for forming a key on the surface of various materials requiring a finish, such as enamel.

sand-calcites (*Geol.*). See under **Fontainebleau Sands.**

sandcrack (*Vet.*). A fissure of the horse's hoof.

sand culture (*Bot.*). An experimental method of determining the mineral requirements of plants; the latter are grown in purified sand to which various solutions are added.

sand cushion (*Civ. Eng.*). A bag of sand placed beneath a helmet to protect the top of the pile from damage due to impact of the monkey when it is being driven.

sand dunes (*Geol.*). Rounded or crescentic mounds of loose sand which have been piled up by wind action on seacoasts or in deserts. See also **barkhans.**

sandfly fever (*Med.*). Phlebotomus fever. An acute disease due to infection with a filter-passer conveyed by the bite of a sand-fly *Phlebotomus papatasii*; characterised by a three days' fever, pains in the joints and the back, diarrhoea, and a slow pulse.

sand-lime bricks (*Build.*). Bricks made from a mixture of damp sand and approximately 6% slaked lime moulded under pressure in a steam chamber.

sandpaper (*Carp., etc.*). Stout paper or cloth with a thin coating of fine sand glued on to one side, for use as an abrading material. Cf. *glass-paper.*

sand pump (*Civ. Eng*). See **sludger.**

sand-pump dredger (*Civ. Eng.*). A long pipe reaching down from a vessel into the sand, the latter being raised under the suction of a centrifugal pump and discharged into the vessel itself or an attendant barge. Also called a SUCTION DREDGER.

sandslinger (*Foundry*). A machine for reproducing the action of a moulder in filling a mould by hand. Sand is delivered in wads at high speed by centrifugal force, and directed by the operator into the mould as required.

sandstones (*Geol.*). Compacted and cemented sedimentary rocks, which consist essentially of rounded grains of quartz, between the diameters of 1 mm. and 0·1 mm., with a variable content of 'heavy mineral' grains. According to the nature of the cementing material, the varieties *calcareous sandstone, ferruginous sandstone, siliceous sandstone* may be distinguished; *glauconitic sandstone, micaceous sandstone,* etc. are so termed from the presence in quantity of the mineral named.

sand trap (*Paper*). An inclined trough across which bars are set at intervals. During the passage of the pulp to strainers, any heavy particles such as sand sink to the bottom and are retained by the bars.

sands-and-slimes process (*Met.*). A process in the cyanidation of gold ores which involves separation of two portions in a classifier, and separate treatment of sands by percolation and slimes by agitation.

sandal bricks (*Build.*). A local term for *grizzle bricks.*

Sandgate Beds (*Geol.*). A division of the Lower Greensand of the Weald in Southern England, comprising variable clayey sands, sandy loams (often glauconitic), fullers' earth (at Nutfield, in Surrey), and rock bands, the chief of which occur in the *Bargate Beds* (q.v.).

sanding (*Carp., etc.*). The operation of cleaning up wood surfaces by rubbing with sandpaper.

Sandmeyer's reaction (*Chem.*). The replacement of the diazo group, —N:N—, in a diazonium compound by chlorine, bromine, or the cyanogen radical, which is effected by heating a solution of the diazonium compound with, e.g., a concentrated solution of cuprous chloride in hydrochloric acid. In this case the —N.N— group is replaced by Cl, with evolution of gaseous N_2.

sandwich beam (*Build.*). A *flitch beam* (q.v.).

sandwich film (*Photog.*). A film which has two emulsions, one on each side of the base, with an intervening dyed layer; used for release prints in the Multi-color system.

sandy clay (*Build.*). See **loam.**

sanguic'olous (*Zool.*). Living in blood.

sanguif'erous (*Zool.*). Blood-carrying.

sanguin'eous (*Bot.*). Blood-red.

sanguiv'orous (*Zool.*). Blood-feeding; as Fleas.

san'idine (*Min.*). A form of potash feldspar identical in chemical composition with orthoclase, but physically different, formed under different conditions and occurring in different rock types. It is the high-temperature form of orthoclase, into which it inverts at 900° C. Occurs in lavas and dyke-rocks.

sanies, sā'ni-ēz (*Med.*). A thin, offensively smelling discharge of pus, mixed with blood or with serum, from a wound or ulcer.—*adj.* **sa'nious.**

San'io's band (or **beam**) (*Bot.*). See **trabecula.**

sanitary wallpapers (*Dec.*). Wallpapers having designs printed in oil colours, and varnished papers; can be sponged.

sanitary ware (*San Eng.*). Glazed earthenware used for some sanitary fittings.

sanser'if (*Typog.*). A type face without serifs; e.g. gill sans.

Santorin, —rēn' (*Build., Civ. Eng.*). A natural pozzuolana or volcanic ash from the Isle of Santorin.

Santorini's duct, —rē'ni (*Zool.*). The dorsal or accessory pancreatic duct of Mammals. Cf. *Wirsung's duct.*

sap (*Bot.*). An aqueous solution of mineral salts, sugars, and other organic substances, present in the xylem of plants.

sap cavity (*Bot.*). The large vacuole filled with fluid, occupying the middle of an adult cell.

sapstain (*Timber*). A discoloration produced in the sapwood of felled timber by the growth of certain fungi.

sapwood (*Bot.*). The layer of recently formed secondary wood forming a sheath over the whole of the surface of the xylem of a woody plant; it contains living cells, is able to conduct sap, and is usually light-coloured. Also called ALBURNUM.

saphir d'eau (*Min.*). French 'water sapphire.' An intense-blue variety of the mineral cordierite, occurring in water-worn masses in the river gravels of Ceylon; used as a gemstone.

sapling (*Bot.*). A young tree.

sapona'ceous (*Bot.*). Slippery, as if soaped.

sapon'ifica'tion (*Chem.*). The hydrolysis of esters into acids and alcohols by the action of alkalis or acids, or by boiling with water, or by the action of superheated steam. It is the reverse process to *esterification* (q.v.).

saponification number (*Chem.*). The number of milligrams of potassium hydroxide required to saponify 1 gm. of a fat or oil.

sap'onite (*Min.*). An amorphous silicate of magnesium and aluminium, occurring as soft soapy masses in cavities in serpentine. BOWLINGITE is the same substance.

sapphire (*Acous.*). The cutter which shaves the surface of wax blanks before a record is cut with a stylus.

sapphire (*Min.*). The fine blue transparent variety of crystalline corundum, of gemstone quality; obtained chiefly from Ceylon, Kashmir, Siam, and Australia. See also **Brazilian.**

sapphire needle (*Acous.*). A gramophone-record reproducing needle ground from natural sapphire; by virtue of its hardness in comparison with that of the record surface, it does not wear comparably with normal steel needles.

sapphire quartz (*Min.*). A very rare indigo-blue variety of silicified crocidolite occurring at Salzburg; used as a semi-precious gemstone. Also known as AZURE QUARTZ and SIDERITE.

sapph'irine (*Min.*). A rare alumino-silicate of magnesium occurring at Fiskernäs (Greenland) as disseminated blue grains and occasional monoclinic crystals.

sappy wool (*Textiles*). Wool which contains an excessive amount of grease.

sapr-, sapro- (Greek *sapros*, rotten, rancid). A prefix used in the construction of compound terms; e.g. *sapraemia* (q.v.).

saprae'mia, sapre'mia (*Med.*). The presence in the blood of toxic products resulting from the putrefactive action of saprophytes on dead tissue (e.g. on retained discharges and placental tissue in the uterus): the condition (intoxication) that results from this.

sap'robe (*Bot.*). A plant growing in foul water.

saprobiot'ic (*Biol.*). Feeding on dead or decaying animals or plants.

saprogen'ous (*Bot.*). Growing on decaying matter.

sapropel'ic (*Zool.*). Said of aquatic organisms which live in the decaying organic matter of a muddy bottom.

sapropel'ite (*Geol.*). A term applied by H. Potonié to coals derived from algal materials. Cf. *humite.*

sap'rophile (*Ecol.*). An animal not properly characteristic of stagnant and polluted waters, but capable of breeding therein by reason of its ability to resist or overcome oxygen-scarcity.

saprophi'lous (*Bot.*). Saprogenous.

sap'rophyte (*Biol.*). An organism which obtains its food from dead organic material.—(*Bacteriol.*) Any bacterium which breaks up dead animal and vegetable matter and does not produce disease in the animal or plant which it inhabits.

saprophyt'ic (*Biol.*). Feeding on dead or decaying organic materal.—*n.* **saprophytism.**

sap'roplankton (*Bot.*). Plankton growing in foul water.

saprozo'ic (*Biol.*). Feeding on dead or decaying organic material.

S.A.R. (*Teleph.*). Abbrev. for *special apparatus rack.*

sarc-, sarco- (Greek *sarx*, gen. *sarkos*, flesh). A prefix used in the construction of compound terms; e.g. *sarcosoma*, the fleshy part of the soma.

sarcen'chyma (*Zool.*). A form of parenchyma occurring in Sponges, characterised by closely packed granular cells in a reduced gelatinous matrix.

sarcin'iform (*Bot.*). In the form of small packets.

sar'coblast (*Zool.*). An elongate multinucleate muscle-cell.

sar'cocarp (*Bot.*). The fleshy part of the pericarp of a drupe.

sar'cocyte (*Zool.*). A middle layer of the ectoplasm in some *Protozoa.*

sarcod'ic, sarcod'ous, sar'coid (*Zool.*). Pertaining to or resembling flesh.

Sarcodi'na (*Zool.*). A class of *Protozoa* comprising forms which are generally free-living, possess the power of thrusting out pseudopodia in the principal phase, and lack always a meganucleus and generally an investing membrane.

sar'cody (*Bot.*). Conversion into something of fleshy texture.

sarcolem'ma (*Zool.*). The extensible sheath of a muscle fibre enclosing the contractile substance.

sar'colytes (*Zool.*). In the histolysis which accompanies metamorphosis in some Insects, fragments of muscle fibres.

sarco'ma (*Med.*). A malignant tumour of connective tissue origin (e.g. of fibrous tissue, bone, cartilage), consisting of round cells and/or spindle-shaped cells and newly formed blood-vessels; the tumour invades adjacent tissue and organs, and metastases are formed via the blood-stream. —*pl.* **sarco'mata.**

sarcoma (*Zool.*). The fleshy portion of an animal body as opposed to the skeletal portion.

sarcomato'sis (*Med.*). The presence of many sarcomata in the body.

sarco'matous (*Med.*). Pertaining to, of the nature of, or resembling sarcoma.

sar'comeres (*Zool.*). The serial portions into which a muscle fibril is divided by the membranes of Krause.

sarcoph'agous (*Zool.*). Flesh-eating.

sar'coplasm (*Zool.*). The interfibrillar protoplasm of muscle fibres.

sar'cosine (*Chem.*). Monomethyl-glycocoll, $H_3C\cdot HN\cdot CH_2\cdot COOH$. It is obtained by the decomposition of creatine or caffeine. Crystals, m.p. 212° C., readily soluble in water. It may be synthesised from chloracetic ester and methylamine, or by hydrolysis with baryta of methylaminoacetonitrile.

Sarcosporid'ia (*Zool*). An order of *Neosporidia* the members of which are parasitic in the muscle cells of Vertebrates; the spores possess neither cases nor polar capsules.

sarcosporidio'sis (*Vet.*). Infection of the muscles of swine, sheep, horses, cattle, goats, and birds by *Sarcosporidia* (q v.).

sar'costyle (*Zool.*). One of the fibrillae or longitudinal contractile elements of a muscle fibre: a *nematophore* (q.v).

sarcotes'ta (*Bot.*). A fleshy layer in a testa.

sarcothe'ca (*Zool.*). The cup-like expansion of the perisarc which surrounds a nematophore.

sar'cous (*Zool.*). Pertaining to flesh: pertaining to muscle tissue.

sarcous element (*Zool.*). The dark area occupying the middle of each sarcomere.

sar'donyx (*Min.*). A form of chalcedony in which the alternating bands are brown and white. Cf. *onyx*

sari (*Textiles*). A light cotton cloth of plain weave with fancy borders in colours, or decorated with rayon. Saris resemble dhooty and are made for the Indian market, being worn by women.

sarking felt (*Build.*). A bituminous underlining placed beneath slates or tiles.

sar'mentose (*Bot.*). Having a stem which arises in a small arch from the root, and then becomes prostrate.

sarongs (*Textiles*). Coloured cotton cloths with borders and white selvedges. Used for natives' garments in the Straits Settlements, Java, and Burma.

sa'ros (*Astron.*). A cycle of 18 years 11 days, which is an integral number of synodic months and also of synodic revolutions of the moon's nodes, so that after such a period the relative positions of sun, moon, and node recur; known to the ancient Babylonians, it was used throughout antiquity to predict eclipses.

saro'thrum (*Zool.*). The pollen-brush of a honey-bee, i.e. the first tarsal joint of the third leg, bearing stiff straight bristles.

sarsen (*Geol.*). Irregular masses of hard sandstones which are found in the Reading and Bagshot Beds of the Tertiary System in Southern England. They often persist as residual masses after the softer sands have been entirely denuded away.

sartorius (*Zool.*). A thigh-muscle of *Tetrapoda* which by its contraction causes the leg to bend inwards.

sash (*Carp.*). A framing for window panes.

sash and frame (*Join.*). A cased frame in which counterweighted sashes slide vertically.

sash bar (*Join.*). A transome or a mullion.

sash centres (*Join.*). The points about which a pivoted sash is moved.

sash chisel (*Join.*). A strong-bladed chisel with a narrow edge, used for cutting the pocket in the pulley stile of a sash and frame.

sash door (*Join.*). A door which has its upper part glazed.

sash fastener (or lock) (*Join.*). A fastening device secured to the meeting rails of the sashes of a double-hung window, serving to fix both sashes in the shut position.

sash fillister (*Join.*). A special plane for cutting grooves in stuff for sash bars.

sash rail (*Join.*). A *transom* (q.v.).

sash-saw (*Join.*). A saw similar to the tenon saw but slightly smaller and finer; used for making window sashes.

sash stuff (*Join.*). The timber prepared for use in the making of sashes.

sash weights (*Join.*). Weights used as counterpoises in balancing the sashes of windows.

sas'solite (*Min.*). See **boric acid.**

sat'ara (*Textiles*). A woollen cloth with a dress-face finish; made from fine quality wools, with a series of ribs across the fabric.

sateen' (*Textiles*). A cloth with a weft surface, with only one interlacing of each warp and weft thread in the weave repeat. Made in numerous qualities and used chiefly for linings and dress goods Complementary to a satin which has a warp surface.

sat'ellite (*Astron.*). The name given to a smaller body revolving round another, generally a planet; e.g. the moon, which is the earth's *satellite*,

satellite (*Bot.*). A small part of a chromosome, attached to one end of the main body of the chromosome by a fine thread-like connexion. Also called TRABANT.

satellite exchange (*Auto. Teleph.*). A small automatic-telephone exchange which is dependent on a main automatic exchange for completion of its calls to subscribers other than those connected to it.

See **discriminating—** **full—**

satin (*Textiles*). A silk fabric with a smooth lustrous surface devoid of pattern; four-fifths of the warp usually appears on the face.

satin drill (*Textiles*). A cotton cloth, bleached or dyed, which is worn by Europeans in tropical countries. Cloths of this type, dyed to suitable colours, are used as overalls.

satin leather (*Leather*). Leather with a perfectly smooth finish and without grain marks.

satin spar (*Min.*). The name given to the fine fibrous varieties of both calcite and gypsum, the former being harder than the latter.

satinet', satinette' (*Textiles*). Similar to satin and sateen, but with weaves which repeat on only 4 ends and 4 picks. Formed by breaking and reversing the 3-and-1 twill every 2 ends.

saturated calomel electrode (*Chem.*). A calomel electrode containing saturated potassium chloride solution.

saturated compounds (*Chem.*). Compounds which do not contain any free valencies and to which no hydrogen atoms or their equivalent can be added, i.e. which contain neither a double nor a triple bond.

saturated diode (*Cathode Ray Tubes, Thermionics*). A diode valve having a tungsten filament giving a limited emission; used for charging or discharging a condenser at a constant rate in some forms of linear time base.

saturated solution (*Chem.*). A solution which can exist in equilibrium with excess of the dissolved substance.

saturated steam (*Eng.*). Steam at the same temperature as the water from which it was formed as distinct from steam subsequently heated. See **dry steam.**

saturated vapour (*Phys.*). A vapour which is sufficiently concentrated to exist in equilibrium with the liquid form of the same substance.

saturated vapour pressure (*Phys.*). The vapour pressure at saturation. This increases with rise of temperature. See **vapour pressure, saturation of the air.**

saturation (*Acous.*). See **acoustic saturation.**

saturation (*Elec. Eng.*). The property of a magnetic material whereby successive increments of magneto-motive force produce less and less magnetic flux in the material once a certain flux density has been reached.

saturation (*Photog.*). The purity of a colour, or freedom from mixture with white or grey; the measure of hue.

saturation (*Thermionics*). (1) The condition obtaining in a thermionic vacuum tube when all the electrons emitted from the cathode are swept away to the anode or other electrodes, so that further increase in anode potential produces no corresponding increase in anode current.—(2) A similar condition in a screened-grid or pentode valve when all the electrons which pass the screen grid go on to the anode, although in this case the cathode emission is not the limiting factor.

saturation coefficient (*Build.*). The ratio between the natural capacity of a material (such as a building-stone) to absorb moisture and its porosity.

saturation current (*Elec. Comm.*). The steady current in a winding of an iron-cored transformer which causes the inductance of the winding to be seriously reduced.

saturation current (*Thermionics*). The maximum total current which can flow from the cathode when saturation occurs. Also called TOTAL EMISSION.

saturation curve (*Elec. Eng.*). The characteristic curve relating magnetic flux density to the strength of the magnetic field.

saturation factor (*Elec. Eng.*). The ratio of the increase of field excitation to the increase of generated voltage which it produces.

saturation limit (*Elec. Eng.*). The maximum flux density economically attainable.

saturation of the air (*Meteor.*). The air, at a given temperature, can contain water vapour up to a limit known as the *saturation point.* The quantity of water vapour which will saturate a given volume of air increases with the temperature; and if, therefore, saturated air is cooled, the excess water vapour condenses in the form of mist. See **dew-point, vapour pressure.**

Saturn (*Astron.*). The sixth planet of the solar system in order of distance from the sun, unique for its system of rings, visible only in a telescope; it has ten satellites; its mass is 95·2 times that of the earth, and its sidereal period is 29·46 years.

sat'urnism (*Med.*). Chronic lead poisoning; plumbism.

saucer (*Hyd. Eng.*). A flat form of camel, used for raising a vessel in shallow waters.

saucisse, saucisson, sō-sēs', —ong (*Civ. Eng.*). A bundle of brushwood of stouter and longer material than in a *fascine* (q.v.) but used for the same purposes.

saur'ian (*Zool.*). Lizard-like.

saurog'nathous (*Zool.*). In Birds, said of a type of palate; the vomers are fine and rod-like and the maxillopalatines scarcely extend inwards from the maxillaries; the palatines and pterygoids articulate with the basisphenoid rostrum.

sausage antenna (*Radio*). An antenna comprising a number of wires connected in parallel, and arranged in a parallel formation around circular spreaders.

sausage poisoning (*Med.*). Botulism.

saussu'rite (*Min.*). Formerly thought to be one mineral, *saussurite* consists of an aggregate of albite, zoisite, prehnite, with other calcium aluminium silicates and calcite. It results from the alteration of feldspars.

saussuritisation (*Geol.*). The name given to the processes which lead to the alteration of the plagioclase feldspars of basic igneous rocks into an aggregate of 'saussurite.'

Savi's ampulla (*Zool.*). In *Selachii*, a long tube expanding internally into an ampulla and opening externally on the surface of the head, containing mucus and innervated by a branch of the lateralis.

saw (*Eng.*).
See **band—** **hack—**
circular— **hot—**
cold—

saw-tooth generator (*Cathode Ray Tubes*). Another name for a *linear time base*; so called because of the shape of the voltage wave-form therefrom.

saw-tooth roof (*Struct.*). A roof formed of a number of north light trusses, presenting a serrated profile when viewed from the end.

saw-tooth truss (*Eng.*). A truss used for small-span roofs of saw-tooth form, braced by vertical and diagonal members.

sax (*Tools*). An axe used for shaping slates; it has a pointed peen for piercing the nail-holes. Also called SLATE AXE.

saxica'vous (*Zool*) Rock-boring.

sax'icole, saxico'lous (*Bot.*). Growing on rocks or stones.

sax'onite (*Geol.*). A coarse-grained, ultramafic igneous rock, consisting essentially of olivine and orthopyroxene, usually hypersthene. A hypersthene-peridotite.

Saxony (*Textiles*). The name applied to woollen yarns or cloth, made from wool of good quality; at one time largely imported from Saxony. The cloth has a soft finish.

Saxony finish (*Textiles*). A type of finish in which a slight nap is produced on the face of a cloth, making it soft to handle.

say-cast (*Textiles*). The coarse part of a fleece, at the tail end.

Sayers winding (*Elec. Eng.*). A type of armature winding in which commutator sparking is prevented by means of additional coils influenced by auxiliary commutating poles.

Sb (*Chem.*). The symbol for *antimony.*

S.B. (*Radio*). Abbrev. for *simultaneous broadcasting* (q.v.).

SB alloy (*Elec. Eng.*). A resistance material having a low temperature coefficient of resistance.

S.B.C. lamp cap (*Elec. Eng.*). Abbrev. for *small bayonet lamp cap.*

S.C. (*Paper*). Abbrev. for *supercalendered paper.*

Sc (*Chem.*). The symbol for *scandium.*

scab (*Vet.*). See **mange.**

scabbling (*Masonry*). The operation of rough-dressing a stone face with an axe, prior to smoothing it.

scabbling hammer (*Masonry*). The pointed hammer used in the rough-dressing of a nigged ashlar.

scabel'lum (*Zool.*). In *Diptera*, the dilated basal portion of a haltere.

scabies, skā'bi-ēz (*Med.*). A contagious skin disease caused by the acarine parasite *Sarcoptes scabiei*, the female of which burrows in the horny layer of the skin.—(*Vet.*) See **mange.**

scab'rid (*Bot.*). Having a surface rough like a file.

scab'rous (*Bot.*). Having a surface roughened by small wart-like upgrowths.—*dim.* **scaber'ulous.**

Scaffixer (*Build.*). Trade-name for a form of chain-fastening device used to lash scaffold poles together.

scaffold, scaffolding (*Build.*). A temporary erection of timber or steelwork, used in the construction, alteration, or demolition of a building, to support or to allow of the hoisting and lowering of workmen, their tools and materials.

scaffold poles (*Build.*). Round timber from 2½ to 6 in. diameter in the middle.

scagliola, skal-yō'la (*Plast.*). An imitation marble made by adding colouring matters and marble chips to a hard cement such as Keene's.

scala (*Zool.*). A ladder-like structure; as the canals in the cochlea of the Mammalian ear known as the *scala vestibuli*, the *scala tympani*, and the *scala media*.—*pl.* **scalae.**

scalae (*Zool.*). See **scapal organ.**

scalar product (*Elec. Eng.*). In multiplying vector quantities, the product obtained by multiplying the magnitudes or moduli of the vectors, together with the cosine of the angle between them. When the vectors represent graphically sinusoidal variations of current and voltage, respectively, in the same circuit, the scalar product gives the power, the cosine of the angle between the vectors being the power-factor. See **vector product.**

scalar quantity (*Phys.*). A quantity which is completely specified by its magnitude, as distinct from a vector quantity which needs also its direction to be stated. Temperature and energy are scalar quantities.

scalar'iform (*Bot.*). Ladder-like.

scalariform cell, scalariform tracheide, scalariform vessel (*Bot.*). A cell, tracheide, or vessel having wall-thickenings which give a ladder-like pattern.

scale (*Acous.*). The ratio of the length to the diameter of an organ pipe, a factor which, amongst others, determines the timbre of the note.

scale (*Photog.*). The range of densities over which a constant gamma is obtained when an emulsion is normally processed; it measures the acoustic contrast obtainable when the emulsion is used for photographic recording.

scale effect (*Aero.*). The effect of a change in Reynolds number upon the measured results in the performance of aerodynamic bodies.

scale (*Bot.*). (1) A thin, flat, semi-transparent plant member, usually of small size, and green only when very young, if then.—(2) A hardened, usually non-green bract of a catkin.

scale (*Zool.*). A small exoskeletal outgrowth of tegumentary origin, of chitin, bone or some horny material, usually flat and plate-like.

scale bark, scaly bark (*Bot.*). (1) Bark which becomes detached in irregular patches.—(2) Rhytidome.

scale hair (*Bot.*). A multicellular flattened hair.

scale leaf (*Bot.*). A leaf, usually reduced in size, membranous, of tough texture, and ordinarily protective in function.

scale, musical (*Acous.*). The selected sequence of notes adhered to in a musical composition. See **natural scale, tempered scale.**

scalene, ska-lēn′ (*Zool.*). In higher Vertebrates, applied to a pair of muscles of the body-wall passing from the ribs along the side of the neck.

scaling (*Acous.*). The adjustment of the notes of a musical instrument to a specified scale; e.g. natural scale or tempered scale. See **aliquot scaling.**

scaling hammer (*Eng.*). See **boilermaker's hammer, boiler scale.**

scalloped (*Bot.*). Said of a margin bearing rounded teeth.

scalpel'la (*Zool.*). In *Diptera*, a pair of pointed processes belonging to the mouth-parts.—*sing.* **scalpellum.**

scalpel'liform (*Bot.*). Shaped like the blade of a pen-knife.

scal'priform (*Zool.*). Chisel-shaped, as the incisor teeth of Rodents.

scaly bark (*Bot.*). See **scale bark.**

scaly bulb (*Bot.*). A bulb, such as that of the lily, made up of a number of overlapping swollen leaf bases which do not form complete circles in cross-section.

scaly leg (*Vet.*). Scabies or mange of the feet and legs of birds, due to *Cnemidocoptes mutans.*

scan area (*Television*). The area swept out on the screen by the scanning beam.

scandent (*Bot.*). Climbing.

scandium (*Chem.*). Symbol, Sc. A metallic element in the third group of the periodic system, usually classed with the rare earth metals. At. no. 21, at. wt. 45·10. It has been found in cerite, orthite, thortveitite, wolframite, and euxenite; discovered in the last named. Scandium is the least basic of the rare earth metals.

scanning (*Television*). The repeated traversing of the surface of a television picture by a beam of light or electrons for the purpose of transmitting or reproducing the image.

See **circular—** **sequential—**
interlaced— **spiral—**
line—

scanning aperture (*Television*). A hole in a scanning disc through which the scanning beam passes.

scanning beam (*Television*). The beam of light or electrons which scans a television image.

scanning disc (*Television*). A rotating disc carrying a series of apertures, lenses, mirrors, or other optical devices, used for mechanical scanning.

scanning hole (*Television*). See **scanning aperture.**

scanning line (*Television*). The trace of a single traverse of the picture by the scanning spot from side to side in the case of horizontal scanning, or vertically in the case of vertical scanning.

scanning speech (*Med.*). A disturbance of speech in which the utterance is slow and halting, the words being broken into syllables; a sign of a lesion in the nervous system, as in disseminate sclerosis.

scanning spot (*Television*). The spot of light formed by the scanning beam on the screen of the reproducer, or in the case of some forms of transmission, on the object being televised.

scansion (*Television*). The operation of scanning.

scanso'rial (*Zool.*). Adapted for climbing trees.

scantling (*Masonry*). Stones more than 6 ft. long.

scantling (*Timber*). A piece of timber of thickness from 2 to 4 in. and of width from 2 to 4½ in.

scapal organ (*Zool.*). A sensory structure situated in the expanded base of a haltere in *Diptera.*

scape (*Bot.*). A peduncle, quite or nearly leafless, arising from the middle of a rosette of leaves, and bearing a flower, several flowers, or a crowded inflorescence; the dandelion furnishes a familiar example.

scape (*Build.*). An *apophyge* (q.v.).

scape (*Zool.*). The basal joint of the antenna in Insects.

'scape pinion, 'scape wheel (*Horol.*). See **escape pinion, escape wheel.**

scaph-, scapho- (Greek *skaphē*, boat). A prefix used in the construction of compound terms; e.g. *scaphocerite* (q.v.).

sca'phium (*Zool.*). (1) In *Ostariophysi*, one of the Weberian ossicles.—(2) In male *Lepidoptera*, part of the genital apparatus.—(3) More generally, any boat-shaped structure.

scaphocephal'ic (*Med.*). Having a keel-shaped head.

scaphoce'rite (*Zool.*). In decapod *Crustacea*, the boat-shaped exopodite of the second antenna.

scaphog'nathite (*Zool.*). In decapod *Crustacea*, the exopodite of the second maxilla, the movements of which cause water to flow through the branchial chamber.

sca'phoid (*Bot., Zool.*). Boat-shaped.

Scaphop'oda (*Zool.*). A class of bilaterally symmetrical *Mollusca* in which the foot is trilobed or with a terminal disc, and the mantle forms a tube enclosed by the tubular univalve shell. Tusk Shells.

scapigerous, —pij'er-us (*Bot.*). Possessing a scape or scapes.

scap'olite or wernerite (*Min.*). A group of minerals forming an isomorphous series, varying from silicate of aluminium and calcium with calcium carbonate, to silicate of aluminium and sodium with sodium chloride. Common scapolite is intermediate in composition between these two minerals. It crystallises in the tetragonal system and is associated with altered lime-rich igneous and metamorphic rocks. A transparent honey-yellow variety is cut as a gemstone.

scappling (*Masonry*). A variant of *scabbling*.

scap'ula (*Zool.*). In Vertebrates, the dorsal portion of the pectoral girdle: the shoulder-blade: any structure resembling the shoulder-blade.—*adj.* **scap'ular.**

scap'ulars (*Zool*). In Birds, small feathers attached to the humerus, and lying along the side of the back.

scapulodyn'ia (*Med.*). Pain in the region of the shoulder-blade.

sca'pus (*Build.*). An *apophyge* (q.v.).

scapus (*Zool.*). The stiff axial rod of a contour feather.

Scarab (*Plastics*). A proprietary urea moulding powder; thermosetting.

scarcement (*Build.*). A ledge formed at a place where part of a wall is set back from the general face of the wall; especially the footing of a stone wall.

scarf (*Carp.*) A joint between timbers placed end to end, notched and lapped, and secured together with bolts or straps.

scarfed joint (*Elec. Eng.*). A cable joint in which the conductor ends are bevelled off so that, after soldering, there is no appreciable increase in conductor diameter at the joint.

scarifier (*Civ. Eng.*). A spiked mechanical picking appliance for breaking up road surfaces as a preliminary to re-metalling.

sca'riose, sca'rious (*Bot.*). Dry, thin, more or less transparent, and usually brownish as if scorched, especially at the tip and along the edges.

scarlatina, —tĕ'na (*Med.*). *Scarlet fever* (q.v.).

scarlatin'iform (*Med*). Resembling or having the form of (the rash of) scarlet fever.

scarlet fever (*Med.*). An acute infectious fever due to infection of the throat with a haemolytic streptococcus; characterised by sore throat, headache, raised temperature, and a punctate erythema of the skin, which subsequently peels. Also called SCARLATINA.

scarp face (*Geol.*). See **escarpment.**

Scarpa's ganglion (*Zool.*). In higher Vertebrates, a ganglion of the vestibular division of the eighth nerve.

scattered (*Bot.*). Inserted singly, apparently without any special order, and spaced out.

scattering (*Radio*). The general re-radiation of wave-energy when a ray is incident on an obstacle or when it enters an irregularly ionised region.

scavenging (or **scavenger**) **pump** (*I.C. Engs.*). An oil-suction pump used to return used oil to the oil tank from the crank-case of an engine using the dry sump system of lubrication.

scavenging stroke (*I.C. Engs.*). See **exhaust stroke.**

Scawfell Tuff (*Geol.*). A volcanic tuff found near Scawfell in the English Lake District; it forms part of the Borrowdale Volcanic Series of Ordovician age.

scawtite (*Min.*). A silicate and carbonate of calcium occurring as minute monoclinic crystals in vesicles at the contact of dolerite and chalk at Scawt Hill, Co. Antrim.

s.c.c. (*Elec. Eng.*). Abbrev. for *single cotton-covered* (*wire*).

scenar'io (*Cinema.*). The script, or 'shooting script,' for the detailed making of a motion-picture; in it all the dialogue and directions for movements are given for the interpretation of the director during the actual shooting.

scenarisa'tion (*Cinema.*). The working up of a scenario in motion-picture production.

Sce'neograph (*Cinema.*). An effects projection machine for projecting coloured slides on to screens.

sce'nograph (*Build.*). A drawing showing a general view of a building or part of a building.

scent scales (*Zool.*). See **androconia.**

scent test (*San. Eng.*). A test sometimes applied to drain-pipes suspected of leakage. The ends are plugged, and a liquid with a pungent odour, e.g. oil of peppermint, is introduced into the pipe, which is watched for any escape.

Schäfer's method, shā'fer (*Med.*). A method of artificial respiration in which the patient lies prone, the head supported on one forearm, and the operator, his knees on either side of the patient's hips, exerts pressure with each hand over the lower ribs at the back at intervals of from three to five seconds.

schap'pe (*Textiles*). The name given to silk thread from which a certain proportion of the natural gum, sericin, has been removed by the process of schapping, i.e. fermentation by steaming.

schedule of dilapidations (*Build.*). A list showing the repairs which require to be done to premises after a period of tenancy.

schedule of prices (*Civ. Eng.*). The same as *bill of quantities.*

schedule speed. The average speed of a train between two termini when the time of intermediate stops is included in the overall time taken from start to stop.

Scheele's green, shā'le (*Chem.*). Copper hydrogen arsenite.

scheel'ite (*Min.*). An ore of tungsten formed under pneumatolytic conditions. It occurs in association with granites, having the composition tungstate of calcium, and crystallises in the tetragonal system.

Scheiner film-speed (*Photog.*). See **Weston-Scheiner film-speed.**

scheme arch (*Civ. Eng.*). See **skene arch.**

Schenk's scarlet phosphorus (*Chem.*). A scarlet-red powder which separates from a solution of red phosphorus in phosphorus tribromide when boiled for some time.

Scher'bius advancer (*Elec. Eng.*). An expedor type of phase advancer, comprising an a.c. motor coupled to a d.c. exciter, for use with slip-ring induction motors.

Schering bridge, shā'ring (*Diel.*). A bridge used to measure the power factor of dielectrics or cables. This method is the most suitable for high-voltage measurements, because the high voltage is borne by the test sample and a standard condenser only; the resistances in the bridge have only low voltages across them.

Schick's test (or **reaction**) (*Med.*). The reaction of the skin to an intradermal injection of a measured amount of diphtheria toxin of known potency. If the skin reacts by redness and swelling (as compared with a control injection of heated toxin) the subject is susceptible to diphtheria.

Schiehall'ion Series (*Geol.*). A massive feldspathic quartzitic grit with a boulder bed at the base, which forms the upper part of the Dalradian System of Pre-Cambrian age in Scotland.

Schiff's bases (*Chem.*). A term for benzylidene anilines, e.g. $C_6H_5 \cdot CH{:}N \cdot C_6H_5$.

Schiff's reagent (*Chem.*). A reagent, consisting of a solution of fuchsine decolorised by sulphurous acid, for testing the presence of aldehydes. Aldehydes give a red-violet colour.

Schiff's test (*Chem.*). A test for cholesterol.

When ferric chloride and concentrated sulphuric acid are heated with cholesterol a violet residue is obtained on careful evaporation to dryness.

schif'fle machine (*Textiles*). See **Swiss machine.**

Schilder's disease (*Med.*). See **encephalitis periaxialis.**

schillerisa'tion (*Geol.*). A play of colour (in some cases resembling iridescence due to tarnish) produced by the diffraction of light in the surface layers of certain minerals. The diffraction is due to regularly orientated rods of opaque iron ores in labradorite and bronzite, and to a microscopic interlamination of two different mineral species in diallage.

schill'erspar (*Min.*). See **bastite.**

Schimm'elbusch's disease (*Med*). A condition characterised by the formation of cysts in the breast, and by hyperplasia of the epithelium of the glandular tissue of the breast.

schindyle'sis (*Zool*). A form of articulation in which a thin plate of skeletal material fits into a narrow cleft.

schist (*Geol.*). The name given to a group of metamorphic rocks which have a tendency to split on account of the presence of foliae of flaky and elongated minerals, such as mica, talc, and chlorite. These rocks are formed from original sedimentary or igneous rocks by the action of combined heat and pressure.

schista'ceous, schist'ose (*Bot.*). Slate-coloured.

schistos'ity (*Geol.*). The tendency in certain rocks to split easily along weak planes produced by regional metamorphism and due to the abundance of mica or other cleavable minerals lying with their cleavage planes parallel.

schistosomi'asis (*Med.*). *Bilharziasis* (q.v.). Invasion of the human body by the blood flukes of the family *Schistosomidae*, giving rise, among other disturbances, to the passage of blood in the urine and in the faeces.

schizo-, skiz'ō *or* skī'zō (Greek *schizein*, to cleave). A prefix used in the construction of compound terms; e.g. *schizogenesis* (q.v.).

schi'zocarp (*Bot.*). A dry fruit, formed from more than one carpel, and separating when ripe into a number of one-seeded parts which do not dehisce.

schi'zocoel, —sēl (*Zool.*). Coelom produced within the mass of mesoderm by splitting or cleavage; cf. *enterocoel*.—*adj.* **schi'zocoelic.**

schizocot'yly (*Bot.*). The forking of cotyledons.

schizog'amy (*Zool.*). In *Polychaeta*, a method of reproduction in which a sexual form is produced by fission or germination from a sexless form.

schizogen'esis (*Zool.*). Reproduction by fission.—*adj.* **schizogenet'ic.**

schizogenet'ic (or **schizogen'ic**) **space** (*Bot.*). An intercellular space formed by the splitting of cell walls.

schizogen'ous gland (*Bot.*). A glandular cavity formed by the separation of cells by splitting of the common middle lamellas.

schizog'nathous (*Zool.*). In Birds, said of a type of palate in which the maxillopalatines do not meet the vomer or each other, and the vomers are fused anteriorly to form a point; the palatines and pterygoids articulate with the basisphenoid rostrum.

schizog'ony (*Zool.*). In *Protozoa*, vegetative reproduction by fission.

schizoid (*Psychiatry*). Showing qualities of a schizophrenic personality, such as asocial behaviour, introversion, tendency to phantasy, but without definite mental disorder.

schizoly'sigen'ous cavity (*Bot.*). An intercellular space formed in part by the separation, in part by the breakdown, of cells.

Schizomyce'tes (*Bot.*). See **Bacteria.**

schi'zont (*Zool.*). In *Protozoa*, a mature trophozoite which is about to reproduce by schizogony.

schizont'ocyte (*Zool.*). In some *Sporozoa*, a cytomere or stage in the life-cycle produced by division of the schizont and itself giving rise by further fission to merozoites.

schizopel'mous (*Zool.*). Having the toes provided with two separate flexor tendons, as in some Birds.

schizophre'nia (*Med.*). The term applied by Bleuler to *dementia praecox* (q.v.).

Schizophy'ceae (*Bot.*). See **Myxophyceae.**

Schizophy'ta (*Bot.*). A group of plants, doubtless artificial, including *Bacteria* and *Myxophyceae*; these multiply by fission, have no well-defined nucleus, and do not appear to have a sexual process.

schi'zopod (*Zool.*). Having the limbs split, i.e. having each limb provided with an endopodite and an exopodite, as in the mysis larva of higher *Crustacea.*

schizorhi'nal (*Zool*). Having the posterior margin of the nares slit-like.

schizothe'cal (*Zool.*). Having horny scales on the tarsus.

schizothy'mia (*Psychiatry*). Manifestation of schizoid traits within normal limits (Kretschmer).

schizotryp'anosomi'asis (*Med.*). Chagas' disease. A disease, occurring in parts of South America, due to infection of the muscles, heart, and brain of Man with the protozoal parasite *Trypanosoma cruzi*, the infection being conveyed by the bite of a bug.

schizozo'ite (*Zool.*). A merozoite; a stage in the life-cycle of a *Sporozoan* produced by schizogony.

Schlen'ke loudspeaker (*Acous.*). A loudspeaker with a large stretched duralumin diaphragm driven eccentrically by a current-carrying coil located freely in the circular gap of a pot magnet.

Schlip'pe's salt (*Photog.*). Sodium sulphantimoniate; a salt much used for re-development in sulphide toning and for intensification with mercury.

Schloemilch detector, shlē'milhh (*Radio*). See **electrolytic detector.**

Schmidt's test (*Chem.*). A test for bilirubin and hydrobilirubin with a concentrated aqueous solution of bichloride of mercury. Bilirubin will eventually become stained green, whereas hydrobilirubin will appear red.

Schneider furnace, shnī'der (*Elec. Eng.*). A type of high-frequency induction furnace.

Schneide'rian membrane (*Zool.*). In Vertebrates, the olfactory mucous membrane.

Schönherr process, shĕn'hār (*Elec. Eng.*). A process for direct fixation of atmospheric nitrogen, employing a single-phase high-pressure arc furnace.

Schönlein's disease, shĕn'līn (*Med.*). See **peliosis rheumatica.**

Schön-Punga motor (*Elec. Eng.*). A compensated single-phase induction motor having a double rotor, one being an auxiliary running concentrically with the main rotor between the latter and the stator.

schorl-rock (*Geol.*). A rock composed essentially of aggregates of black tourmaline (schorl) and quartz. A Cornish term for the end-product of tourmalinisation. See also **luxulyanite.**

Schotter's apparatus (*Chem.*). Apparatus of particular design used for the absorption of carbon dioxide in chemical analysis.

Schottky effect (or **noise**) (*Thermionics*). Strictly, noise in the anode current of a thermionic valve due to random variations in the surface condition of the cathode. Frequently extended to include *shot noise* (q.v.).

Schrag'e motor (*Elec. Eng.*). A variable-speed induction motor employing a commutator winding on the rotor from which an e.m.f. is collected and injected into the stator winding.

Schreiner finish, shrī'ner (*Textiles*). A lustrous finish obtained on cotton satins and sateens by rollers engraved with fine lines which, by means of heat and pressure, are imprinted on the fabrics.

Schrott effect (*Thermionics*). See **shot noise.**

Schultz-Charlton reaction (*Med.*). The local blanching of the scarlet-fever rash when scarlatinal antitoxin is injected into the skin.

Schumann plates (*Phys.*). Photographic plates having little or no gelatine; used for photographing spectra in the ultra-violet below wavelength 2000 A.U., where gelatine is strongly absorbent.

Schwann's sheath (*Zool.*). See **neurolemma.**

schwanno'ma (*Med*). A tumour growing from the sheath of a nerve (neurofibroma) and containing cells resembling those of the neurilemma.

Schweinfurt green, shwin'foort (*Chem.*). See **Paris green.**

Schweitzer's reagent, shvit'ser (*Chem.*). A reagent for cellulose. It consists of a 0·3% solution of precipitated cupric hydroxide in a 20% ammonium hydroxide solution. This mixture is a solvent for cellulose, which can be re-precipitated by the addition to the solution of mineral acids.

sciat'ic (*Zool.*). Situated in, or pertaining to, the ischial or hip region.

sciat'ica (*Med*). Inflammation of the fibrous elements of the sciatic nerve, resulting in pain and tenderness along the course of the nerve in the buttock and the back of the leg: less strictly, pain along the course of the sciatic nerve, from whatever cause.

science. The ordered arrangement of ascertained knowledge, including the methods by which such knowledge is extended and the criteria by which its truth is tested. The older term *natural philosophy* implied the contemplation of natural processes *per se*, but modern science includes such study and control of nature as is, or might be, useful to mankind, and even proposes control of the destiny of man himself. *Speculative science* is that branch of science which suggests hypotheses and theories, and deduces critical tests whereby unco-ordinated observations and properly ascertained facts may be brought into the body of science proper.

scientific alexan'drite (*Min*). A misnomer for artificial corundum coloured with vanadium oxide and resembling true alexandrite in some of its optical characters.

scientific emerald (*Min.*). An imitation in which the colour resembles that of true emerald, but actually the material is a beryl glass coloured with chromic oxide.

scintillation of stars (*Astron.*). The twinkling of stars, a phenomenon due to the deflection, by the strata of the earth's atmosphere, of the light-rays from what are virtually point-sources. The effect increases towards the horizon; it is not observable in the planets.

scintling (*Bricks*). The operation, when bricks are being dried in the open, of placing the half-dry raw bricks diagonally and a little distance apart, so as to admit air between them.

sci'ograph (*Build.*). A drawing showing a sectional view of a building.

sci'on (*Bot.*). (1) A portion of a plant, usually a piece of young stem, which is inserted into a rooted stock in grafting.—(2) A young plant formed at the end of, or along the course of, a runner.—(3) A stolon.

sciophyl'lous (*Bot.*). Having leaves which can endure shading.

sci'ophyte (*Bot.*). A plant which grows in shady situations.

scirocco (*Meteor.*). See **sirocco.**

scir'rhous carcinoma (*Med.*). A hard cancer, in which there is an abundance of connective tissue and few cells.

scir'rhus (*Med.*). A scirrhous carcinoma.

scirrhus cord (*Vet.*). See **botryomycosis.**

Scirtop'oda (*Zool.*). An order of *Rotifera* in which the adults can swim freely, but also move by a skipping motion effected by means of special setose appendages; the tail is usually absent.

scis'sile (*Bot*). Capable of being split.

scissors, rowelling (*Vet.*). An instrument for incising the skin of animals when a seton is to be threaded.

scissors truss (*Carp.*). A type of truss used for a pitched roof, consisting of two principal rafters braced by two other members, each of which connects the foot of a rafter to an intermediate point in the length of the other rafter.

scler-, sclero- (Greek *skleros*, hard). A prefix used in the construction of compound terms; e.g. *sclerocorneal* (q.v.).

scle'ra (*Zool.*). The tough fibrous outer coat of the Vertebrate eye.—*adj.* **sclerot'ic.**

scleran'thium (*Bot*). A dry one-seeded fruit enclosed in the hardened remains of the calyx.

scleratogenous, —toj'en-us (*Zool*). Skeleton-forming.

sclere, sklēr (*Zool.*). A skeletal structure: a sponge spicule.

scler'eide (*Bot.*). (1) A general term for a cell with a thick, lignified wall, i.e. any sclerenchymatous cell.—(2) A thick-walled cell mixed with the photosynthetic cells of a leaf, giving them mechanical support.—(3) A stone cell.

sclere'ma neonato'rum (*Med*). A disease of newborn infants in which there is symmetrical hardening of the subcutaneous fat in certain parts of the body.

scleren'chy'ma, *or* —en-kī'ma (*Bot.*). A tissue composed of cells with thick lignified walls and with little or no living contents. The cells are elongated, with pointed ends which often interlock, or less often short and blunt-ended. Sclerenchyma supports and protects the softer tissues of the plant.—(*Zool.*) Hard skeletal tissue, as of Corals.

scler'ite (*Zool.*). A hard skeletal plate or spicule.

scleri'tis (*Med.*). Inflammation of the sclera of the eye. See also **episcleritis.**

sclero-. Prefix. See **scler-.**

scler'oblast (*Zool.*) In *Porifera*, a spicule-forming cell.

scleroblast'ic (*Zool.*). See **scleratogenous.**

sclerocaul'ous (*Bot*). Having a hard, dry stem.

scler'ocoel, —sēl (*Zool.*). The cavity of a sclerotome.

sclerocor'neal (*Zool.*). Pertaining to the sclerotic and the cornea.

sclerodactyl'ia (*Med.*). Sclerodermia of the hands, the skin being drawn tightly over the fingers.

scler'oderm (*Zool*). A hard integument.

scleroder'matous (*Zool.*). Possessing exoskeletal structures.

scleroder'mia, scleroder'ma (*Med.*). A condition of hardness and rigidity of the skin as a result of overgrowth of fibrous tissue in the dermis and subcutaneous tissue, the fat of which is replaced by the fibrous tissue.

scleroder'mite (*Zool.*). The exoskeleton of an Arthropodan somite.

sclero'ma (*Med.*). A condition in which hard nodules of granulomatous tissue appear in the nose, or occasionally in the trachea.

scleronych'ia (*Med.*). Thickening and dryness of the nails.

Scleropa'rei (*Zool.*). An order of *Neopterygii* in which one of the suborbital bones extends across the cheek towards the pre-operculum; carnivorous forms with pointed teeth; marine. Mail-cheeked Fishes, Scorpion-fishes, Rock-perches, Gurnards, Sticklebacks, Greenlings.

scler'ophyll (*Bot.*). A hard, stiff, and tough leaf, with a strongly cutinised epidermis.

sclerophyll vegetation (*Bot.*). Woody plants with hard, tough, and generally small leaves, characteristic of dry places.

sclerophyll'ous (*Bot.*). Having sclerophylls.

scleroproteins (*Chem.*). Insoluble proteins forming the skeletal parts of tissues, e.g. keratin from hoofs, nails, hair, etc., chondrin and elastin from ligaments. See **albuminoids.**

scler'oscope hardness test (*Met.*). The determination of the hardness of metals by measuring the rebound of a diamond-tipped hammer dropped from a given height.

scler'osed, sclerot'ic (*Bot.*). Having hard, usually lignified walls.—(*Med.*) Affected with sclerosis.

sclero'sis (*Bot.*). The hardening of cell walls or of tissues by thickening and lignification.—(*Med.*) An induration or hardening, as of the arteries. See also **disseminated sclerosis.**

sclerotes'ta (*Bot.*). A hard layer in the testa of a seed in which a sarcotesta is also present.

sclerot'ic (*Bot., Med.*). Sclerosed.

sclerotic (*Zool.*). The sclera of the eye: pertaining to the sclera.

sclerotic cell (*Bot.*). See **sclereide, stone cell.**

sclerotic ossicles (or **bones**) (*Zool.*). A ring of small membrane bones, derived from the sclera of the eye in some Reptiles and Birds.

sclero'tiform, sclero'tioid (*Bot.*). Resembling a sclerotium.

sclero'tium (*Bot.*). A hard mass of fungal hyphae, usually black on the outside, crust-like to globular, and serving as a resting stage from which fructifications are formed later.—(*Zool.*) The resting or encysted stage in the life-cycle of *Mycetozoa*, in which the organism is represented by a number of multinucleate cellulose cysts.—*adj.* **sclero'tial.**

scler'otome (*Zool.*). One of the metamerically arranged masses of mesenchyme which give rise in part to the axial skeleton in developing Vertebrates.

sclerot'omy (*Surg.*). Operative incision of the sclera.

scobic'ular, sco'biform (*Bot.*). Looking like sawdust.

sco'binate (*Bot.*). Said of a surface which feels as if it has been roughened with a coarse file.

scoin'son arch (*Build.*). See **squinch.**

Scolecifor'mia (*Zool.*). An order of *Phanerocephala*, most of which are burrowing forms; the parapodia are reduced or absent; the buccal region is eversible, but the pharynx is not armed; tentacles and palps are usually lacking and the peristomium is without cirri. Includes the Lug-Worms.

sco'lecite (*Bot.*). An old name for an *archicarp*.

scolecite (*Min.*). A member of the zeolite group of minerals; a hydrated silicate of calcium and aluminium, occurring usually in fibrous or acicular groups of crystals.

sco'lecospor'ous (*Bot.*). Having thread-shaped or worm-shaped spores.

sco'lex (*Zool.*). The terminal organ of attachment of a tapeworm (Cestode).—*pl.* **scolices.**—*adjs.* **sco'lecid, scolec'iform.**

scoliokypho'sis (*Med.*). Abnormal curvature of the spine in which scoliosis is combined with kyphosis.

scolio'sis (*Med.*). Abnormal curvature of the spine laterally.

scolo'pale (*Zool.*). A hollow rod-like structure forming part of a scolophore in Insects.

scol'ophore (*Zool.*). A spindle-shaped nerve-ending in Insects, auditory in function and consisting essentially of a bipolar nerve cell.

scolus (*Zool.*). A thorn-like process of the body-wall, characteristic of some Insect larvae.

sconce (*Furn.*). A wall bracket, usually one designed for illuminating purposes.

scon'tion (*Masonry*). An inside quoin, as laid in a splayed jamb. Also called SCONCHEON.

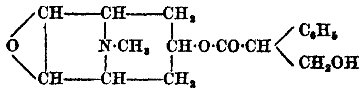
scoop (*Cinema.*). One or more suspended broadsides, which are special types of incandescent flood-lights for use in motion-picture studios.

scoop (*Civ. Eng.*). See **bucket.**

scoop (*Surg.*). A spoon-like instrument for clearing out cavities.

sco'pa (*Zool.*). The pollen brush of Bees, consisting of short stiff spines on the posterior metatarsus.

scopol'amine (*Chem.*). A coca-base alkaloid, present in *Datura meteloides*. It is the scopoline ester of tropic acid, i.e.



scop'ula (*Zool.*). A small tuft of hairs; as in some Spiders (*Tengellidae, Pycnothelidae*, etc.), a small tuft of tarsal hairs of use in climbing: a rod-like sponge spicule with a number of rays at one end.

scop'ulate (*Bot.*). Resembling a brush.

scorbu'tic (*Med.*). Of, or pertaining to, scurvy: proceeding from, or affected with, scurvy.

scorbu'tus (*Med.*). See **scurvy.**

score (*Typog.*). See **em rule, en rule.**

sco'ria (*Geol.*). A cavernous mass of volcanic rock which simulates a clinker.

scorification (*Chem.*). The separation of gold or silver from an ore by heating it to a high temperature with granulated lead and a little borax, in a scorifier. The impurities form a slag with the lead oxide which is produced, while the gold or silver dissolves in the molten lead, which sinks to the bottom of the vessel.

scorifier (*Chem.*). A crucible of bone ash or fireclay used in assaying and in the metallurgical treatment of precious metals. See also **scorification.**

scoring (*Cinema.*). The preparation of the sound-script, in which are described all music and noises to be introduced into a motion-picture, before the shooting commences in the studio. See **scoring stage, pre-scoring, post-scoring.**

scoring stage (*Cinema.*). A special sound stage set apart in sound-film studios for the use of orchestras when they are required to record sound under good conditions, or to record sound in time with a projected motion-picture, no cinematograph pictures being taken.

Scorpio (*Astron.*). Scorpion. Eighth sign of the *Zodiac* (q.v.).

scor'pioid cyme (*Bot.*). A cymose inflorescence in which the branches develop alternately right and left, but do not all lie in one plane; in bud, the axis of the inflorescence is coiled.

Scorpionid'ea (*Zool.*). An order of large *Embolobranchiata* having the prosoma, mesosoma, and metasoma distinct; possessing large chelate pedipalps and a pair of ventral, comb-like, tactile organs (*pectines*); the tail ends in a post-anal sting provided with poison glands; respiration is by lung-books; nocturnal predaceous forms found in warm climates. Scorpions.

scotch (*Build.*). See **scutch.**

Scotch beaming (*Textiles*). See **Scotch dressing.**

Scotch boiler (*Eng.*). See **marine boiler.**

Scotch bond (*Build.*). *English garden-wall bond* (q.v.).

Scotch carpet (*Textiles*). See **Kidderminster carpet.**

Scotch crank (or **yoke**) (*Eng.*). A form of crank, used on a *direct-acting pump* (q.v.), in which a square block, pivoted on the overhung crank pin, works in a slotted crosshead carried by the common piston rod and ram.

Scotch dressing or **dresser sizing** (*Textiles*).

(1) A method of sizing cotton yarns of extra fine count; they are passed from the warper's beam through a size box, then brushed, dried by hot air, and again brushed.—(2) A method of producing a striped warp by running yarns of different colours from a number of warper's beams on to the weaver's beam, according to the colour design. This is called SCOTCH DRESSING, SCOTCH BEAMING, or DRY TAPING. The term *dresser sizing* (q.v.) relates only to (1).

Scotch hearth (*Met.*). A furnace for smelting high-grade lead ores without previous roasting. Air is blown through a shallow layer of sulphide concentrates mixed with coke. Sulphide is oxidised to oxide by the air, and this in turn is reduced to lead by the coke. Furthermore, lead oxide and sulphide react to form lead and sulphur dioxide. The process requires much poking and shovelling, hence *Newnam hearth* (q.v.) and *Federal hearth* (q.v.).

Scotch staff (*Surv.*). A form of self-reading staff in which three separate lengths of solid staff are fitted together, by means of brass socketed joints and set-screws, to form a longer staff.

Scotch topaz (*Min.*). A term applied in the gemstone trade to yellow transparent quartzes, resembling Brazilian topaz in colour, used for ornamental purposes. See **citrine, cairngorm.**

Scotch yoke (*Elec. Eng.*). A triangular framework used in certain types of electric tractor for coupling two traction motors to the driving-wheel system.—(*Eng.*) See **Scotch crank.**

sco'tia (*Arch.*). A *cavetto* (q.v.).

scoto'ma (*Med.*). (1) A blind or partially blind area in the visual field, the result of disease of the retina or optic nerve.—(2) The appearance of a black spot in front of the eye, as in choroiditis. —*pl.* **scotomata.**

scotom'eter (*Med.*). An instrument for detecting and measuring *scotomata* (1).

scot'ophyte (*Bot.*). A plant which lives in the dark.

Scott connexion (*Elec. Eng.*). A method of connecting two single-phase transformers so as to convert a three-phase three-wire a.c. supply to a two-phase three-wire supply, and vice versa.

Scott-Bentley discriminator (*Elec. Eng.*). In series motors requiring a wide range of speed, a field divertor arrangement for obtaining light-load speeds above normal.

scourer (*Eng.*). A flour-milling machine in which the wheat, for cleaning purposes, is subjected to the action of revolving beaters in a ventilated casing.

scouring (*Hyd. Eng.*). Said of the eroding action of water flowing at high velocity.

scouring (*Textiles*). (1) A process to which raw wool and manufactured woollen fabrics are subjected, raw wool to remove natural grease and impurities, yarns and cloth to remove oil and dirt.—(2) A process by which the natural gum is removed from silk yarns prior to dyeing.

scrambler (*Bot.*). A plant which develops long shoots which grow loosely over and above other plants.

scrambler (*Radio*). A device used to obtain secrecy in radiotelephone conversations. Its action is to transfer the different frequency components of the transmitted speech to other parts of the frequency spectrum, high frequencies being moved lower, and so on. A similar device at the receiving end reverses the process and restores the original sounds.

scraper (*Carp.*). A thin flat steel blade with a square straight edge on which a burr is raised; used to pare wood from a surface which is being finally dressed.

scraper ring (*I.C. Engs.*). A ring usually fitted on the skirt of a petrol- or oil-engine piston, to prevent excessive oil consumption. It may have a bevelled upper edge or a slotted groove, the oil being scraped off the cylinder wall and led back to the sump through holes in the piston wall.

scratch (*Acous.*). The same as *surface noise.*

scratch-coat (*Plast.*). The first of three coats applied in plastering. It consists of coarse stuff.

scratch filter (*Radio*). A low-pass filter, with a cut-off at about 7000 cycles, which can be inserted into the low-frequency amplifier of a radio receiver, when the latter is used for the reproduction of gramophone records, to eliminate noise due to the needle scratching the bottom of the grooves of the record. See **optical scratch, shadow scratch.**

scratch work (*Plast.*). *Sgraffito* (q.v.).

scratched blue (*Pot.*). Incised ornament on unbaked clay, sprinkled with cobalt glass, then fused in the kiln.

scratched figure (*Typog.*). A figure cast with a stroke through it to indicate a cancel, thus : $\cancel{6}$.

scratcher (*Plast.*). A tool used to make scratch marks in a cement surface, in order to provide a grip for a subsequent coat, and enable it to adhere more satisfactorily.

scree or **ta'lus** (*Geol.*). A tumbled mass of angular rock debris strewn on a hillside or at a mountain foot, resulting from frost action or, in arid regions, insolation.

screed (*Plast.*). A band of plaster laid on the surface of a wall as a guide to the thickness of a coat of plaster to be applied subsequently. *

screed-coat (*Plast.*). A coat laid level with the screeds.

screen (*Acous.*). The fine-mesh sieve which is used for passing the materials used in the manufacture of gramophone records.

screen (*Build., Civ. Eng.*). A large sieve used for grading fine or coarse aggregates.

screen (*Cathode Ray Tubes*). See **fluorescent screen.**

screen (*Cinema.*). The white surface on which cinematograph (or other) images are projected. In cinemas it is pierced with a large number of small holes, designed so as to permit the passage of sound-waves from the reproducing loudspeakers with small and uniform attenuation with frequency. For domestic sub-standard projection with limited light, the apparent brilliance of the image is increased by treating the surface so that the reflected light is concentrated to some extent in the normal direction. See also **aerial screen.**—(*Photog.*) See **focusing screen.**

screen (*Photog., Print.*). The meshwork of lines at right-angles, ruled on glass, used to translate the subject of a *half-tone* (q.v.) illustration into dots. Screens are roughly classified according to the number of lines per in., viz. *fine* (e.g. 150), *medium* (e.g. 133), *coarse* (e.g. 85). See also **colour screen.**

screen (*Television*). The surface on which the reproduced picture appears. It may be the screen of a cathode ray tube, or a white reflecting surface in the case of mechanical scanning systems.

screen (*Thermionics*). An electrode consisting of a relatively fine mesh network of wires interposed between two other electrodes, to reduce the electrostatic capacity between them. It is usually maintained at a positive potential, and connected to earth through a condenser.

screen burning (*Cathode Ray Tubes*). The gradual falling off in luminosity, sometimes accompanied by discoloration, which occurs in the fluorescent screen of a cathode ray tube, particularly if operated under adverse conditions.

screen grid (*Thermionics*). The third electrode (starting from the cathode) in a screened grid or pentode valve.

screen memory (*Psycho-an.*). Early childhood impressions and ideas which break through into consciousness, but are distorted and condensed into something which is unrecognisable to the individual.

screen modulation (*Radio*). A system of modulation in which the potential of the screen in a multi-electrode valve is varied in accordance with the impressed modulating currents.

screen-protected motor (*Elec. Eng.*). A protected type of electric motor in which the openings for ventilation are covered with wire-mesh screens.

screened antenna (*Radio*). An antenna fitted with a counterpoise earth connexion, to reduce the eddy current losses in the ground.

screened-grid valve (*Thermionics*). A four-electrode valve comprising a cathode, control grid, screen, and anode, in the order stated. Used as a high-frequency amplifier, where its low grid to anode capacitance is of value. Also called SHIELD GRID VALVE, TETRODE.

screened pentode (*Thermionics*). A pentode valve having a fine-mesh auxiliary grid and consequently small grid-to-anode capacitance, for use at high frequencies.

screening effect (*Elec. Eng.*). The property of a metal envelope to screen an enveloped magnetic field from the outside surroundings.

screening protector (*Elec. Eng.*). See **line choking coil.**

screenings (*Build., Civ. Eng.*). The residue from a sieving operation.

screw-and-nut steering-gear (*Automobiles*). A steering-gear in which a square-threaded screw formed on the lower end of the steering-column engages with a nut provided with trunnions, which work in blocks sliding in a short slotted arm carried by the drop-arm spindle.

screw-auger (*Tools*). An auger having a helical groove cut in its surface so as to carry away the chips from the cutting edge.

screw axes (*Min.*). Axes of symmetry about which the atoms in a mineral are symmetrically disposed. Rotation about a four-fold screw axis, for example, will carry an atom 1 into the positions successively occupied by similar atoms 2, 3, and 4, after rotations of 90°, 180°, 270°, and 360°. Cf. *rotation axes of symmetry.*

screw chases (*Typog.*). Chases used in newspaper work. They are fitted with screws, which obviates the use of separate quoins and sidesticks.

screw chasing (*Eng.*). See **chaser.**

screw composing-stick (*Typog.*). An old type of composing-stick fastened with a thumbscrew. The modern style is fastened at the correct measure by means of a lever.

screw conveyor (*Eng.*). See **worm conveyor.**

screw-cutting lathe (*Eng.*). A metal turning-lathe provided with a lead screw driven by *change wheels* (q.v.), for traversing the pointed tool used in screw-cutting.

screw jack (*Eng.*). See **jack.**

screw micrometer (*Eng.*). See **micrometer gauge.**

screw nail (*Build.*). A nail in whose surface shallow helical depressions are formed, so that as it is driven in place with blows from a hammer it turns like a screw.

screw pile (*Civ. Eng.*). A pile having a wide projecting helix or screw at the foot, useful in alluvial ground.

screw plate (*Eng.*). A hardened steel plate in which a number of screwing dies of different sizes are formed.

screw plug (*San. Eng.*). A drain-plug consisting of a rubber ring held between two steel discs which, on being screwed together, force the ring out to close the drain-pipe in which the plug is placed.

screw propeller (*Eng.*). See **air-screw, marine screw propeller.**

screw shackle (*Struct.*). A long nut screwed internally with a right-hand thread at one end and a left-hand thread at the other, serving to connect the ends of two rods which are to be joined together, and providing a means of adjusting the total length.

screw thread (*Eng.*). A helical ridge of approximately triangular (or V), square, or rounded section, formed on a cylindrical core, the pitch and core diameter being standardised under various systems.

See **acme—**
British Association—
British Standard Fine—
British Standard Pipe—
British Standard Whitworth—
buttress— **Sellers—**
international— **square—**
metric— **Swiss** (or **Thury**)**—**

screws, temperature (*Horol.*). The screws in the rim of a compensation balance, excluding the quarter screws.

screwed boots (*Boots and Shoes*). Boots in which the sole is attached to the upper by screws, which are made from threaded wire and inserted by machinery; sometimes an outer sole is sewn on to the screwed sole.

screwed steel conduit (*Elec. Eng.*). Light steel tubing, having screwed ends for connecting up in lengths by means of sockets, in which electrical installation wiring is run. Cf. *plain steel conduit.*

screwing die (*Eng.*). An internally threaded hardened steel block, sometimes split in halves, on which cutting edges are formed by longitudinal slots. Held in a stock, lathe, or screwing machine for cutting external threads.

screwing machine (*Eng.*). A form of lathe adapted for the continuous production of screws, or screwed pieces, by means of dies.

screws (*Med.*). See **caisson disease.**

scribbler (*Spinning*). A woollen-trade term for a *carding machine.*

scribbling (*Spinning*). A term used in the woollen trade for *carding.*

scribe-awl (*Carp., etc.*). A *scriber* (q.v.).

scriber (*Carp.*). A pointed steel tool used for making an incised mark on timber, to guide a subsequent cutting operation.

scribing block (*Eng.*). A tool for gauging the height of some point on a piece of work, above a surface plate or machine table. It consists of a base supporting a pivoted column, to which a scriber is slidably clamped. Also called SURFACE GAUGE.

scrieve board (*Ship Constr.*). A formation of portable portions of flat wooden boards whereon are scrieved (or scribed) the ship's transverse frame sections and lines indicative of shell seams, decks, stringers, etc. Scrieve boards are used for setting the soft iron, to which the frames, etc. are turned.

scrim (*Textiles*). A fabric generally made from low quality linen tow, in an open weave. Used as a reinforcement in book-binding, upholstery, plaster work, etc. Also called MULL.

script (*Typog.*). A style of type which imitates handwriting.

scrobe (*Zool.*). In some *Arthropoda*, especially Insects, a groove for the reception of an antenna.

scrobic'ulate (*Bot., Zool.*). Having the surface dotted all over with small rounded depressions: pitted.

scrob'icule, scrobic'ula (*Zool.*). In *Echinoidea*, the smooth area of the test around the boss of a spine.

scrobic'ulus (*Bot., Zool.*). A small pit or rounded depression.

scrof'ula (*Med.*). Caseating tuberculosis of the lymphatic glands.—*adj.* **scrof'ulous.**

scrofuloder'mia, scrofuloder'ma (*Med.*). Tuberculous infection of the skin from the bursting of a deep-seated tuberculous abscess: a subcutaneous tuberculous abscess.

scroll chuck (*Eng.*). A self-centring chuck, having jaws slotted to engage with a raised spiral or scroll on a plate which is rotated by a key, so as to advance the jaws while maintaining their concentricity.

scro'tiform (*Bot.*). Like a bladder.

scro'tum (*Anat., Zool.*). In Mammals, a muscular sac forming part of the ventral body-wall into which the testes descend.—*adj.* **scro'tal.**

scrubbers (*Gas*). In a gas-works plant, the apparatus in which the gas is freed from tar, ammonia, and sulphuretted hydrogen.

scudding (*Leather*). The operation of removing the epidermis hair roots, pigment cells, and lime salts from the grain side of a hide, before tanning.

sculptured (*Bot., Zool.*). Bearing spines, ridges, or other markings standing up from the surface.

scum (*Build.*). A surface formation of lime crystals appearing on new cement work.

scumbling (*Paint.*). The operation of partially removing the finishing coat of paint while it is still wet by dabbing it with a rag or sponge, thereby exposing the previous coat in places and producing a kind of mottled finish.

scurfy (*Bot.*). Having the surface sprinkled with small bran-like scales.

scurvy (*Med.*). Scorbutus. A nutritional disease due to deficiency in the diet of vitamin C (ascorbic acid), characterised by anaemia, debility, apathy, sponginess of the gums, ulceration of the mouth, and haemorrhages from various parts of the body.

scu'tate. See **scute.**

scutch (*Build.*). The bricklayer's cutting tool for dressing bricks to special shapes. Also called SCOTCH.

scutcheon. See **escutcheon.**

scute (*Zool.*). An exoskeleton scale or plate.—*adj.* **scu'tate.**

scutel'lar epithelium (*Bot.*). A layer of elongated cells covering the surface of the scutellum, lying against the endosperm, and producing enzymes which assist in the utilisation of the latter.

scu'tellate (*Bot.*). Rounded and nearly flat; shaped like a saucer.

scutella'tion (*Zool.*). Scale-arrangement; pholidosis.

scutel'lum (*Bot.*). A flattened portion of the embryo of a grass, probably the expanded cotyledon; it is applied to the endosperm and serves as an absorptive organ.

scutellum (*Zool.*). The posterior of three sclerites into which the notum is typically divided in Insects: in Birds, a tarsal scale: more generally, a shield-shaped structure.

scu'tiform (*Bot.*). Shield-shaped.

scu'tum (*Zool.*). In Insects, the middle sclerite of three into which the notum is typically divided. —*adj.* **scu'tal.**

scybalum, sib'— (*Med.*). A round, hard, and dry faecal mass in the intestine.

scyelite, si'— (*Geol.*). A coarse-grained ultramafic igneous rock, named from the original locality at Loch Scye in Sutherlandshire, Scotland; it consists essentially of mafic minerals including serpentine pseudomorphs after olivine set poikilitically in large amphibole crystals associated with large bronze mica crystals. A mica-hornblende-peridotite.

scyphi (*Bot.*). See **scyphus.**

scyphif'erous (*Bot.*). Having scyphi.

scyphis'toma (*Zool.*). In *Scyphozoa*, the segmenting polyp stage. Cf. *hydratuba.*

Scyphomedu'sae (*Zool.*). See **Scyphozoa.**

Scyphozo'a (*Zool.*). A class of *Cnidaria* in which alternation of generations frequently does not occur, the hydroid phase being partially suppressed, but if present it is solitary and gives rise to the medusoid phase by transverse fission (strobilisation) and possesses gastral ridges and filaments; the medusa is large and without a velum and nerve-ring; the gonads are of endodermal origin. Jelly-fish.

scyph'ula (*Zool.*). See **scyphistoma.**

scy'phus (*Bot.*). A cup-like widening of the distal end of the podetium in some lichens.—*pl.* **scy'phi.**

S.E. (*Build.*). Abbrev. for *stopped end.*

Se (*Chem.*). The symbol for *selenium.*

sea. An expanse of salt water on the face of the globe; strictly, one of lesser extent than an ocean. Sea water contains the majority of the common elements in small amounts, the principal ions being chlorine and sodium; others are calcium, magnesium, and potassium; dissolved gases, e.g. oxygen, nitrogen, carbon dioxide. The salinity holds a constant relation to the chlorine content and varies between 32 and 37·4 parts per thousand in the open sea; that of the Red Sea is about 40%. See also **ocean.**

sea anchor (*Ships*). A float to which a ship may be attached by a hawser to ride out a gale. Also called FLOATING ANCHOR.

sea breeze (*Meteor.*). See **land and sea breezes.**

sea earth (*Telcg.*). A sea earth is effected by the removal of the main earth connexion of the termination of a submarine cable to some miles out to sea, instead of making it near the shore, to avoid the earth coupling of a number of such submarine cables. The earth connexion takes the form of an insulated conductor inside the cable, ultimately terminated on the armouring, which is in contact with the sea.

Sea-Island cotton (*Textiles*). A long staple, silky cotton produced in Georgia, Carolina, and N. Florida and the adjacent islands. Now almost superseded by other long-staple cottons.

sea lily (*Geol., Zool.*). See **Crinoidea.**

sea marker (*Aero.*). Any device dropped from an aircraft on to water to make an observable patch from which the drift of the aircraft may be determined. Usually filled with some oily liquid containing a light-coloured powder, which spreads over the water surface.

sea otter (*Furs*). The dressed skin of an amphibious Mammal resembling the otter, found in the North Pacific; the fur is a silvery brown and exceptionally valuable.

seaplane (*Aero.*). An aeroplane fitted with means for taking off and alighting on water. See **float seaplane, flying-boat.**

sea-wall (*Civ. Eng.*). A coastal wall built to afford protection against erosion and/or flooding.

seal (*Furs*). The dressed skin of one of the eared seals that bear fur, e.g. *Callorhinus ursinus* (the Alaska seal) and *Arctocephalus,* both of which are closely protected. The fur is a rich brown (seal brown) and of a velvety texture.

seal, sealing, sealing-in (*Elec. Comm.*). (Of a relay) terms equivalent to *lock* (q.v.).

seal (*San. Eng.*). The water contained in a trap, which prevents the flow of air or gases from one side to the other.

sealed cover (*San. Eng.*). An air-tight cast-iron cover fitting into a frame and used to cover a manhole.

sealing (*Build.*). The operation of closing a joint, or of attaching one piece to another, by means of cement, lead, etc.

sealing box (*Cables*). A box in which the end of a paper-insulated cable is hermetically sealed with a compound.

sealing-in. The making of an air-tight joint between the filament wires and the glass envelope of an incandescent lamp.

sealing-off. The final sealing of the exit to the evacuating pumps of an incandescent lamp bulb.

Sealocrete (*Build.*). Trade-name of a waterproofing agent for cement surfaces.

seam (*Met.*). A surface defect in worked metal, the result of a blowhole being closed but not welded; it remains as a fine crack.

seam (*Mining*). (1) A tabular, generally flat deposit of coal or mineral; a stratum or bed.—(2) A joint or fissure.

seam (*Plumb.*). See **welt.**

seam roll (*Plumb.*). A *hollow roll* (q.v.).

seam welding (*Elec. Eng.*). A continuous electric welding process in which two overlapping sheets of metal are passed between a pair of wheels forming the electrodes that carry the welding current.

seamless tube (*Met.*). Tube other than that made by bending over and welding the edges of flat strip. May be made by extrusion (non-ferrous metals), or by piercing a hole through a billet and then rolling down over a mandrel to form a tube of the required dimensions.

search coil (*Elec. Eng.*). See **exploring coil.**

searchlight projector (*Illum.*). A projector embodying a parabolic reflector; capable of housing a high-intensity arc lamp for producing a parallel beam of light for picking out objects at night at considerable distances.

season (*Astron.*). One of the four divisions of the tropical year taken from the passage of the sun through the equinoctial and solstitial points: *spring*, reckoned from the equinox on March 21, is 92 days 20·2 hours; *summer*, from the solstice on June 21, is 93 days 14·4 hours; *autumn*, from the equinox on Sept. 23, is 89 days 18·7 hours; *winter*, from the solstice on Dec. 22, is 89 days 0·5 hour.

seasonal polymorphism (*Ecol.*). The occurrence of different forms of the same species at different seasons, a phenomenon especially characteristic of lake faunas.

seasoning (*Leather*). The process of coating leather, after dyeing, with some form of liquid albumen, preparatory to glazing and polishing.

seasoning (*Timber*). The process in which the moisture content of timber is brought down to an amount suitable for the purpose for which the timber is to be used.

seat board (*Horol.*). The board or platform that carries the movement of a long case clock.

seat earth (*Geol.*). See **underclay.**

seating (*Eng., etc.*). A surface for the support of another piece, e.g. the end of a girder, or a masonry block.

seba'ceous (*Bot.*). Looking like lumps of tallow.—(*Zool.*) Producing or containing fatty material, as the *sebaceous glands* of the scalp in Man.

sebaceous cyst (*Med.*). A cyst formed as a result of blockage of the duct of a sebaceous gland, often present on the face, scalp, or neck.

sebif'erous (*Zool.*). Conveying fatty material.

sebif'ic (*Zool.*). See **colleterial.**

sebip'arous (*Zool.*). Sebaceous.

seborrhoe'a, seborrhe'a (*Med.*). Overactivity of the sebaceous glands, resulting in an abnormally greasy skin.

seborrhoe'ic (or **seborrhe'ic**) **dermati'tis** (*Med.*). An inflammatory disease of the skin characterised by the presence of reddish patches covered with greasy scales; especially of the scalp, causing 'scurfy head.'

se'bum (*Zool.*). (Latin, 'tallow, suet, grease.') The fatty secretion produced by the sebaceous glands.

Secchi's classification, sek'kē (*Astron.*). The earliest classification of about 4000 stars into spectral types; made by Father Secchi (1818-1878), who divided them into four groups designated by Roman figures, starting with the white, or helium, stars and ending with the reddest.

sec'odont (*Zool.*). Having teeth adapted for cutting.

second. (1) A unit of time equal to 1/60 of a minute, or 1/86400 of the mean solar day.—(2) A unit of angular measure, equal to 1/60 of a minute of arc; indicated by the symbol ″.—(3) In the duodecimal notation, 1/12 of an inch; indicated by ‴.

seconds hand (*Horol.*). The small hand of a clock or watch that makes one turn per minute.

second channel interference (*Radio*). Interference which arises in a supersonic heterodyne receiver owing to insufficient attenuation of signals of image frequency prior to the frequency changing stage.

second contraction (*Cyt.*). Shortening and thickening of the threads in the diplonema stage of meiosis as diakinesis comes on.

second detector (*Radio*). The rectifier or detector which follows the intermediate frequency amplifier in a supersonic heterodyne receiver.

second development (*Photog.*). The second development in a reversal process, after the first image has been removed by bleaching and the remaining silver halide rendered developable by further exposure to light.

second tap (*Eng.*). A tap used, after a taper tap, to carry the full thread diameter further down the hole, or to give the finished size of thread in a through hole.

second ventricle (*Zool.*). In Vertebrates, the cavity of the right lobe of the cerebrum.

seconds (*Build.*). Bricks similar to *cutters* (q.v.), but of a slightly uneven colour.

seconds (*Textiles*). The term applied by woolsorters to the rather coarse wool from the edges of the front of a fleece; also to coarse skirtings from merino fleeces.

secondary (*Zool.*). Arising later: of subsidiary importance: in Insects, the hind-wing: in Birds, a quill feather attached to the forearm.

secondary alcohols (*Chem.*). Alcohols containing the group :CH·OH. When oxidised they yield ketones.

secondary amines (*Chem.*). Amines containing the imino group :NH. They yield with nitrous acid nitrosamines.

secondary association (*Bot.*). The coming together of bivalent chromosomes during meiosis.

secondary beam (*Struct.*). In floor construction, a beam carried by *main beams* (q.v.) and transmitting loads to them.

secondary body cavity (*Zool.*). See **coelom.**

secondary bow (*Meteor.*). A rainbow having an angular radius of 52°, the red being inside and the blue outside, usually fainter than the primary bow. It is produced in a manner similar to the primary bow except that two internal reflections occur in the raindrops. See **rainbow.**

secondary cell (*Elec. Eng.*). A voltaic cell in which the electrochemical action is reversible, so that the cell can be charged and discharged economically. See **primary cell, accumulator.**

secondary cell wall (*Bot.*). The layers of wall material deposited on the primary wall as the cell ages; it usually contains more cellulose and less pectin than the primary wall, and is often pitted.

secondary coil (*Elec. Eng.*). A coil which links the flux produced by a current flowing in another coil (the *primary coil*).

secondary colours (*Paint.*). Colours produced by mixing two or more primary colours.

secondary constant (*Elec. Comm.*). The propagation constant, or the characteristic impedance, of a length of uniform transmission line.

secondary cortex (*Bot.*). See **phelloderm.**

secondary electrode (*Elec. Eng.*). See **bi-polar electrode.**

secondary electrons (*Thermionics*). Those electrons which are emitted from a surface by electronic bombardment, as distinct from the primary bombarding electrons.

secondary emission (*Thermionics*). The emission of electrons from a surface (usually conducting) by the bombardment of the surface by electrons from another source. The number of secondary electrons may exceed that of the primaries, depending on the velocity of the latter.

secondary emission multiplier (*Photo-electric Cells, etc.*). See **electron multiplier.**

secondary enrichment (*Geol.*). The name given to the addition of minerals to, or the change in the composition of the original minerals in, an ore body, either by precipitation from downward-percolating waters or upward-moving gases and solutions. The net result of the changes is an increase in the amount of metal present in the ore at the level of secondary enrichment.

secondary gneissic banding (*Geol.*). A prominent mineral banding exhibited by coarse-grained crystalline rocks which have been subjected to intense regional metamorphism, involving rock-flowage. Cf. *primary gneissic banding.*

secondary growth (*Bot.*) See **secondary thickening.**

secondary hardness (*Met.*) Further increase in hardness produced on tempering high-speed steel after quenching.

secondary leakage (*Elec. Eng.*). The magnetic leakage associated with the secondary winding of a transformer.

secondary meristem (*Bot.*). A meristem formed from permanent tissue.

secondary mycelium (*Bot.*). (1) Hyphae growing down from the developing-fruit body of a fungus and taking up food material for its nutrition.—(2) The mycelium of binucleate segments, bearing clamp connexions, formed by many *Basidiomycetes.*

secondary nitro-compounds (*Chem.*). Nitro-compounds containing the group $:CH \cdot NO_2$.

secondary nucleus (*Bot.*). The nucleus formed in the embryo sac by the union of the two polar nuclei.

secondary petiole (*Bot.*). The petiole of a leaflet of a compound leaf.

secondary phloem (*Bot.*). Phloem formed by the activity of a cambium.

Secondary Rocks (*Geol.*). An obsolete term applied to the rocks which were deposited within the period of geological time which ranges from the Triassic era to the Cretaceous era. See **Mesozoic.**

secondary standard (*Elec. Eng.*). A copy of a *primary standard* for general use in a standardising laboratory.

secondary succession (*Bot.*). A succession arising when the ground has been partly deprived of vegetation by a fire or other accident.

secondary thickening (*Bot.*). The increase in diameter of a stem or root when elongation has ceased and all primary tissues have been differentiated.

secondary tissue (*Bot.*). Tissue formed from a cambium or other secondary meristem.

secondary voltage (*Elec. Eng.*). The voltage at the terminals of the secondary winding of a transformer.

secondary wall layer (*Bot.*). See **secondary cell wall.**

secondary wave (*Radio*). A wave deriving from the main or desired wave forming a communication link but arising when this wave is partially reflected, or refracted, or scattered.

secondary winding (*Elec. Eng.*). A winding which links the flux produced by a current flowing in another winding (the *primary winding*, q.v.).

secondary wood (or xylem) (*Bot.*). Wood formed by the activity of a cambium.

secrecy (or privacy) system (*Teleph.*). Modification of speech-frequencies within the speech-band, so that during transmission from a radio transmitter to a receiver the signal is unintelligible and cannot be tapped. The interchange of frequencies at the transmitter is restored at the receiver. See **scrambler, inverter.**

secret dovetail (*Join.*). An angle joint between two members in which neither shows end grain, the visible external parts being mitred, while the dovetails are kept back from both faces. Also called a DOVETAIL MITRE, MITRE DOVETAIL.

secret nailing (*Carp.*). The operation of uniting two pieces with nails driven in in such a manner that the nail holes are not visible from the outside.

secret switch (*Elec. Eng.*). See **locked cover switch.**

secre'tin (*Zool.*). In Vertebrates, a hormone produced by certain cells forming part of the lining of the intestine when stimulated by hydrochloric acid from the stomach; it passes into the bloodstream and stimulates the pancreas to secretion and apparently also causes a flow of bile into the intestine.

secre'tion (*Physiol.*). A substance elaborated, collected, and discharged by a gland or gland-cell: the process of elaboration of such a substance.

secre'tory (*Zool.*). Secretion-forming.

secretory cell (*Bot.*). A cell in which oils, resins, nectary, etc. are formed; the secretions may be retained in the cell or may exude from it.

secretory duct (or passage) (*Bot.*). An elongated intercellular space in which secretions accumulate.

secretory tissue (*Bot.*). A group of secretory cells.

section (*Bot.*). A division of a genus consisting of a number of closely related species.—(*Micros.*) A thin slice of plant material, sufficiently transparent to be capable of investigation with the compound microscope.

section (*Elec. Comm.*). The elementary part of a complete wave-filter which passes the requisite band of frequency but does not necessarily contribute to all the attenuation features of the filter, which are generally obtained by combining several sections of different types.

section (*Surv.*). The representation to scale of the variations in level of the ground surface along any particular line.

section (*Typog.*). (1) A reference mark (§) directing the reader's attention to a footnote.—(2) A folded sheet of a book. Also called SIGNATURE.

section gap (*Elec. Eng.*). An arrangement for dividing the overhead contact wire of an electric traction system into sections, both electrically and mechanically, without interfering with the smooth passage of the current-collector; usually done by overlapping the ends of the adjacent sections of contact wire in a horizontal plane. Also called AIR GAP, OVERLAP SPAN.

section insulator (*Elec. Eng.*). An insulator forming the joint between two sections of an overhead trolley wire.

section marks (*For.*). Marks denoting places of origin.

section mould (*Carp., etc.*). A templet whose profile corresponds to the shape of the section of a required member. This shape is marked on the ends of a timber and used as a reference in making the member.

section pillar (*Elec. Eng.*). A cable box, in the form of a cast-iron pillar or small kiosk, in which different sections of feeder cables are joined together by removable links.

section switch (*Elec. Eng.*). A switch whose function is to connect or disconnect two sections of an electric circuit, generally two bus-bar sections.

section warping (*Weaving*). The making of a warp in sections. From these sections, when placed side by side, a sheet of warp yarn of full width may be wound on to the loom beam.

sectional pontoon dock (*Civ. Eng.*). A form of *self-docking dock* (q.v.) built up of a number of separate pontoons lying transversely to the length of the dock and carrying its two side walls, which are sufficiently far apart to permit any one of the pontoons to be unbolted and supported by the dock. Also called RENNIE DOCK.

sector (*Geom.*). A plane figure enclosed by two radii of a circle (or of an ellipse) and the arc cut off by them.

sector-pattern instruments (*Elec. Eng.*). Switchboard instruments contained in cases having a sector-shape instead of the usual circular shape; used to save space on the switchboard.

sector regulator (*Civ. Eng.*). A form of drum weir. It consists of a hollow reinforced concrete sector of a cylinder placed transversely across the direction of flow and capable of rotation about a horizontal axis on the downstream side, with accommodation for the sector in a special pit in the bed of the stream.

secto'rial (*Zool.*). Adapted for cutting.

sectorial chimaera (*Bot.*). A chimaera in which the plant consists of two or more distinct types of tissue, arranged in sectors which come to the surface.

sectroid (*Arch.*). The curved surface between adjacent groins on a vault surface.

sectrom'eter (*Chem.*). A potentiometer for electrometric titrations in which the microammeter is replaced by a cathode ray tube.

secular acceleration (*Astron.*). The name applied to a non-periodic but cumulative term in the mathematical expression of the moon's motion, by which the moon is in advance of her theoretical position by about 11″ every century.

secular changes (*Geol., etc.*). Changes which are extremely slow and take many centuries to accomplish; they may apply to climate or levels of land and sea.

secular parallax (*Astron.*). An effect, so slow as to be undetectable, by which, owing to the motion of the solar system as a whole through space, the apparent places of the stars (and hence the shape of the constellations) will in the course of 1 million years entirely change.

sec'und (*Bot.*). Having the lateral members all turned to one side.

secun'dine (*Bot.*). The inner integument when two are present.

Sedenta'ria (*Zool.*). See **Rhizota.**

sedentary (*Zool.*). Said of animals which remain attached to a substratum.

sediment-transporters (*Ocean.*). Aquatic animals which stir up bottom deposits and mix up organic and mineral constituents.

sedimentary rocks (*Geol.*). All those rocks which result from the wastage of pre-existing rocks. They include the fragmental rocks deposited as sheets of sediment on the floors of seas, lakes, and rivers and on land; also deposits formed of the hard parts of organisms, and salts deposited from solution, in some cases with the aid of lowly organisms. Igneous and metamorphic rocks are excluded.

sedimentation (*Chem.*). The settling of solid particles from a liquid, as a result of either gravity or centrifuging.—(*Geol.*) See **deposition.**

sedimentation tank (*Sewage*). A tank into which sewage from the detritus pit is passed so that suspended matters may sink to the bottom, from which they can be removed.

sedimentation test (*Med.*). The measurement of the rate of sinking of red blood cells in drawn blood placed in a tube; the rate is increased in disease and in pregnancy.

se'dohep'tose (*Chem.*). A heptose obtained from the leaves and stems of *Sedum spectabile.*

seed (*Bot.*). A multicellular structure containing the embryo of a higher plant, together with stored food, the whole protected by a testa.

seed coat (*Bot.*). See **testa.**

seed crystal (*Chem.*). A crystal introduced into a supersaturated solution or a supercooled liquid in order to initiate crystallisation.

seed leaf, seed lobe (*Bot.*). A cotyledon in a flowering plant.

seed stalk (*Bot.*). See **funicle.**

seed vessel (*Bot.*). A dry fruit.

seedling (*Bot.*). The young plant from a germinated seed.

seedy (*Textiles*). Said of wools containing grass seeds likely to be difficult to remove.

seedy toe (*Vet.*). A chronic infection of the sensitive laminae of the horse's toe.

seersucker (*Textiles*). A light-weight dress fabric, generally with a check pattern, made in India.

Seessel's pocket, zā-sel (*Zool.*). A pit of unknown significance occurring just behind Rathke's pocket on the dorsal side of the oral cavity in developing Vertebrates.

Seewer governor (*Elec. Eng.*). A hydraulic turbine governor for controlling the speed of high-pressure Pelton wheels; a needle valve varies the divergence of the conical pressure jet issuing from the nozzle.

Seger cones, zā'ger. Small cones of clay and oxide mixtures, calibrated within defined temperature ranges at which the cones soften and bend over. Used in furnaces to indicate, within fairly close limits, the temperature reached at the position where the cones are placed. Also FUSION CONES.

seggar (*Pot.*). A *sagger* (q.v.).

segment (*Bot.*). (1) A multinucleate portion of a hypha or filament, delimited by transverse walls. —(2) A daughter cell cut off by the division of a single apical cell.—(3) A portion of the lamina of a leaf when deeply lobed but not divided into true leaflets.

segment (*Elec. Eng.*). One of many elements, insulated from one another, which collectively form a commutator.

segment (*Geom.*). A plane figure enclosed by the chord of a circle (or of an ellipse) and the arc cut off by it. The segment of a sphere or of an ellipsoid is the portion cut off by a plane.

segment (*Zool.*). One of the joints of an articulate appendage: one of the divisions of the body in a metameric animal: a cell or group of cells produced by cleavage of an ovum.—*adj.* **segment'al.**

segment'al (*Zool.*). In metameric animals, repeated in each somite; as *segmental arteries, segmental papillae.*

segmental apparatus (*Zool.*). The brain-stem of Vertebrates, i.e. that part of the brain which shows the same type of organisation as the spinal cord. Cf. *suprasegmental structures.*

segmental arch (*Civ. Eng.*). An arch having the shape of a circular arc struck from a point below the springings.

segmental core disc (*Elec. Eng.*). An armature core disc made up in segments; used when a disc in a single piece would be so large as to be unwieldy.

segmental duct (*Zool.*). The archinephric or pronephric duct of Vertebrates.

segmental Gothic arch (*Arch.*). An arch whose outline is formed by two segments of circles meeting obtusely.

segmental interchange (*Cyt.*). The exchange of portions between two chromosomes which are not homologous.

segmental organ (*Zool.*). An embryonic excretory organ of a metameric animal.

segmentation (*Zool.*). Meristic repetition of organs or of parts of the body: the early karyokinetic divisions of a fertilised ovum, leading to the formation of a blastula or analogous stage.

segmentation cavity (*Zool.*). See **blastocoele.**

segmentation nucleus (*Zool.*). The nucleus of a fertilised ovum formed by the union of the male pronucleus with the female pronucleus.

segregation (*Gen.*). (1) The process by which a pair of allelomorphic characters become separated out in the pure dominants and the pure recessives of the second and subsequent generations.—(2) The separation of hereditary factors from one another during spore formation.

segregation (*Met.*). Non-uniform distribution of impurities, inclusions, and alloying constituents in metals. Arises from the process of freezing, and usually persists throughout subsequent heating and working operations.

See **inverse—** **normal—**

seiche, sāsh. An apparent tide in a lake (originally observed on Lake Geneva) due to the pendulous motion of the water when excited by wind.

Seidlitz powder, sed'lits (*Chem.*). Effervescent powder. A mixture of sodium bicarbonate with tartaric acid, acid sodium tartrate, or some similar acid or salt.

Seignette salt, sen-yet' (*Chem.*). *Rochelle salt* (q.v.).

seine-net, sān *or* sēn (*Ocean.*). A long shallow net with a buoyed head-rope and a weighted bottom rope; used to surround a certain area of water or ground so that anything within that area may be captured; it may be worked from the shore or from a boat.

seis'mograph. An instrument by means of which earthquake shocks and concussions are registered. (Greek *seismos*, earthquake.)

seismology. The study of earthquake phenomena.

seis'monasty (*Bot.*). Movement by a plant in response to a stimulus provided by mechanical shock.

Seison'ida (*Zool.*). An order of marine *Rotifera* of parasitic habit, having a reduced trochal disc, a long narrow body, and an elongate foot with a perforated disc at the end.

seistan, sēs'tahn (*Meteor.*). The 120-day summer north wind in E. Persia.

seizure or **seizing-up** (*Eng.*). The locking or partial welding together of sliding metallic surfaces normally lubricated, as of a journal and bearing; due to failure of lubrication or insufficient clearance leading to excessive friction.

Sela'chii (*Zool.*). A class of aquatic *Craniata* breathing by gills, having a biting mouth with well-developed jaws, paired fins, and a cartilaginous skeleton; a gill-cover if present is membranous. Sharks, Rays, Skate, Chimaeras.

Selbor'nian (*Geol.*). The stage of rocks in the Cretaceous System which includes the Gault and Upper Greensand of Southern England; approximately equivalent to the Albian Stage of the Cretaceous.

selec'tance (*Radio*). A term sometimes used to express selectivity, especially numerically.

selected areas (*Astron.*). Two hundred and six areas distributed nearly uniformly over the whole sky, and forty-six special areas mostly near the Galaxy, to which intensive research under international co-operation is being applied to extend and complete the statistical work on stellar motions done by Kapteyn.

selection fauna (*Zool.*). Immigrants from one type of habitat which succeed in surviving in a different type of habitat, e.g. forms typical of running freshwaters surviving in stagnant waters.

selective absorption (*Bot.*). The power sometimes said to be possessed by a plant of taking in some substances and rejecting others.

selective absorption (*Light*). Absorption of light, limited to certain definite wavelengths, which produces so-called absorption lines or bands in the spectrum of an incandescent source, seen through the absorbing medium. See **Kirchhoff's law, Fraunhofer lines.**

selective emission (*Elec. Eng.*). The property of an incandescent body whereby it emits radiation, predominantly of one frequency.

selective fading (*Radio*). A phenomenon which is liable to occur in the transmission of short waves over long distances, when different frequency components, although close together in the frequency spectrum, are unequally attenuated, in a manner varying rapidly with time. The resulting distortion cannot be corrected by equalising networks.

selective fertilisation (*Bot.*). Union occurring between some types of gametes but not by all types produced by a species.

selective freezing (*Met.*). A process involved in the solidification of alloys, as a result of which the crystals formed differ in composition from the melt. Thus, in alloys in a eutectic system (except the eutectic alloy), crystals of one metal are formed from a melt containing two, and this continues until the melt reaches the eutectic point.

selective mating (*Zool.*). See **preferential mating.**

selective protection (*Elec. Eng.*). A term applied to methods of protecting power transmission networks in which an automatic disconnexion of the faulty section occurs without disturbance of the remainder of the network.

selective resonance (*Elec. Eng.*). Resonance with a harmonic, instead of the fundamental.—(*Radio*) Resonance which occurs at one or more discrete frequencies, instead of extending over a band of frequencies as in some forms of filter.

selectivity (*Radio*). The ability of a circuit or complete receiver to discriminate between the transmissions of differing frequencies.

selector (*Auto. Teleph.*). The unit device in automatic telephone switching, operated either by the dialled impulses originated by the subscriber, or by self-generated or machine-generated impulses arising in the exchange. See **hunting selector, finding selector, uniselector,**

also **A-digit—**
access—
BC-digit—
code—
digit-absorbing—
discriminating—
final—
group—
numerical—
P.B.X. final—
repeating—
tandem—
test—
test final—
trunk-offering—
trunk-offering final—

selector forks (*Automobiles*). In a gear-box, forked members whose prongs engage with grooves cut in the bosses of the gears, which they move along a splined shaft for changing gear. They are secured to a sliding rod operated by the gear-lever.

selector plug (*Auto. Teleph.*). A plug for making connexion to a selector, so that the latter can be taken out of service temporarily for testing, without removal from its shelf.

selector shelf (or **panel**) (*Auto. Teleph.*). A group of selector switches so arranged in a row that their bank wiring is taken out to one terminal strip.

selector switch (*Elec. Eng.*). A switch which prepares the closing of a circuit on any one of two alternative paths by means of a main switch or circuit-breaker.

sel'enite (*Geol.*). The name given to the colourless and transparent variety of *gypsum* (q.v.) which occurs as distinct monoclinic crystals, especially in clay rocks.

selenit'ic cement (or **lime**) (*Build.*). A mixture of a feebly hydraulic lime with approximately 5% of plaster of Paris ground together to suppress the slaking action of the lime ; used for plastering or rendering.

sele'nium (*Chem.*). Symbol, Se. A non-metallic element, in the sixth group of the periodic system. At. no. 34 ; at. wt. 78·96 ; valencies 2, 4, 6. A number of allotropic forms are known. *Red selenium* is monoclinic ; m.p. 180° C. ; sp. gr. 4·45. *Grey* (*metallic*) *selenium*, formed when the other varieties are heated at 200° C., is a conductor of electricity when illuminated ; m.p. 220° C. ; b.p. 688° C. ; sp. gr. 4·80 ; specific electrical resistivity 12 microhms per cm. cub. Selenium is widely distributed in small quantities, usually as selenides of heavy metals. It is obtained from the flue dusts of processes in which sulphide ores are used, and from the anode slimes in copper refining. It is used as a decoloriser for glass, in red glasses and enamels, and in photo-electric cells and rectifiers. Selenium is similar to sulphur in chemical properties, but resembles tellurium more closely still.

selenium cell. A photo-electric cell dependent for its action on the influence of light on the conductivity of selenium.

selenium glass (*Photog.*). A red-orange glass filter used in colour cinematography.

selenium halides (*Chem.*). Selenium has a greater affinity for the halogens than sulphur. Selenium fluoride, SeF_6, is the only hexahalide. Tetrahalides are known. No compounds with iodine.

sele'nodont (*Zool.*). Having cheek teeth with crescentic longitudinal ridges on the grinding surface.

selenog'raphy (*Astron.*). The description and delineation of the moon's surface; the science that treats of the moon in the way in which geography treats of the earth. (Greek *selênê*, moon.)

sele'nophone (*Acous.*). A system of photographically recording sound on paper, the track being reproduced by scanning with a focused slit, the modulated reflected light being received into a photo-electric cell.

self-actor mule (*Spinning*). An automatic spinning machine, used for making cotton or woollen yarns and dry-spun worsted yarns.

self-aligning ball-bearing (*Eng.*). A *ball-bearing* (q.v.) in which the two rows of balls roll between an inner race and a spherical surface in the outer race, thus allowing considerable shaft deviation from the normal.

self-annealing (*Met.*). A term applied to metals such as lead, tin, and zinc, which recrystallise at air temperature and in which little strain-hardening is produced by cold-working.

self-baking electrode (*Elec. Eng.*). An arc-furnace electrode in the form of a hollow tube, into which a paste-like electrode material is continuously fed as it becomes hard-baked and burns away in the furnace.

self-balance protection (*Elec. Eng.*). A method of protecting transformers and a.c. generators from internal faults, based on the fact that the instantaneous sum of the phase currents in a symmetrical three-phase system is always zero.

self-centring (or **universal**) **chuck** (*Eng.*). A lathe-chuck for cylindrical work in which the jaws are always maintained concentric by a scroll, or by radial screws driven by a ring gear operated by a key. See **scroll chuck.**

self-centring lathing (*Build.*). Expanded metal specially manufactured with raised ribs, greatly stiffening the sheet and enabling it to be used for lathing purposes with the minimum of framing. Also called STIFFENED EXPANDED METAL.

self-cleansing (*San. Eng.*). A term applied to a velocity of flow of sewage material sufficient to prevent deposition of solid matters.

self-coloured. Entirely of the same tint.

self-compatible (*Bot.*). Said of a plant forming reproductive organs which will function together ; self-fertile.

self-docking dock (*Civ. Eng.*). A floating dock built up in sections, so that any section can be unbolted and lifted up on to the remainder for repair or maintenance purposes.

self-excitation (*Elec. Eng.*). A form of machine excitation in which the supply to the field system is obtained either from the machine itself or from an auxiliary machine coupled to it.

self-excited oscillator (*Radio*). The normal form of oscillator, in which the excitation of the grid circuit is derived from the alternating current flowing in the anode circuit.

self-faced (*Masonry*). A term applied to stone, e.g. flagstone, which splits along natural cleavage planes, leaving faces which do not have to be dressed.

self-fertilisation (*Zool.*). In a hermaphrodite animal, impregnation of the female elements of an individual by its own male elements. Cf. *cross-fertilisation.*

self-hardening steel (*Met.*). Steel which hardens on cooling in air, i.e. does not require to be quenched in oil or water. The effect is produced by adding alloying elements which lower and retard the normal transformation from austenite to pearlite.

self-heterodyne (*Radio*). See **auto-heterodyne.**

self-incompatible (*Bot.*). Said of a plant producing reproductive organs which will not function together ; self-sterile.

self-induced e.m.f. (*Elec. Eng.*). The e.m.f. induced in an electric circuit as a result of a change in the current flowing in it.

self-inductance (*Elec. Eng.*). The property of a circuit whereby self-induction occurs. It is measured by the rate of change of linkages in a circuit accompanying a rate of change of current in that circuit of one unit per second. Also called INDUCTANCE, COEFFICIENT OF SELF-INDUCTION.

self-induction (*Elec. Eng.*). The property of an electric circuit by which it resists any change in the current flowing in the circuit.

self-oscillation (*Radio*). The generation of continuous oscillations by a regenerative receiver when the degree of reaction is increased beyond a certain limit.

self-pollination (*Bot.*). The transfer of pollen from the anthers to the stigmas of the same flower, or to the stigmas of another flower on the same plant, or to those of a flower on another plant of the same clone.

self-reading staff (*Surv.*). A type of levelling staff on which the graduations are such that the observer at the level may read the value at which his line of sight intersects the staff.

self-restoring coherer (*Radio*). A coherer in which the cohering contact reverts automatically to its original condition after the finish of a signal, without the aid of a decoherer; e.g. a mercury-carbon contact.

self-sealing condenser (*Elec. Comm.*). See **Mansbridge condenser.**

self-starter (*Automobiles*). A small electric motor, fed from the lighting battery, used for starting an automobile engine.

self-starting rotary convertor (*Elec. Eng.*). A synchronous convertor designed to start up from the a.c. supply as an induction motor, thus requiring no separate starting motor.

self-sterility (*Bot., Zool.*). In a hermaphrodite animal or plant, the condition in which self-fertilisation is impossible or ineffective.

self-synchronising (*Elec. Eng.*). A term applied to a synchronous machine that can be switched on to the a.c. supply without being in exact synchronism with it.

self-toning paper (*Photog.*). Printing-out paper having inherent toning qualities which render separate toning unnecessary for normal purposes.

self-winding watch (*Horol.*). A watch that winds itself whilst being worn; the winding may also be performed by the opening or shutting of the case.

selfing (*Bot.*). Pollination of a stigma from the anthers of the same flower or plant.

sella turcica (*Zool.*). In Vertebrates, a pocket in the floor of the chondrocranium in which the pituitary body comes to lie: in some *Crustacea*, part of the endoskeleton of certain posterior somites.

Sellers (or **U.S.S.**) **screw-thread** (*Eng.*). The United States standard thread, having a profile angle of 60°, and a flat crest formed by cutting off ⅛ of the thread height.

Sellmeier's dispersion formula, zel′mi-er (*Light*).

$$\mu^2 = 1 + C_1 \cdot \frac{\lambda^2}{\lambda^2 - \lambda_1^2} + C_2 \frac{\lambda^2}{\lambda^2 - \lambda_2^2} + \ldots$$

An expression giving the refractive index μ of a medium for light wavelength λ; λ_1, λ_2, etc. being the wavelengths of absorption bands in the medium, C_1 and C_2 being constants for a given medium. See **anomalous dispersion.**

Selma Chalk (*Geol.*). An argillaceous sandy limestone some 900 ft. thick, of Upper Senonian age, rich in foraminifera and lamellibranchs (*Exogyra*, as well as the aberrant form *Rudistes*), occurring in the coastal region of the southern U.S.A.

Selsyn motor (*Elec. Eng.*). A small self-synchronising motor (used for transmitting signals) which indicates the position of a switch or reproduces instrument indications at a distance.

sel′vedge (*Textiles*). The distinctive edge of a piece of cloth, generally ½ in. in width on both sides, but usually wider in expensive materials; it improves the appearance of the cloth and sometimes bears a woven trade-mark or name. Also called LISTING, LISTS.

semat′ic (*Zool.*). Warning; signalling; serving for warning or recognition, as *sematic colours*.

semeiol′ogy, sem-i— (*Med.*). The branch of medical science which is concerned with the symptoms of disease. (Greek *sēmeion*, sign.)

semeiot′ic (*Med.*). Pertaining to, or relating to, the symptoms and signs of disease.

se′men (*Zool.*). The fluid formed by the male reproductive organs in which the spermatozoa are suspended.—*adj.* **sem′inal.**

semi- (Latin *semi*, half). A prefix used in the construction of compound terms; e.g. *semitendinous*, half tendinous. In Botany, the prefix also signifies somewhat, more or less.

semi-amplex′icaul (*Bot.*). Said of a leaf base which half clasps the stem.

semi-apogamy (*Bot.*). A union of cells for reproductive purposes, when the cells are not of opposite sexes but when one at least of them is more or less gametic in nature.

semi-automatic (*Elec. Eng.*). Said of an electric control in which the initiation of an operating sequence is manually performed and the sequence of operations proceeds automatically.

semi-automatic exchange (*Teleph.*). An exchange in which the operators set up the desired connexions by means of remotely controlled switches.

semi-automatic tandem working (*Teleph.*). The system which employs a semi-automatic intermediate switching exchange to route calls from a manual exchange either to a manual or an automatic exchange.

semi-automatic telephone system (*Teleph.*). A telephone system in which the operators are assisted in setting up connexions for calls by remotely controlled switches.

semi-beam (*Struct.*). See **cantilever.**

semi-bungalow (*Build.*). A house with walls of only one-storey height, but with a room (or rooms) constructed in the roof space.

semicar′bazide (*Chem.*). $H_2N{\cdot}CO{\cdot}NH\,NH_2$, a base forming salts, e.g. hydrochloride. M.p. 96° C.; may be prepared from potassium cyanate and hydrazine hydrate. It reacts with aldehydes and ketones, forming *semicarbazones* (q.v.).

semicar′bazones (*Chem.*). The reaction products of aldehydes or ketones with semicarbazide. The two amino hydrogen atoms of the semicarbazide react with the carbonyl oxygen of the aldehydes or ketones, forming water, and the two molecular groups then combine to form the semicarbazone.

semi-cell (*Bot.*). One of the two halves of a cell of a desmid.

semicircular arch (*Civ. Eng.*). An arch describing half a circle.

semicircular canals (*Zool.*). In *Craniata*, the canals of the internal ear associated with the equilibristic function.

semicircular deviation (*Ships*). That component of the effect on a ship's compass of the permanent magnetism in the hull which becomes a maximum twice when the ship is rotated through 360°.

semi-closed slot (*Elec. Eng.*). A slot whose width narrows sharply at the top, necessitating the insertion of the conductors from the ends of the slot.

semi-coke (*Fuels*). See **coalite.**

semi-conductor (*Elec. Eng.*). A material having a resistivity which is high, but not high enough for it to be classed as an insulator.

semicyclic bonds (*Chem.*). The double linkage between a carbon atom in a ring and a carbon of a side chain. Such bonds occur frequently in terpene derivatives; they are stable under the influence of heat, but acids effect a migration of the double linkage.

semi-diameter (*Astron.*). Half the angular diameter of a celestial body; the measure always used in expressing the apparent size of bodies with discs, such as the sun and the moon.

semi-elliptic spring (*Automobiles*). A *carriage spring* (q.v.), so called because when a pair is used, one inverted and attached by its ends to the other, the arrangement resembles an ellipse.

semi-enclosed (*Elec. Eng.*). Said of electric motors in which ventilation is provided but access to live parts can only be obtained by opening the case.

semi-girder (*Struct.*). See **cantilever.**

semi-heterotypic division (*Cyt.*). The failure of completion of the first division in meiosis.

semi-immersed liquid-quenched fuse (*Elec. Eng.*). A liquid-quenched fuse in which the fuse link is above the liquid before operation but drawn down into it during or after fusion.

semi-indirect fitting (*Elec.Eng.*). A lighting fitting used for a semi-indirect lighting scheme; more than 60% and less than 90% of the light flux is emitted in the upper hemisphere.

semi-indirect lighting (*Illum.*). A method of illumination by means of translucent bowls surrounding lamps that have no reflectors.

semilu′nar, semilu′nate (*Bot., Zool.*). Crescent-shaped, or in the form of a half moon, as the Gasserian ganglion of Vertebrates.

semimetamorpho′sis (*Zool.*). In Insects, partial or direct metamorphosis in which a pupal stage is wanting and the immature stage is a nymph.

sem′inal receptacle (*Zool.*). See **vesicula seminalis.**

semi-natural vegetation (*Bot.*). Vegetation which is influenced in its occurrence and persistence by human agency, though not planted by man.

seminif′erous (*Bot.*). Seed-bearing.—(*Zool.*) Semen-producing or semen-carrying.

semino′ma (*Med.*). A malignant tumour of the testis arising from the germinal cells.

semiovip′arous (*Zool.*). Giving birth to imperfectly developed young, as marsupial Mammals.

semipal′mate (*Zool.*). Having the toes partially webbed.

semi-permeable membrane (*Chem.*). A membrane which permits the passage of solvent but is impermeable to dissolved substances.

semiplacen′ta (*Zool.*). A non-deciduate placenta in which only the foetal part is thrown off at birth. Cf. *placenta vera.*

semi-polar bond (*Chem.*). A bond in which a pair of electrons supplied by one atom is shared between it and another; both atoms thus become electrically charged and together constitute a dipole.

semi-porcelain (*Pot.*). A superior kind of earthenware, with hard, non-absorbent body.

semisteel (*Met.*). A term once commonly applied to castings made by mixing pig-iron and steel scrap; now rarely used. Admixture with steel scrap is now regarded as one of the methods of obtaining high-duty irons.

semistreptosty′lic (*Zool.*). Having a slightly movable articulation between the quadrate and the squamosal. Cf. ***streptostylic, monimostyly.***

semi-terete (*Bot.*). Half-cylindric.

semi-transparent mirror (*Photog.*). A mirror which partially reflects and partially transmits light-rays without appreciable diffusion.

semi-valence (*Chem.*). A singlet linkage.

semi-water gas (*Chem.*). A mixture of carbon monoxide, carbon dioxide, hydrogen, and nitrogen obtained by passing a mixture of air and steam continuously through incandescent coke. Its calorific value is low, about 125 B.Th.U. per cu. ft.

Semper's rib (*Zool.*). In *Lepidoptera*, a degenerate trachea accompanying the ordinary trachea within the cavity of some of the wing-nervures.

sempervi′rent (*Bot.*). Evergreen.

senarmon′tite (*Min.*). The trioxide of antimony, crystallising in the cubic system.

sender (*Elec. Comm.*). A radio transmitting station for broadcasting.—(*Auto. Teleph.*) The same as *keysender.*

sending end (*Elec. Eng.*). The end of a transmission line from which electrical energy is sent out.

Sen′ecan Stage (*Geol.*). The lower division of the Upper Devonian of N. America; it includes the Portage, Ithaca, and Oneonta Groups.

Senegal gum (*Chem.*). See **gum arabic.**

senes′cent (*Biol.*). Said of that period in the life-history of an individual when its powers are declining prior to death.

senil′ity (*Biol.*). Condition of vital exhaustion or degeneration due to racial or individual old age.

Senni Beds (*Geol.*). A series of sage-green and dull-red micaceous sandstones containing the remains of fossil fishes. They occur between the typical Dittonian Red Marls and the overlying Brownstones in the Old Red Sandstone of the westerly parts of South Wales.

Seno′nian (*Geol.*). The name given to the highest of the three stages into which the British Chalk is divided; equivalent to Upper Chalk of Britain, but succeeded by the Danian stage in Denmark.

sensation (*Psychol.*). An awareness in consciousness of a physical experience.

sensation area (*Acous.*). See **auditory sensation area.**

sensation curves (*Photog.*). Curves which give the relative response of the eye to different colours having the same intensity.

sensation level (*Acous.*). The difference in level of a single-frequency sound, as applied to the ear, from the level which is just audible at the same frequency. The number of decibels a single frequency note has to be attenuated before it becomes just inaudible.

sensation unit (*Acous.*). The former name of the *decibel*; so called because it was erroneously thought that the subjective loudness scale of the ear is approximately logarithmic.

sense (*Radio*). The relative progression along a line, e.g. up or down, left or right, the line not in itself giving this information, which is indicated by an arrow. In radio direction-finding, in which the direction of arrival of a radio-wave is ascertained by directive antennae, the sense of the direction as determined by a simple loop, frame, or Adcock antenna is indeterminate, but it is readily determined by injecting an additional electromotive force depending on the arriving wave and derived from a simple elevated aerial.

sense dome (*Zool.*). In Insects, a campaniform sensilla.

sense-hillocks (*Zool.*). See **neuromasts.**

sense organ (*Bot., Zool.*). A structure specially adapted for the reception of stimuli.

sensibility (*Bot.*). The condition of a plant of being liable to parasitic attack.

sensible horizon (*Surv.*). See **visible horizon.**

sensif′erous, sensig′erous (*Zool.*). Sensitive.

sensil′la (*Zool.*). A small sensory structure.

sensitisa′tion (*Chem.*). The process by which a sol of a lyophilic colloid becomes lyophobic in character, with the result that it may readily be coagulated by electrolytes.

sensitiser (*Chem.*). A substance, other than the catalyst, whose presence facilitates the start of a catalytic reaction.

sensitisers (*Photog.*). Chemicals, usually dyes, used to increase the sensitivity of photographic emulsions, generally or to specific colours. The subsequent exposure is with the dried plate or film, but may be wet.

sensitive (*Zool.*). Capable of receiving stimuli.

sensitive drill (*Eng.*). A small drilling machine in which the drill is fed into the work by a hand-lever attached directly to the drilling spindle, the operator being thus given sensitive control of the rate of drilling.

sensitive flame (*Phys.*). A gas flame which changes its height or shape when sound-waves fall on it. The simplest type, in which the gas, issuing from a fine orifice, burns with a tall narrow flame, is sensitive to very high-pitched sounds, which cause the flame to shorten and roar.

sensitivity (*Elec. Eng.*). The change in deflection of an instrument per unit torque applied.

sensitom′eter, colour (*Photog.*). See **Abney colour sensitometer.**

sensitomet'ric wedge (*Photog*). A wedge having graduated degrees of attenuation for neutral grey transmission; used for attenuating unknown brightnesses to a standard brightness.

sensitom'etry (*Photog.*). The measurement of the response of light-sensitive emulsions to incident light with suitable processing, involving the accurate measurement of density.

senso'rium (*Zool.*). The seat of sensation; the nervous system.—*adj.* **senso'rial.**

sensory (*Zool.*). Directly connected with the sensorium: pertaining to, or serving, the senses.

sentiment (*Psycho-an.*). A psychological constellation formed when instinctive emotions become attached to objects, ideas, persons, etc., in the environment; e.g. the sentiment of patriotism formed around ideas and feelings about a country or nation.

sentinel pile (*Med.*). An oedematous mass of rolled-up anal mucosa situated at the margin of the anus at the lower end of an anal fissure.

sepal (*Bot.*). One of the leaf-like members forming the calyx of a flower.

sep'aline (*Bot.*). Of the nature of a sepal.

sep'alody (*Bot*). An abnormal condition shown by the conversion of some other member of a flower into a sepal.

sep'aloid (*Bot.*). Resembling a sepal.

separable, separating (*Bot.*). Becoming detached in the normal course of events.

separate excitation (*Elec. Eng.*). A form of machine excitation in which the supply to the field system is obtained from a separate direct-current source.

separate-lead-type cable (*Cables*). See **S.L.-type cable.**

separate system (*Sewage*). A system of sewerage in which two sewers are provided in every street, one for the sewage proper, and the other for the rain water. Cf. *combined system.*

separating calorimeter (*Eng.*). A device for mechanically separating and measuring the water associated with very wet steam; used in conjunction with the *throttling calorimeter* (q.v.) in determining dryness fractions.

separating drum (*Eng.*). An auxiliary steam-collecting drum attached by tubes to the upper drum of some water-tube boilers to avoid priming or foaming.

separating weir (*Civ. Eng.*). See **leaping weir.**

separation (*Bot.*). The liberation of a reproductive body from the parent plant.

separation disc (*Bot.*). A biconcave disc of intercellular material, found here and there between the cells of a filament of a blue-green alga, and assisting in the break-up of the filament to form hormogones.

separation doors (*Mining*). Underground ventilating doors between the intake and the return air ways.

separation layer (*Bot.*). See **absciss layer.**

separation of losses (*Elec. Eng.*). The itemising of the individual losses from the combined losses obtained during the testing of an electrical machine.

separator (*Civ. Eng.*). A distance piece, usually of steel or cast-iron, bolted between the webs of parallel side-by-side steel joists to give rigidity and ensure unity of action.

separator (*Elec. Eng.*). A thin sheet of wood or perforated celluloid separating the plates of a secondary cell.

separator (*Mining*). A machine for separating valuable minerals from one another, e.g. magnetically. A *concentrator* separates valuable minerals from gangue or country rock.

separator circuit (*Television*). A circuit, generally employing saturated valves, for separating the line and frame synchronising signals from the picture signal and from each other.

separator valve (*Radio*). An amplifying valve interposed between an oscillator valve and the modulated stages, to prevent the changes of load conditions of the latter from affecting the frequency of the oscillator.

sepia print (*Cinema.*). A release print in which the image is dyed sepia instead of being left black.

se'piolite (*Min.*). See **meerschaum.**

sepsis (*Med.*). The invasion of bodily tissue by non-specific pathogenic bacteria.—*adj.* **septic.**

sept-, septi-, septo-. Prefixes used in the construction of compound terms.—(1) Latin *septum,* partition; e.g. *septonasal,* pertaining to the septum of the nose.—(2) Latin *septem,* seven; e.g. *septavalent* (q.v.).—(3) Greek *sēptos,* rotten; e.g. *septicaemia* (q.v.).

septal neck (*Zool.*). In some *Cephalopoda* having a chambered shell, a tubular extension of a septum supporting the siphuncle.

septa'ria, septa'rian nodules (*Geol.*). Concretionary nodules containing irregular cracks which have been filled with calcite or other minerals.

sep'tate (*Bot.*). (1) Divided into cells or compartments by walls (fungal spores and hyphae, algal filaments).—(2) Divided into two or more chambers by partitions (ovaries of flowering plants).

septate fibre (*Bot.*). A fibre of which the lumen is divided into several compartments by transverse septa.

septation (*Bot.*). The division of a plant member into separate parts by walls (usually transverse).

septava'lent (*Chem.*). See **heptavalent.**

sep'temfid (*Bot.*). Deeply divided into seven parts.

sep'tenate (*Bot.*). Having parts in sevens.

Septibran'chia (*Zool.*). An order of specialised marine *Pelecypoda* in which the gills have been transformed into a horizontal muscular septum, which surrounds and is continuous with the foot and cuts off an upper respiratory chamber from the mantle-cavity; this septum is pierced by paired orifices, and by its contraction pumps water through the respiratory chamber; the byssus gland is rudimentary or absent. Carnivorous or carrion-feeding forms living in deep water.

septic tank (*Sewage*). A tank in which sewage is left for about 24 hours, during which time a scum forms on the surface and the sewage below is to some extent purified by the action of the anaerobic bacteria functioning in the absence of oxygen.

septicae'mia, septice'mia (*Med.*). The invasion of the blood-stream by bacteria and their multiplication therein; associated with high fever, chills, and petechial haemorrhages into the skin.—*adj.* **septicae'mic.**

septicaemia, apoplect'iform (*Vet.*). See **spirochaetosis (avian).**

septicaemia, haemorrha'gic (*Vet.*). See **pasteurellosis.**

septici'dal (*Bot.*). Said of the manner of dehiscence of a fruit composed of several compartments when the split forms through the middle of the partitions.

septicopyae'mia, septicopye'mia (*Med.*). Combined septicaemia and pyaemia.

septifra'gal (*Bot.*). Said of the manner of dehiscence of a fruit when the outer walls of the carpels break away from the partitions.

septum (*Bot.*). (1) A transverse wall in a fungal hypha, an algal filament, or a spore.—(2) A wall between one cell and another.—(3) The partition between two neighbouring chambers of an ovary.—(*Zool.*) A partition separating two cavities.—*adj.* **septal.**

septum (*Photog.*). A dividing piece in a beam-splitting camera, to avoid interference between the two beams because of contiguity of the lenses.

septum transver'sum (*Zool.*). See **diaphragm.**

sequence (*Cinema.*). The unit of the scenario, involving one general idea or happening and a number of scenes, each of which may include a number of shots.

sequence (*Elec. Eng.*). The order in which the several phases of a polyphase alternating-current supply undergo their cyclic variation of e.m.f.

sequence switch (*Auto. Teleph.*). A rotary switch for making complicated circuit changes in a prescribed order.

sequential scanning (*Television*). Scanning in which the spot traverses each line in the same direction, returning rapidly from the end of one line to the beginning of the next. Cf. *oscillatory scanning*

sequestrec'tomy (*Surg.*). The surgical removal of a sequestrum.

seques'trum (*Med.*). A piece of bone dead as a result of infection and separated off from healthy bone.

se'ral community (*Bot.*). Any plant community which is not stabilised, but represents a stage in a succession.

sere (*Bot.*). A series of plant communities making up a succession.

serein, se-ran^{g}' (*Meteor.*). The rare phenomenon of rainfall out of an apparently clear sky.

serge (*Textiles*). Dress and suiting fabrics, generally of twill weave, made from crossbred types of wool spun on the worsted system; also made with worsted warp and woollen weft, and with cotton warp and worsted weft.

serial bud (*Bot.*). A supernumerary bud lying to the side of the axillary bud.

ser'iate (*Bot.*). Arranged in a row.

sericeous, ser-ish'us (*Bot.*). Having a silky sheen.

ser'icite (*Min.*). A white potash-mica, like muscovite in chemical composition and general characters but occurring as a secondary mineral, often as a decomposition product of orthoclase.

series (*Elec. Eng.*). A *series* connexion of two or more electric circuits is one in which the same current traverses all the circuits. They are said to be connected *in series.*

series arm (*Elec. Comm.*). That arm of a wave-filter which is in series with one leg of the transmission circuit.

series capacitor (*Elec. Eng.*). A capacitor connected in series with a transmission line or distribution circuit in order to compensate for the inductive reactance drop and thereby improve the regulation.

series characteristic (*Elec. Eng.*). The characteristic graph relating terminal voltage and load current in the case of a series-wound direct-current machine.

series-characteristic motor (*Elec. Eng.*). An electric motor having a speed torque characteristic similar to that of a d.c. series motor, i.e. one in which the speed falls with an increase of torque.

series field (*Elec. Eng.*). The main field winding of a motor when series connected.

series, Fourier (*Phys., etc.*). See **Fourier series.**

series-gap condenser (*Radio*). Two variable vane condensers, usually with air dielectric, with the moving vanes on the same rotating shaft; used in high-frequency circuits with the two capacitances in series, to obviate taking the current through a rubbing contact or through a pigtail, the latter being inductive.

series modulation (*Radio*). A form of anode modulation in which the modulator and the modulated amplifier valves are connected directly in series, to eliminate the necessity for a modulation transformer or choke coupling.

series motor (*Elec. Eng.*). An electric motor whose main excitation is derived from a series field winding.

series-parallel controller (*Elec. Eng.*). A method of controlling the speed and tractive effort of an electric tractor having one or more pairs of series motors, whereby the motors can be connected either in series or in parallel.

series-parallel winding (*Elec. Eng.*). The same as *multiplex winding*

series regulator (*Elec. Eng.*). A regulating resistance connected in the main circuit of an electric motor.

series, spectral (*Light*). See **spectral series.**

series system (*Elec. Eng.*) The constant current system of d.c. distribution developed by Thury, in which generators and motors are all connected in series to form a single d.c. circuit. Also called THURY SYSTEM.

series transformer (*Elec. Eng.*). A power transformer operating under constant-current instead of constant-voltage conditions. See also **current transformer.**

series winding (*Elec. Eng.*). A field winding connected in series with the armature of the motor.

ser'if (*Typog.*). The short lines at right-angles to, or set across, the beginning and end of a type letter.

ser'ine (*Chem.*). $CH_2OH{\cdot}CH(NH_2)\,COOH$, α-amino-β-hydroxypropionic acid, obtained by the hydrolysis of various proteins.

sero-. Prefix indicating association with *serum* (q.v.).

sero-amniotic connexion (*Zool.*). In a developing embryo of a higher Vertebrate, the point of union between the serous membrane, or chorion, and the amnion.

ser'ophyte (*Med.*). Any micro-organism which will grow in the presence of fresh serum exuding into a wound, such as the streptococcus and the staphylococcus.

seropu'rulent (*Med.*). Said of a discharge or effusion which is both serous and purulent.

se'ropus (*Med.*). Serum mixed with pus.

sero'sa (*Zool.*). See **serous membrane.**

serosi'tis (*Med.*). Inflammation of a serous membrane.

serother'apy (*Med.*). The curative or preventive treatment of disease by the injection into the body of animal or human serums which contain antibodies to the bacteria or toxins causing the disease.

seroti'nal, seroti'nous (*Bot.*). Appearing late in the year.

serous (*Zool.*). Watery: pertaining to, producing, or containing a watery fluid or serum.

serous membrane or **serosa** (*Zool.*). One of the delicate membranes of connective tissue which line the internal cavities of the body in *Craniata*; the chorion.

ser'pentine (*Geol.*). The general name applied to basic and ultrabasic igneous rocks which, as a result of autometamorphism, have had their coloured silicates converted in large measure into serpentine. Such serpentines are usually dark green, streaked and blotched with red iron oxide, whitish talc, etc.

serpentine (*Min.*). A hydrated silicate of magnesium which crystallises in the monoclinic system, but as pseudomorphs only. It is always of secondary origin. The translucent varieties are used for ornamental purposes; those with a fibrous habit are called asbestos. See **asbestos, chrysotile.**

serpentine-jade (*Min.*). A variety of the mineral serpentine, resembling bowenite, occurring in China; used as an ornamental stone.

serpentinisa'tion (*Geol.*). A type of autometamorphism effected by magmatic water, which results in the replacement of the original mafic silicates by the mineral serpentine (bastite, chrysotile) and secondary fibrous amphibole (tremolite, actinolite).

Serpollet boiler, ser-pol'ā (*Eng.*). A *flash boiler* (q.v.) used in the early Serpollet steam cars.

Ser'pulite Grit (*Geol.*). A minor subdivision of the Eriboll Quartzite of Cambrian age in the North-West Highlands of Scotland, characterised by the occurrence of the organism *Serpulites*, by some geologists regarded as a very primitive nautiloid cephalopod, by others as merely a segmented worm.

serrate (*Bot.*). Said of a toothed margin when the teeth are sharp, like those of a saw, and pointing forwards.—(*Zool.*) Saw-like, notched; as *serrate antennae*.

serratu'late, ser'rulate (*Bot.*). Minutely serrate.

serra'tus magnus (*Zool.*). In higher Vertebrates, a muscle connecting the scapula with the anterior ribs.

ser'ricorn (*Zool.*). Having serrate antennae.

ser'rula (*Zool.*). A comb-like ridge on the chelicerae of *Chelonethi*.

Serto'li cells (*Zool.*). Enlarged lining epithelium cells of the seminiferous tubules of higher Vertebrates, associated with groups of developing spermatozoa.

se'rum (*Med., Zool.*). A watery secretion: the watery fluid which separates from blood in coagulation.—*adj.* **se'rous.**

serum albu'min (*Chem.*). An albumin obtained from blood and nutritive fluids. A crystalline, water-soluble substance, which is not precipitated by NaCl, but coagulates at 70°-75° C.

serum sickness (*Med.*). The reaction that sometimes occurs about eight days after the therapeutic injection of serum; characterised by slight temperature, urticaria, and pain in, and swelling of, joints.

Serval (*Build.*). Trade-name of a sarking felt made of asbestos fibre soaked with bitumen.

serval (*Furs*). The dressed skin of an African wildcat; the fur is yellow with black spots, and the tail ringed.

service area (*Radio*). That area surrounding a broadcast transmitter where the signal strength is sufficiently above the interference-level to be of entertainment value.

See **A—** **B—** **C—**

service call (*Teleph.*). A telephone call made by a linesman or operator during the testing of circuits, or for service messages.

service capacity (*Elec. Eng.*). The power output of an electric motor, as specified on the maker's nameplate.

service ceiling (*Aero.*). See **ceiling (service).**

service ell (*Plumb.*). An ell having a male thread at one end.

service, grade of (*Auto. Teleph.*). See **grade of service.**

service mains (*Elec. Eng.*). Cables of small conductor cross-section which lead the current from a distributor to the consumer's premises.

service pipe (*Civ. Eng.*). A branch pipe drawing supplies from a main. Also called **supply pipe.**

service reservoir (*Hyd. Eng.*). A small reservoir supplying a given district, and capable of storing the water which is filtered during the hours of small demand for use when the requirements become greater. Also called DISTRIBUTION RESERVOIR, CLEAR WATER RESERVOIR.

service tanks (*Aero.*). See under **fuel tanks.**

service tee (*Plumb.*). A tee having a female thread on the branch and one end of the run and a male thread on the other end of the run.

service value (*Elec. Eng.*). A term describing the overall efficiency of an electric fan; defined as the number of cubic feet of air moved per minute per watt of input.

serving (*Cables*). (1) A layer of jute, tape, or yarn, impregnated with bitumen or similar substance, to protect the lead sheath or wire-armouring.—(2) The process of covering a cable with some form of mechanically strong insulating and binding tape.

serving hatch (*Build.*). An opening, fitted with a door, in the wall between a kitchen and a dining-room, through which dishes, etc. for a meal may be passed to facilitate serving.

servo control (*Aero.*). An additional mechanism to reinforce or replace the pilot's effort in working the controls of an aeroplane. It may be actuated either by aerodynamic or mechanical relay forces, or by combinations of both.

servomotor (*Eng.*). A device for magnifying a relatively small effort, usually by hydraulic means; e.g. for providing a large force for operating a governor-controlled valve by a governor of small power. See **pilot valve.**—(*Elec. Eng.*) A mechanical relay of the hydraulic type, much used in electric control apparatus. Also called RELAY.

ses'amoid (*Bot.*). Granular.—(*Zool.*) A small rounded ossification forming part of a tendon, usually at, or near, a joint; as the patella.

sesqui- (*Chem.*). Containing two kinds of atom, radical, etc. in the proportions of 2 : 3.

sesquiter'penes (*Chem.*). A group of terpene derivatives of the empirical formula $C_{15}H_{24}$.

ses'sile (*Bot.*). (1) Having no stalk.—(2) Fixed and stationary.

sessile benthos (*Bot.*). Plants growing attached at the bottom of water.

session (*Acous.*). During the recording of gramophone records, or in broadcasting or rehearsals, a continuous period during which there may be a number of repetitions of performance.

seston (*Biol., Ocean.*). Very small plankton organisms which are retained only by the finest nets.

set (*Carp.*). See **nail punch.**

set (*Cinema.*). In a motion-picture studio, the construction specially designed and used as the background for the action of the artists. The walls of the set are generally large standardised flats, covered with hessian canvas; they may be mounted on ladders, for facilitating the movements of electricians, or they may be hung by ropes from the roof of the studio. The set may represent a simple interior, or a whole town built in the open on the lot.

set or **sett** (*Eng.*). See **cold sett.**

set (*Hyd. Eng.*). The direction of a current of water.

set (*Mining*). (1) A frame of timber used in a shaft or tunnel.—(2) A section of a leased mining area in Cornwall.

set (*Plast.*). See **setting coat.**

set (*Typog., etc.*). (1) The width of a type character.—(2) To *compose* (q.v.) type-matter.

set (*Weaving*). See **sett.**

set-hands dial (*Horol.*). A small dial on a turret clock movement the hands of which read the same as the main dial. Used in regulating the clock.

set-hands square (*Horol.*). The square for setting the hands of a key-wound watch.

set noise (*Radio*). Interfering noise which arises in the receiver itself, such as Johnson noise, shot noise, and mains hum.

set of chromosomes (*Cyt.*). A group of chromosomes consisting of one each of the various kinds of chromosomes contained in the nucleus of the gamete.

set-off (*Build.*). *Offset* (q.v.).

set-off (*Typog.*). The smudging of ink from one printed sheet to another, as a result of the ink not being dry. 'Set-off paper' is sometimes placed between the sheets to obviate this.

set-off blanket (*Print.*). In the lithographic offset process the design is transferred from the plate to the rubber *set-off blanket*, which in turn prints it upon the paper.

set, subscriber's (*Teleph.*). See **subset.**

set-up instrument, set-up-scale instrument, set-up-zero instrument (*Elec. Eng.*). See **suppressed-zero instrument.**

set-work (*Plast.*). Two-coat plasterwork on lath.

se'ta (*Bot.*). (1) A single elongated cell or row of cells, with scanty colourless contents, found in some algae.—(2) A long hollow outgrowth from the cell wall.—(3) A thick walled unicellular structure found among the asci in some *Ascomycetes*.—(4) The multicellular stalk which bears the capsule of mosses and liverworts.—(5) A slender, straight prickle.—(6) A bristle.—(*Zool.*) A small bristle-like structure; a chaeta.—*adjs.* **seta'ceous, setif'erous, setig'erous, set'iform, se'tose, set'ulose.**

setigerous sac, se-tij'— (*Zool.*). See **chaeta sac.**

se'ton (*Vet.*). A strip of linen or tape drawn through an incision in the skin, to serve as a counter-irritant or to promote drainage of an abscess.

se'tose (*Bot., Zool.*). Bristly.

sett (*Civ. Eng.*). A kind of *follower* (q.v.) used where a pile has been driven in beyond the immediate reach of the monkey.

sett (*Civ. Eng.*). A small rectangular block of stone 6 in. deep by 3-4 in. wide and from 6-9 in. long; sometimes used for surfacing roads where the traffic is heavy. The best setts are of either Scotch or Welsh granite, although sandstone and whinstone are frequently used.

sett or **set** (*Weaving*). The count or number of a reed, which determines the ends per inch in a fabric.

sett systems (*Textiles*). Systems for arranging, or for expressing, the fineness of cloths, i.e. the number of ends or threads per inch. Systems vary, but fundamentally they are all concerned with the number of ends per inch in a fabric. Better known as REED-COUNTING SYSTEMS.

setter (*Acous.*). On an organ console, a thumb piston under a manual, for setting up temporary stop combinations on the combination pistons.

setting (*Astron.*). See under **rising.**

setting (*Build.*). The name given to the hardening of a lime, cement, mortar, or concrete mixture, or a plaster.

setting (*Furs*). The process of brushing water, etc. on fur to make hairs lie in position.

setting and lustring (*Textiles*). Different processes of finishing by which woollen and worsted fabrics are set and their appearance enhanced. The processes, which may be applied at various stages of finishing, all involve the application of moisture and heat while the fabrics are under tension. See **crabbing, decatising, dry blowing, roll boiling.**

setting coat or **set** (*Plast.*). The finishing coat of plaster—a thin layer, about ⅛ in. thick, of fine stuff.

setting-out (*Leather*). A mechanical process for removing creases and marks from leather, which is stretched out in a wet condition.

setting point (*Chem.*). (1) The temperature at which an oil just ceases to flow when submitted to a pressure equal to a head of 5 cm. of water under defined conditions.—(2) The temperature at which a melted wax, when allowed to cool under definite specified conditions, first shows the minimum rate of temperature change.

setting-point test (*Lubricants*). A test made to ascertain the temperature at which an oil will cease to flow; used in order to determine suitability for use at low temperatures, e.g. in refrigerating machines.

setting rule (*Typog.*). A brass rule with a projecting nose-piece, used by the compositor to facilitate setting up type-matter in the composing stick. See **composing rule.**

setting stick (*Typog.*). A *composing stick* (q.v.).

settlement (*Build., Civ. Eng.*). The subsidence of a wall, structure, etc.

settling tank (*Sewage*). A sedimentation tank.

severy (*Arch.*). See **civery.**

sewage (*San. Eng.*). The drainage and excrementitious matter conveyed in sewers.

sewage farm (*San. Eng.*). A farm on which sewage (especially sewage conveyed from a town) is used as a manure. See **land treatment.**

sewage (or sludge) gas (*Fuels*). A self-generated combustible gas collected from the digesting tanks of sewage sludge. General composition: 66% CH_4 and 33% CO_2, with calorific values ranging from 650 to 750 B.T.U. per cu. ft. The gas has a very slow rate of flame propagation.

sewer (*San. Eng.*). A pipe or closed channel for the conveyance of sewage and surface waters from towns to a place of disposal.

sewing (*Bind.*). The operation of joining the gathered sections of a book by sewing.

sewround (*Shoes*). The term for a single-sole shoe in which the upper and the sole are sewn together by a horizontal seam while the shoe is turned inside out; used for slippers and dancing-shoes. Also called TURNSHOE.

sex- (Latin *sex*, six). A prefix used in the construction of compound terms; e.g. *sex-digitate*, having six digits.

sex (*Biol.*). The sum-total of the characteristics, structural and functional, which distinguish male and female organisms, especially with regard to the part played in reproduction: to determine the sex of a specimen.—*adj.* **sexual.**

sex cells (*Biol.*). See **gametes.**

sex chromosome (*Cyt.*). The chromosome which is responsible for the initial determination of sex. Cf. *autosome*.

sex determination (*Zool.*). The phenomena occurring prior to, and during, the development of an individual which lead to the establishment of its sex.

sex gland (*Zool.*). See **gonad.**

sex-intergrade (*Bot.*). A plant bearing staminate and pistillate flowers, but belonging to a species of which the members are normally dioecious.

sex-limited character (*Bot., Zool.*). A character developed only by individuals which belong to one sex.

sex-linked (*Gen.*). Said of hereditary characteristics borne by the sex chromosome.

sex mosaic (*Zool.*). An individual showing characteristics of both sexes; an intersex.

sex ratio (*Zool.*). The ratio of males to females.

sex reversal (*Zool.*). The gradual change of the sexual characters of an individual, during its lifetime, from male to female or vice versa; as in Crabs parasitised by *Sacculina*.

sex transformation (*Zool.*). See **sex reversal.**

sexan'gular (*Bot.*). Having six angles.

sexfa'rious (*Bot.*). In six rows.

sexiva'lent (*Chem.*). See **hexavalent.**

sexpar'tite (*Bot.*). Divided deeply into six lobes or segments.

sextant (*Surv., etc.*). A reflecting instrument in the form of a quadrant, for measuring angles up to about 120°. It consists essentially of two mirrors: a fixed *horizon glass*, half silvered and half plain glass, and a movable *index glass*, to which is attached an arm moving over a scale graduated to read degrees directly. The index glass reflects an image of one signal, or body, into the silvered part of the horizon glass, and this image is brought into coincidence with the other signal or body as seen through the plain part of the same glass. The sextant is used chiefly for measuring the altitude of the sun at sea, the reflected image of the sun being made to touch the visible horizon.

sextodec'imo (*Print.*). See **sixteenmo.**

sexual cell (*Biol.*). A male or female germ-cell.

sexual coloration (*Zool.*). Characteristic colour difference between the sexes, especially marked at the breeding season.

sexual dimor'phism (*Bot., Zool.*). Structural differences between the males and females of a species, especially differences in superficial characters, such as colour.

sexual organs (*Zool.*). The gonads and their accessory structures; reproductive system.

sexual reproduction (*Bot., Zool.*). The union of gametes or of gametic nuclei, preceding the formation of a new individual.

sexual selection (*Zool.*). A phase of natural selection, based on the struggle for mating, by which some authorities have attempted to explain the existence of the secondary sexual characteristics.

S.F. (*Masonry*). Abbrev. for *sunk face.*

sgraffito or **graffito,** (z)gra-fē'to (*Dec., Pot., etc.*) A mode of surface decoration in which two finishing coats of contrasting colours are applied, one on top of the other. Before the upper one has set, parts are removed according to some design, thus exposing the coat below.

shackle insulator (*Elec. Eng.*). A porcelain insulator whose ends are secured to metal shackles.

shackler (*Mining*). A person employed to couple and uncouple trains of trams on a double forking.

shade (*Paint.*). A gradation of colour.

shade (*Surv.*). A disc of coloured glass capable of being moved into a position across the line of sight of a surveying instrument when the latter is being used for solar observations.

shade chomophyte (*Bot.*). A plant inhabiting shaded rock crevices.

shade plant (*Bot.*). (1) A plant which flourishes only, or grows best, in shade.—(2) A quick-growing plant which is grown to afford shade to crops, and removed when these no longer need protection.

shaded-pole (*Elec. Eng.*). A term applied to the magnet system of induction-type indicating instruments, in which one pole is surrounded by a heavy copper ring.

shadow (*Light*). The shadow of an obstacle cast by a point source of light is the geometrical projection of the obstacle, except for small-scale diffraction effects at the edge. If the source of light is extended, as is the sun or moon, the central dark portion or umbra is surrounded by a lighter diffuse region, called the *penumbra*, where light is received from only a part of the source.

shadow bands (*Astron.*). A phenomenon sometimes occurring just before totality in a solar eclipse, in which parallel striations of light and shade are seen moving rapidly perpendicularly to their length; it is due to the corrugations introduced into the nearby plane wave of light from the sun by irregularities in the earth's atmosphere.

shadow photometer (*Light*). See **Rumford's photometer.**

shadow scratch (*Cinema.*). Defect in a recorded sound-track, similar in appearance to optical scratch.

shadow stripes (*Textiles*). Cotton cloths, of plain or satin weave, in which stripes are produced by using warp yarns of different directions of twist. The shadow effect is due to light being reflected in different directions by the different twists.

shadow test (*Med.*). See **retinoscopy.**

shaft (*Arch.*). The principal portion of a column, between the capital and the base.

shaft (*Civ. Eng., Mining*). A passage, usually vertical, leading from ground-level into an underground excavation, for purposes of ventilation, access, etc.

shaft (*Zool.*). The part of a hair distal to the root: the straight cylindrical part of a long limb bone: the rachis, or distal solid part of the scapus of a feather.

shaft cable (*Mining*). A specially armoured cable of great mechanical strength running down the shaft of a mine.

shaft governor (*Eng.*). A compact type of spring-loaded governor used for controlling the speed of small oil engines, etc.; it is arranged to rotate about the crankshaft axis, and is sometimes housed in the flywheel. See **spring-loaded governor.**

shaft pillar (*Mining*). The area of coal or ore left unworked round the bottom of a shaft or pit for support.

shafting (*Eng.*). See **line shafting.**

shafty wool (*Textiles*). Wool that is dense, of good length, and well grown.

shag (*Textiles*). A nap of long, coarse character on certain types of woollen fabrics.

shaggy (*Bot.*). Covered with long weak hairs.

shagreen' (*Leather*). Leather made from the belly part of a shark skin.

shake (*Horol.*). Side play, as applied to the clearance between a pivot and its hole.—END-SHAKE, the movement between the shoulders of an arbor and its plates, or between the ends of a staff and its end stones.

shake (*Mining*). A cave in limestone: in a coal-mine, a vertical crack in the seam and roof.

shake (*Timber*). A partial or complete separation between adjacent layers of fibres.

shaker patterns (*Hosiery*). See **racked.**

shaking grate (*Eng.*). A grate for a hand-fired boiler furnace in which the pivotally supported fire-bars can be rocked by hand levers in order to break up clinker.

shaking palsy (*Med.*). See **paralysis agitans.**

shale (*Geol.*). A consolidated clay-rock which possesses definite lamination. Cf. *mudstone.* See also **oil-shale.**

shale oils (*Fuels*). Oils obtained by the carbonisation of oil shales, of which the Scottish oil shales form the most important group in Great Britain; the calorific value is lower than that of petroleum oils.

shalloon' (*Textiles*). A woollen fabric of twill weave, usually dyed a dark colour; used for coat lining.

shallow well (*Civ. Eng.*). A shaft sunk nearly to the bottom of a superficial permeable stratum in order to tap the waters in it.

shaly sandstone (*Mining*). *Blaes* (q.v.).

shamal, shah'mal (*Meteor.*). The summer north-west wind in the plain of Mesopotamia.

shank (*Build.*). (1) The shaft of a column, pillar, etc.—(2) The shaft of a tool, connecting the head and the handle.

shantung' (*Textiles*). A plain silk cloth of light brown colour, with a rough surface; made from tussah, the silk produced by the wild silkworm.

Shap Granite (*Geol.*). A well-known granite occurring on Shap Fell in the Lake District of England. Much quarried as a valuable building-stone, distinctive in appearance by reason of the abundant pink phenocrysts of alkali-feldspar which it contains. A valuable indicator of the directions of ice movement in northern England.

Shap Rhyolite Group (*Geol.*). A division of the great Borrowdale Volcanic Series of the Lake District of England, occurring high up in the series and consisting essentially of rhyolitic flows.

shaped-conductor cable (*Elec. Eng.*). A three-phase cable in which the conducting cores are specially shaped so as to give the best utilisation of the total available cross-section of the cable.

shaper rail (*Cotton Spinning*). See **copping rail.**

shaper tools (*Eng.*). Cutting tools similar to those used on planing machines, and similarly supported in a clapper box.

shaping machine (*Eng.*). A machine tool for producing small flat surfaces, slots, etc. It consists of a reciprocating ram carrying the tool horizontally in guide ways, and driven by a *quick return* (q.v.) mechanism. Either the tool or the table may be capable of traverse.

share (*Agric. Mach.*). A pointed wedge-shaped implement of cast-iron or steel which is fixed on the front part of the breast of a plough. It makes the horizontal cut that separates the furrow slice from the undersoil. See **coulter.**

shared-channel broadcasting (*Radio*). See **common-frequency broadcasting.**

sharp (*Build., Civ. Eng.*). Said of sand the grains of which are angular, not rounded.

sharp (*Paint.*) Said of oil paint which contains a large proportion of turpentine.

sharp-bend (*Elec. Eng.*). In electrical installation work, a bend of short radius for joining two lengths of steel conduit which are at 90°.

sharp-edged orifice (*Eng.*). A circular orifice cut in a thin plate; placed in a pipe, or the wall of an air-box, to measure the flow of air or gas.

sharp flutings (*Build.*). Flutings which are so close together as to form sharp arrises.

sharp mouth (*Vet.*) See **mouth (sharp).**

Sharpey's fibres (*Zool.*). Calcified bundles of white fibres and elastic fibres, prolonged from the periosteum into the periosteal lamellae of bone.

sharpness of directivity (*Radio*). The extent to which the radiating or receiving properties of an antenna are concentrated within certain angular limits.

sharpness of resonance (*Acous.*). The rapidity with which resonance phenomena are exhibited as the frequency of excitation of a constant driving force is varied.

sharpness of tuning (*Radio*). A term practically synonymous with selectivity, but referring more directly to the change in circuit adjustment necessary to alter the signal strength from its maximum value to a negligible one.

shaving (*Acous.*). The cutting of the surface of a wax blank by a finely ground shaving-knife, made of sapphire, so that it is perfectly flat and free from irregularities, which would be carried through the processing and appear as defects in the finished gramophone record.

shaving (*Leather*). A process by which skins and hides are brought to an even thickness; formerly done by hand, now by the bank knife splitting machine.

shear (*Eng., Phys., etc.*). A type of deformation in which parallel planes in a body remain parallel but are relatively displaced in a direction parallel to themselves; in fact, there is a tendency for adjacent planes to slide over each other. A rectangle, if subjected to a shearing force, parallel to one side, becomes a parallelogram. See **modulus of rigidity, torsion.**

shears (*Eng.*). See **ways.**

shear-legs (*Eng.*). See **sheers.**

shear mouth (*Vet.*). See **mouth (shear).**

shear stress (*Eng.*). The intensity of shear force per unit area of cross-section, varying in some definite way across the section, e.g. as the radius in a twisted shaft, and parabolically across a beam.

shearing (*Furs*). The shortening of fur by cutting the tops of hairs.

shearing (*Textiles*). The operation of clipping the wool from sheep; carried out by hand or by power. The term is also applied to the removal of projecting fibres from the face of a fabric by cropping or shearing.

shearing of rocks (*Geol.*). Shear zones, which are common in metamorphic rocks, are indicated by bands of crushed rock (cataclasite, etc.) and by the development of such minerals as chlorite. See **strain-slip cleavage.**

sheath (*Bot.*). The leaf base when it forms a vertical coating surrounding the stem.

sheath (*Zool.*). An enclosing or protective structure; as the elytron of some Insects.

sheath-circuit eddies (*Cables*). The paths of currents in the sheaths of separate cables which flow only when the sheaths are bonded. See also **sheath eddies.**

sheath current (*Elec. Eng.*). The eddy current flowing in the metallic sheath of an alternating-current cable.

sheath eddies (*Cables*). Currents which are induced in the sheath of a single cable, and which flow even when the sheaths are isolated from each other.

sheath effects (*Elec. Eng.*). The phenomena associated with the metallic sheaths of cables carrying alternating currents.

sheath of Schwann (*Zool.*). See **neurolemma.**

sheathed-pilot system (*Elec. Eng.*). A system of selective protection employing multicore pilot cables in which each pilot wire is provided, outside its main insulation, with a thin metallic sheath.

sheathing (*Carp.*). Close boarding nailed to the framework of a building to form the walls or the roof.

sheathing paper (*Build.*). A flexible waterproof lining material made from bitumen reinforced with fibre, and faced with stout sheets of kraft paper.

sheaves, bow (*Elec. Comm.*). See **bow sheaves.**

shed (*Build.*). A small outhouse, especially one having a lean-to roof.

shed roof (*Build.*). A *lean-to roof* (q.v.).

shed (*Weaving, etc.*). The horizontal opening formed between the warp threads in a loom, for the passage of the shuttle which carries the weft.

shedding (*Weaving*). Dividing the warp threads in a loom horizontally, so that they form a *shed* or passage for the shuttle. After a pick has been inserted the shed is changed. See **closed shed, open shed.**

sheep pox (*Vet.*). An epidemic disease of sheep, due to infection by a filterable virus, and characterised by fever and a papule-vesicular eruption of the skin and mucous membranes of the respiratory tract and genitalia.

sheep scab (*Vet.*). See **mange (psoroptic).**

sheer lawns (*Textiles*). The name applied to very fine linens, used for ladies' handkerchiefs, etc.

sheers (*Eng.*). A large lifting device used in shipyards, etc., resembling a crane in which a pair of inclined struts take the place of a jib. Also called SHEER-LEGS, SHEAR-LEGS.

sheet (*Print.*). A term applied to any one piece of printing paper, printed or plain.

sheet anchor (*Ships*). A spare anchor, similar to a bower anchor, which can be used in case of emergency when a ship is moored.

sheet glass (*Glass*). Glass used for common glazing purposes; produced by drawing a continuous thin film of glass from a molten bath and, after a suitable time interval for cooling, cutting up the product into sheets. It is not of such good quality, nor so flat, as plate glass, which is ground and polished.

sheet lead (*Build.*). Lead in a form in which it is commonly used in building construction, viz. in the form of sheets. It is the trade practice to refer to it in terms of the weight of 1 sq. ft. of area, e.g. *7 lb. sheet lead*, a standard quality.

sheet lightning (*Meteor.*). Diffuse illumination of clouds by distant lightning of which the actual path of the discharge is not seen.

sheet pavement (*Civ. Eng.*). A road surfacing formed of continuous material such as concrete, and free therefore from the frequent joints associated with *block pavements* (q.v.).

sheet piling (*Civ. Eng.*). Timber or steel sheeting supported in a vertical position by guide piles, and serving to resist lateral pressures.

sheet-work (*Print.*). A term applied to printing in which the required number of sheets is printed on one side from one forme of a section, and then on the other side from the other forme. *Cf. work and turn.*

sheeting (*Civ. Eng.*). Rough horizontal boards used to support the sides of narrow trenches during excavation in very loose soils, each pair of boards on opposite sides of the trench being wedged apart with struts.

sheetings (*Textiles*). Cotton or linen cloths used for bed coverings; cotton cloths are woven grey and then bleached.

sheeting twill (*Textiles*). The 2-and-2 twill.

shelf (*Carp.*). A horizontal board, secured usually to a wall, for the temporary support of articles.

shelf-back (*Bind.*). See **spine.**

shelf nog (*Carp.*). A wooden piece built into a brick wall, so as to leave a projecting part which will serve as a support for a shelf.

shelf, selector (*Auto. Teleph.*). See **selector shelf.**

shell (*Chem.*). A group of electrons in an atom, all of which have the same principal quantum number.

shell (*Zool.*). A hard outer case or exoskeleton of inorganic material, chitin, lime, silica, etc.

shell bark (*Bot.*). See **rhytidome.**

shell gimlet (*Carp.*). A gimlet having a parallel shank.

shell gland (*Zool.*). In some Invertebrates, a glandular organ which secretes the materials for the formation of the shell. Also SHELL SAC.

shell ligament (*Zool.*). The dorsal ligament joining the valves of the shell in lamellibranch *Mollusca.*

shell pump (*Civ. Eng.*). See **sludger.**

shell shake (*Timber*). Part of a cup shake, as exhibited on the surface of converted timber.

shell-shock (*Psychol.*). See **war neurosis.**

shell-type transformer (*Elec. Eng.*). A transformer in which the magnetic circuit surrounds the windings more or less completely.

shells, electron (*Phys.*). See **K, L, M . . . shells, Bohr theory.**

shellac′ (*Chem.*). The purified product of *lac* (q.v.); thin yellow or brown leaflets, which can be bleached. Sp. gr. 1·08-1·13, saponification value 194-213, acid value 48-64, ester value 187-163. Electric strength (one-minute value for a film 0·1 inch thick) is 350-600 kV. per inch. Shellac is a thermoplastic moulding material, and forms the basis of photographic and other varnishes. The normal gramophone disc record is based on shellac, the black colour being obtained by the addition of carbon black as a filler.

shelly (*Timber*). Said of timber exhibiting shell shake.

shelter deck (*Ship Constr.*). A term correctly interchangeable with *awning deck.* Sometimes used in a more casual way to identify a deck above a weather deck.

shepherd's check (*Textiles*). A small check pattern of black and white, or other contrasting colours.

sherardising (*Met.*). The process of coating steel or iron with a corrosion resistant layer of zinc, by heating the object to be coated to a temperature of approximately 300° C. in a closed box containing a powder consisting of zinc dust with some zinc oxide.

Sheraton style (*Furn.*). The style developed by Thomas Sheraton, who flourished in 1790-1810; characterised by delicate curves (kidney writing-tables, lyre-shaped chair backs), concave fronts to chests, the use of choice woods, painting, and inlays.

Sherringham daylight (*Illum.*). An artificial-daylight illumination obtained by means of a special lighting fitting in which an opaque reflector is sprayed with zones of different tints so as to give the correct resultant illumination.

shides (*Build.*). *Shingles* (q.v.).

shield (*Cathode Ray Tubes*). The electrode which controls the intensity of the cathode ray beam. It is usually negatively charged with respect to the cathode, which it surrounds or encloses.

shield (*Civ. Eng.*). A kind of *curb* (q.v.) adapted for use at the working face in driving a tunnel through loose or water-bearing ground. It is driven forward as excavation proceeds by means of hydraulic jacks around its edge.

shield, electrostatic (*Elec. Eng., etc.*). See **electrostatic shield.**

shield grid valve (*Thermionics*). The same as *screened-grid valve.*

shielded-pole instrument (*Elec. Eng.*). An induction instrument having a shaded pole.

shift (*Build.*). *Break joint* (q.v.).

shift (*Cathode Ray Tubes*). Bodily movement of the image or pattern across the fluorescent screen of a cathode ray tube, effected by variation of the steady P.D. between the deflector plates, or of the steady current through the deflector coils.

shift (*Mining*). (1) The period of time for which a miner works in a day.—(2) The men who work in a mine for a given period or purpose; e.g. the *day shift* or the *repair shift.*

shift-phase recording (*Cinema.*). In a light-valve, the separation of currents for the two ribbons, so that the retarded currents in one ribbon neutralise amplitude distortion arising from the comparable velocity of the ribbons and the steady velocity of the film passing normally to them.

shifting of brushes (*Elec. Eng.*). The displacement of the brushes of a commutator motor from the neutral position.

shilling-stroke (or **mark**) (*Typog.*). See **diagonal.**

shim (*Elec. Eng.*). A packing piece consisting of a thin sheet of magnetic material for placing behind a pole piece in a magnetic circuit to adjust an air-gap.

shim′amushi fever (*Med.*). Tsutsugamushi fever; flood fever; Japanese river fever. An acute febrile disease associated with infection by Rickettsia, transmitted by the bite of a larval mite; it is characterised by fever, enlargement of lymphatic glands in the neck, axilla, and groin, conjunctivitis, and a dark-red macular rash.

shimmy (*Automobiles*). See **wheel wobble.**

shin (*Rail.*). A *fish-plate* (q.v.).

shiner (*Masonry*). A thin flat stone laid on edge in a rubble wall, the width of the stone being equal to the depth of at least two courses of the other stones.

Shineton Shales (*Geol.*). A group of shales found in Shropshire, of Upper Cambrian age; the English equivalents of the Tremadoc slates of North Wales.

shingle (*Build.*). A thin, flat, rectangular piece of wood laid in the manner of a slate or tile, as a roof covering or for the sides of buildings. Also called SHIDE.

shingle (*Geol.*). Loose detritus, generally of coarser grade than gravel though finer than boulder beds, occurring typically on the higher parts of beaches on rocky coasts.

shingle trap (*Civ. Eng.*). A low barrier wall built out into flowing water or into the sea to catch the shingle and sand and minimise scour.

shingles (*Med.*). See **herpes zoster.**

ship caisson (*Hyd. Eng*). A floating caisson shaped like a ship, and capable of being floated into position across the entrance to a basin, lock, or graving dock, and then sunk into grooves in the sides and bottom of the entrance.

ship plane (*Aero.*). Any aeroplane with special adaptations for rising from, or alighting upon, the deck of a ship. Sometimes arranged for catapulting off Usually provided with folding wings to facilitate storage below decks.

ship's clock (*Horol*). A lever timepiece specially cased for use on board ship.

shiplap (*Carp*). A term applied to parallel boards having a rebate cut in each edge, the two rebates being on opposite faces. They are especially adapted for use as sheathing.

shippers (*Build.*). Bricks which are sound and hard-burned, but not of good shape.

shivering (*Vet.*). A disease of horses, of unknown cause; characterised by involuntary spasmodic contractions of the muscles of one or both hind limbs and tail, less frequently of other parts of the body.

shives (*Textiles*). Vegetable matter found in wool, exclusive of burrs. See also **shove.**

shoad or **shode** (*Mining*). Float-ore. Water-worn fragments of vein minerals found on the surface away from the outcrop.

shoal (*Hyd. Eng.*). A submerged sand-bank.

shock. See **electric shock.**

shock (*Acous.*). See **acoustic shock.**

shock (*Eng., etc.*). The sudden application of load to a member.

shock absorber (*Automobiles*). A frictional or hydraulic damper, having links attached to the chassis frame and axle respectively, to prevent spring rebound and damp out oscillation.

shock excitation (*Radio*). The excitation of transient currents in an oscillatory circuit at its natural resonant frequency by the sudden application or removal of an e.m.f. having some other frequency. The cause of interference by keying clicks from a continuous wave telegraph transmitter.

shockproof switch (*Elec. Eng.*). A switch having all its external metallic parts covered, or protected by insulating material, in order to guard against the possibility of electric shock. Also called ALL-INSULATED SWITCH, HOME OFFICE SWITCH.

shockproof watch (*Horol.*). A watch provided with a flexible mounting for the balance staff, to avoid damage to the pivots when the watch is subjected to severe shock.

shoddy (*Textiles*). Waste material obtained from woollen fabrics that have not been milled; used again in the production of lower quality materials, either alone or blended with new wool or wool and cotton; used also as agricultural fertiliser.

shoe (*Build.*). The short bent part at the foot of a downpipe, directing the water away from the wall.

shoe (*Civ. Eng.*). (1) The iron point fitted over the driving end of a pile.—(2) The block, plate, or piece giving support to the foot of a rafter or post.

shoe (*Elec. Eng.*). The device by which an electric tractor collects current from a live rail.

shoe (*Mining*). The replaceable steel wearing part of the head of a stamp or muller of a grinding pan.

shogged-rib (*Hosiery*). See **racked.**

Shone ejector (*San. Eng.*). An apparatus employed to force sewage from a low-level sewer into a near-by high-level sewer, under the pressure of compressed air from an air compressor.

shon'kinite (*Geol.*). A coarse-grained basic igneous rock (named originally from the Shonkin Sag Laccolith in Montana, U.S.A.), gabbroic in composition, sodic in character, and, as defined by Rosenbusch, containing nepheline as an essential constituent.

shoot (*Cinema.*). To register a *shot* (q.v.).

shoot (*Hyd.*). A *chute* (q.v.).

shoot (*Weaving*). A thread of *weft* (q.v.).

shooting (*Join.*). The operation of truing with a *jointing plane* (q.v.) the edges of timbers which are to be accurately fitted together.

shooting board (*Join.*). A prepared board used to steady a piece of timber whilst shooting the edges. It has a stop against which the piece of timber abuts endwise, and a guide surface against which the jointing plane runs.

shooting plane (*Join*). See **jointing plane.**

shooting star (*Astron.*). See **meteor.**

shop rivet (*Struct.*). A rivet which is put in when the work is being erected on the floor of the assembly shop prior to delivery to the site.

shop traveller (*Eng.*). See **overhead travelling crane.**

shore (*Build.*). A substantial prop of timber or other material used in direct compression, to give temporary support.

shoring (*Build., Civ. Eng.*). The method of temporarily supporting, by props of timber or other material in compression, the sides of excavations and, especially, unsafe buildings.

short. A term used to indicate that a material, such as iron, rock, or wood, is brittle. *Short coal* means friable coal.

short (*Cinema.*). A short film, in length not more than three reels, as contrasted with a *feature film*, which is generally the attraction in a programme.

shorts (*Mining*). (1) The contents of a wagon of coal containing very much dirt.—(2) The shortage in production under a royalty lease; also called UNDER-GETTINGS.

shorts (*Typog.*). Vowels printed with the short accent over them, thus: ă, ĕ, ĭ, ŏ, ŭ.

short-chord winding (*Elec. Eng.*). An armature winding employing coils whose span is less than the pole pitch.

short-chording (*Elec. Eng.*). A method of armature winding in which the coil span is less than the pole pitch.

short-circuit (*Elec. Eng.*). The electrical condition created when the terminals of a generator, transformer, or other source or conveyor of electrical energy are connected by a conducting path of negligible resistance.

short-circuit characteristic (*Elec. Eng.*). The characteristic graph relating e.m.f. or excitation to load current in the case of a machine operating under short-circuit conditions.

short-circuit current (*Elec. Eng.*). The current flowing in an electrical machine under short-circuit conditions.

short-circuit impedance (*Elec. Comm.*). The driving or input impedance of a network or line when the end is short-circuited or grounded.

short-circuit test (*Elec. Eng.*). The test carried out on an electrical machine with its output terminals short-circuited and full-load current flowing.

short-circuit voltage (*Elec. Eng.*). The e.m.f. necessary to cause full-load current to flow under short-circuit conditions.

short-circuited rotor (*Elec. Eng.*). The same as *squirrel-cage rotor*. See **squirrel-cage motor.**

short-circuiting device (*Elec. Eng.*). A switching device on the rotor of a slip-ring induction motor; operated by a mechanical clutch, which short-circuits the rotor windings when the motor has gained speed.

short coal (*Mining*). See **short.**

short column (*Eng.*). A column the diameter of which is so large that bending under load may be neglected, and in which failure would occur by crushing; commonly assumed as a column of less than 20 diameters.

short-day plant (*Bot.*). A plant in which the onset of flowering is hastened by giving the plant alternating periods of relatively short illumination and relatively long darkness.

short-period comets (*Astron.*). Those comets moving in elliptical orbits of such a size that the comets' returns to the neighbourhood of the sun are repeated at intervals comparable to the sidereal periods of the planets, one such group having periods between three and eight years.

short shoot (*Bot.*). A short branch borne in the axil of a scale leaf and bearing the true foliage leaves of the plant.

short-sightedness (*Med*). See **myopia.**

short stick (*Textiles*). A cotton-trade term to indicate a yard length of exactly 36 in. 120ss means 120 wraps of 36 in. each and a length of 120 yards exactly.

short-time breakdown voltage (*Cables*). The voltage required to break down a cable in a short time (minutes).

short-time rating (*Elec. Eng.*). The output which an electrical machine can deliver for a specified short period (½ hour or 1 hour) without exceeding a specified safe temperature.

short waves (*Radio*). Electromagnetic waves whose wavelength is of the order of 50 metres or less.

shortening condenser (*Radio*). A condenser inserted in series with an antenna to reduce its natural wavelength.

shot (*Cinema.*). The unit in motion-picture production, comprising the sequence of events while the cameras are in operation. For each shot there may be several takes, to ensure a selection of good registrations.

See **angle—**
close—
crane—
long—
medium—
mute—
panning—
tracking—

shot (*Weaving*). See under **weft.**

shot-drilling (*Mining*). Boring deep holes by means of hard steel shot fed down a rotating hollow cylinder.

shot effects (*Textiles*). Effects produced in fabrics in which the weft is a different colour from the warp.

shot-hole (*Civ. Eng.*). A hole bored in rock for the reception of a blasting charge.

shot-hole (*Timber*). A small hole made in timber by a wood-boring insect.

shot-hole disease (*Bot.*). A disease of leaves of various plants, caused by fungi which destroy small patches of tissue, which drop out.

shot noise (*Thermionics*). A noise which occurs spontaneously in the anode current of a thermionic tube, owing to the fact that the current is not truly continuous but is made up of a series of random pulses as each electron arrives at the anode. So called because of the similarity to bullets from a machine-gun directed on a target. Also called SCHROTT EFFECT, SMALL-SHOT EFFECT, and see **Schottky effect.**

Shotover Sands (*Geol.*). A group of sands and clays of fresh-water origin capping Shotover Hill and other hills near Oxford, England, and believed to be of the same age as part of the Wealden Beds of Southern England.

Shottky effect (*Thermionics*). See **Schottky effect.**

shoulder (*Elec. Comm., etc.*). That part of a characteristic curve at which the response tends to fall off, as at the upper limit of thermionic characteristics or the gamma curves of photographic emulsions.

shoulders (*Acous.*). The alteration of the shape of the needle tip during the reproduction from gramophone records causes ridges (*shoulders*) to be formed on the side of the needle, which then slides over the flat surfaces of the disc rather than in the groove.

shoulders (*Carp.*). The abutting surfaces left on each side of a tenon; they abut against the cheeks of the mortise.

shoulder girdle (*Zool*). See **pectoral girdle.**

shoulder nipple (*Plumb., etc.*). A nipple which is not threaded over its full length but only at the two ends.

shouldered arch (*Arch.*). A lintel supported over a door opening upon corbels.

shouldering (*Build.*). The operation of bedding the heads of roofing slates in hair mortar, for added protection when the roof is very exposed.

shove or **shive** (*Textiles*). A waste product consisting of small particles of woody tissue adhering to flax fibres after scutching; removed during hackling and combing.

shower, meteoric (*Astron.*). See **meteoric shower.**

shower-proofing (*Textiles*). The rainproofing woollen and worsted cloths by treating them with metallic salts or insoluble soap; the ventilating properties and the general appearance of a fabric are not affected by this treatment.

shrapnel shell (*Ammunition*). A shell filled with lead bullets, which are ejected forwards by means of a bursting charge ignited by a time fuse.

shread head (*Build.*). A *jerkin head* (q.v.).

shredded wheat (*Cinema*). The term applied to film which has been damaged by running off the sprocket wheels in a projector or camera.

shrink-ring commutator (*Elec. Eng.*). A high-speed type of commutator in which the segments are held together by a steel ring shrunk on over a layer of insulation.

shrinkage (*Civ. Eng.*). The difference in the spaces occupied by material before excavation and after settlement in embankment.

shrinkage (*Textiles*). See **sinkage.**

shrinkage allowance (*Eng.*). The difference in diameter, when both are cold, of two parts to be united by shrinking. See **shrinking-on.**

shrinkage stoping (*Mining*). Whilst excavating (stoping) ore from a vein or lode, the leaving of sufficient broken ore in the stope to keep the walls from falling in. This broken ore is subsequently withdrawn.

shrinking-on (*Eng., etc.*). The process of fastening together two parts by heating the outer member so that it expands sufficiently to pass over the inner and on cooling grips it tightly; e.g. in the attachment of steel tyres to locomotive wheels.

shrinking processes (*Textiles*). Various methods for rendering wool cloths unshrinkable during tailoring and during wear. Cloths are shrunk effectively by the manufacturer before sale. The oldest method is known as *London shrinking*.

shroud or **shrouding** (*Eng.*). (1) Circular webs employed to stiffen the sides of gear-teeth. See **full shroud, half shroud.**—(2) An outer or peripheral strip used to strengthen turbine blading.—(3) A semicircular deflecting wall formed at one side of an inlet port in some I.C. engines to promote air swirl in the cylinder.—(*Radio, etc.*) Extension of metal parts in valves, and other electrical devices subject to high voltages, so that parts of the insulating dielectric are not excessively stressed.

shrub (*Bot.*). A woody plant in which most of the side shoots survive, so that there is no strong development of a main trunk as in a tree.

shuffs (*Build.*). See **chuffs.**

shunt (*Elec. Eng.*). A *shunt* connexion of an electric circuit, with respect to another, is one in which the same e.m.f. is applied to both.

shunt (*Rail.*). To divert a train from a principal to a side track, especially to allow another train to pass along the principal track.

shunt arm (*Elec. Comm.*). That arm of a filter-section which is connected between the two legs of the loop-circuit of a wave-filter.

shunt characteristic (*Elec. Eng.*). The characteristic graph relating terminal voltage and load current in the case of a shunt-wound d.c. machine.

shunt circuit (*Elec. Eng.*). See **voltage circuit.**

shunt-excited antenna (*Radio*). An antenna consisting of a vertical radiator (frequently the mast itself) directly earthed at the base, and connected to the transmitter through a lead attached to it a short way above the ground.

shunt feed (*Radio*). See **parallel feed.**

shunt field (*Elec. Eng.*). The main field winding of a motor when shunt connected.

shunt-field relay (*Elec. Comm.*). A relay with two coils on the opposite sides of a closed magnetic circuit, so that a bridging magnetic circuit takes no flux while the currents in the two coils magnetise the circuit in the same direction; flux passes in this bridging circuit when one current is reversed.

shunt-field rheostat (*Elec. Eng.*). A rheostat for insertion in the shunt-field of a d.c. shunt machine; used to vary the speed of a shunt motor, or to vary the voltage of a shunt generator.

shunt motor (*Elec. Eng.*). An electric motor whose main excitation is derived from a shunt-field winding.

shunt-trip (*Elec. Eng.*). A solenoid-type tripping device, connected in shunt across either the main or an auxiliary supply, by which a circuit-breaker may be tripped by a suitable relay.

shunt winding (*Elec. Eng.*). A field winding connected in shunt across the armature circuit of a motor.

shunted condenser (*Teleg.*). See **reading condenser.**

shute (*Hyd.*). A *chute* (q.v.).

shuting (*Build.*). An *eaves gutter* (q.v.).

shutter (*Build.*). A removable protective covering to the outside or inside of a window.

shutter (*Cinema.*). The rotating device in a camera which exposes the film when it is stationary, and shuts off the light from the source while the film is moved intermittently. Also, in a film projector, the rotating device which cuts off the light from the screen during the time that the film is moving. Each frame may be flashed on to the screen two or three times to reduce the flicker.

See **automatic—** **flicker—**

shutter (*Photog.*). The device in a camera for exposing the sensitised surface to the image of the object during a known time and at will. See **focal plane shutter.**

shutter weir (*Civ. Eng.*). A type of movable weir consisting of a row of large panels hinged at the bottom and inclined slightly downstream towards the top when the weir is closed.

shuttering (*Civ. Eng.*). The general term for temporary works for the support of reinforced concrete while it is setting. Also FORM WORK.

shutting post (*Build.*). The post against which a gate shuts.

shutting stile (*Join.*). The stile of a door further from the hinges. Also MEETING STILE.

shuttle (*Weaving, etc.*). (1) The device which carries the weft or filling (in the form of a cop or pirn bobbin) across a loom, through the upper and lower warp threads. It is made of hard wood, boat-shaped, with a metal tip at each end, and near one end has an eye through which the weft passes.—(2) In a sewing-machine, a sliding or rotating device that carries the lower thread to form a lock-stitch.

shuttle armature (*Elec. Eng.*). A simple form of armature; used on small d.c. machines in which there are only two slots, so that the armature stampings assume an H-shape; the winding is a single coil connected to a two-part commutator. Also called H-ARMATURE.

shuttle box (*Weaving*). A box-like extension at each end of the race board, from which the shuttle is thrown, to and fro, when the loom is working.

shuttle guard (*Weaving*). A guard fixed to the sley of a loom, in such a position that it will deflect and keep low a shuttle which by accident flies out of the loom.

shuttle machine (*Textiles*). See **Swiss machine.**

shuttle race (*Weaving*). See **race board.**

shuttling (*Weaving*). Replenishing the weft by inserting a new cop or pirn bobbin in the shuttle.

Si (*Chem.*). The symbol for *silicon.*

sial (*Geol.*). The discontinuous earth shell of granitic composition which forms the foundation of the continental masses and which is in turn underlain by the sima. So called because it is essentially composed of siliceous and aluminous minerals.

sial'agogue, sial'ogogue (*Med.*) Stimulating the flow of saliva (Greek *sialon*): any medicine which does this.

si'alo-adeni'tis, si'aladeni'tis (*Med.*). Inflammation of a salivary gland.

si'aloid (*Zool.*). Resembling saliva.

si'alolith (*Med.*). A calculus in a salivary gland.

sialorrhoe'a (*Med.*). Excessive secretion of saliva.

sib'ilus (*Med.*). A sibilant or whistling *rhonchus* (q.v.) due to the passage of air over secretions in the smaller bronchial tubes.

sic'cative (*Paint.*). A *drier* (q.v.).

Sicilian (*Textiles*). A plain cloth, made from fine cotton warp and coarse mohair weft; used for dress goods.

sickle-celled anaemia (*Med.*). Drepanocytosis.

sickle-shaped truss (*Eng.*). A truss for roofs of very large span in which the upper and lower chords enclose a crescent or sickle-shaped area, which is triangulated by diagonal members.

side band (*Radio*). The band of frequencies, equal in width to the highest modulating frequency, which extends on either side of the carrier frequency of a modulated wave. A free channel, equal in width to the combined widths of the two side bands, is usual for broadcast transmission.

side-bones (*Vet.*). Ossification of the lateral cartilages of a horse's foot.

side-chains (*Chem.*). Alkyl groups which replace hydrogen in ring compounds.

side-chain theory (*Med.*). A theory propounded by Ehrlich to explain the phenomena of the poisoning and immunity of living cells. It assumes that the molecules of protoplasm possess a cyclic structure and side-chains similar to those found in derivatives of benzene. Molecules of foodstuffs or toxins are incorporated into the cell by attachment to these side-chains or *receptors*. Interaction of toxin molecules with a number of receptors in a cell tends to stimulate overproduction of receptors, which are liberated into the blood, where they act as antibodies.

side circuit (*Teleph.*). The telephone circuit loop which is used as one leg of a phantom, the two wires being effectively in parallel for the phantom circuit.

side-contact rail (*Elec. Eng.*). An electric traction conductor arrangement making use of a special channel-section conductor-rail, contact being made sideways by the collecting-shoe.

side cutting (*Civ. Eng.*). Excavation taken from the side of a railway or canal when the amount of the normal cutting is less than the fill.

side drift (*Civ. Eng.*). An *adit* (q.v.).

side frequency (*Radio*). The frequency of a side wave.

side hook (*Carp.*). A *bench hook* (q.v.).

side keelson (*Ship Constr.*). See under **keelson.**

side pond (*Hyd. Eng.*). A storage space at the side of a canal lock-chamber, the two being interconnected by a sluice, so that the normal loss of water occurring in the process of passing a vessel through the lock may be reduced.

side posts (*Carp.*). *Princess posts* (q.v.).

side rabbet plane (*Join.*). A rabbet plane with its cutting edge on the side, not on the sole, of the tool.

side rail (*Rail.*). A *check-rail* (q.v.).

side-running trolley (*Elec. Eng.*). A trolley-wheel arrangement in which contact is made sideways to the trolley-wire.

side slip (*Aero.*). Motion of an aircraft such that it travels in a direction corresponding to its lateral axis, in addition to its normal forward motion. Most commonly, slipping outwards in an incorrectly banked turn.

side slope (*Civ. Eng.*). The inclination of the earth slopes on each side of a cutting.

side-stick (*Typog.*). A tapering piece of wood placed at the sides of pages when locking them up. Quoins are wedged between them and the sides of the chase.

side-stick (*Vet.*). A cylindrical stick fixed to the head-collar and to the surcingle in order to limit the movement of a horse's head.

side timber (*Carp.*). A roof purlin supporting the common rafters.

side-tone (*Acous.*). The hearing of one's own voice in a reverberant enclosure. Particularly, the audition of one's own voice in a telephone receiver, via the transmitter, at a level which is higher than natural. See **anti-side-tone.**

side tool (*Eng.*). A cutting tool in which the cutting face is at the side, and which is fed laterally along the work.

sidetracking skate (*Aero.*). See **skate (sidetracking).**

sidewalk (*Civ. Eng.*). [U.S.] A raised strip, alongside a road, for the passage of pedestrian traffic only. In Britain usually called a PAVEMENT.

side wave (*Radio*). An isolated frequency component in the side band. Analysis shows that a sinusoidally modulated wave may be decomposed into a carrier wave of frequency ω and two side waves of frequencies $\omega+\rho$ and $\omega-\rho$ respectively, where ρ is the modulating frequency.

side-waver (*Carp.*). A side timber.

side'real day (*Astron.*). See **day (sidereal).**

sidereal month (*Astron.*). The interval (amounting to 27·32166 days) between two successive passages of the moon through the same point in her orbit, relative to the fixed stars.

sidereal moon (*Astron.*). The instant when the First Point of Aries is on the meridian at upper culmination, indicated by 0^h local sidereal time.

sidereal period (*Astron.*). The interval between two successive positions of a celestial body in the same point with reference to the fixed stars; applied to the moon and planets to indicate their complete revolution of the heavens as against their synodic revolution relative to the line joining the earth and sun.

sidereal time (*Astron.*). A method of reckoning intervals based on the rotation of the earth on its axis as the fundamental period; sidereal time at any moment is the hour angle of the First Point of Aries at the moment, and increases from 0 to 24 hours, beginning with sidereal noon.

sidereal year (*Astron.*). The interval between two successive passages of the sun in its apparent annual motion through the same point relative to the fixed stars; it amounts to 365 25636 days, slightly longer than the tropical year, owing to the annual precessional motion of the equinox.

sid'erite (*Geol.*). A general term for meteoric iron, which usually consists of nickel-iron.

siderite (*Min.*). (1) See **chalybite.**—(2) See **sapphire quartz.**

sidero'sis (*Med.*). (1) *Pneumonokoniosis* (q.v.) due to the inhalation of metallic particles by workers in tin, copper, lead, and iron mines, and by steel-grinders.—(2) Excessive deposit of iron in the body tissues.

sid'erostat (*Astron.*). An instrument designed on the same principle as the coelostat to reflect a portion of the sky in a fixed direction; applied specially to a form of telescope called the *polar siderostat*, in which the observer looks down the polar axis on to a mirror.

siding (*Rail.*). A short length of side line on to which one train from the main line may be shunted to allow of the passage of another train on the main line.

Sidol (*Build.*). Trade-name for a timber preservative.

Siebold's organ (*Zool.*). See **crista acustica.**

siege (*Build.*). A mason's *banker* (q.v.).

siege (*Glass*). The floor of a pot furnace upon which the pots rest.

Siegwart (*Build.*). Trade-name for a form of fire-resisting floor, built of reinforced concrete tubes laid close together and grouted in between the joints in the several tubes to complete the floor, ready for any top finish.

Siemens dynamometer (*Elec. Eng.*). The name applied to a dynamometer-type of instrument when arranged for measuring current or power.

Siemens ozone tube (*Chem.*). Apparatus used in the preparation of ozone by the silent discharge of electricity.

Siemens-Marten process (*Met.*). See **open-hearth process.**

sienna (*Paint.*). A natural yellow earth pigment; used 'raw' or 'burnt.'

sieve, siv (*Build., etc.*). An open container fitted with a mesh or gauze bottom.

sieve area (*Bot.*). A limited area on the longitudinal wall of a sieve tube, perforated by numerous fine pores through which material may pass.

sieve field (*Bot.*). One of the perforated areas into which a sieve plate may be divided by a network of thick strands of wall material.

sieve plate (*Bot.*). A perforated area in the lateral or end wall of a sieve tube.

sieve tube (*Bot.*). A long tubular element, enclosed by a thin wall of cellulose and containing living contents but no nucleus, occurring in the phloem of vascular plants. Sieve tubes conduct elaborated food material about the plant, and communicate with one another by means of sieve areas or sieve plates.

sieving, sifting (*Build., etc.*). The operation of shaking loose materials in a sieve so that the finer particles pass through the mesh bottom. By using a number of sieves with different meshes the particles can be graded according to size.

sight (*Optics*). The sensation produced when light waves impinge on the photosensitive cells of the eye.

sight-feed lubricator (*Eng.*). A small glass tube through which oil-drops from a reservoir can be seen, or which is filled with water so that oil from the pump rises in visible drops on its way to the oil-pipe.

sight lines (*Cinema.*). The extreme angles from which the screen can be seen in a cinema.

sight rail (*Surv*). An above-ground horizontal wooden rail fixed to two upright posts, one on each side of a trench excavation for a sewer, drain, etc. Used with others to establish a reference line from which the sewer, etc., may be laid at the required gradient.

sight rule (*Surv.*). See **alidade.**

sig'moid (*Bot., Zool., etc.*). Curved like the letter S.

sigmoid flexure (*Zool*) An S-bend.

sigmoidec'tomy (*Surg*). Excision of part of the sigmoid flexure of the colon.

sigmoid'oscope (*Med.*). A tube fitted with a lamp for viewing the mucous membrane of the rectum and pelvic colon.

sigmoidos'tomy (*Surg*). The surgical formation of an opening (artificial anus) in the sigmoid flexure of the colon.

sign (*Med.*). Any objective evidence of disease or bodily disorder, as opposed to a *symptom* (q.v.), which is a subjective complaint of a patient.

signal (*Elec. Comm.*). The modification of an electrical effect having a variation wave-form or coding which represents the intelligence transmitted. The modulation of a carrier is the signal, not the carrier itself, which, if properly modulated, remains unchanged. The carrier, essential for modulation, if not sent, must be reinserted for demodulation purposes at the receiving end.

See **answer—***
breakdown—*
busy-flash—*
clear—*
clearing—
compound—*
correction—
impulsing—*
offering—*
release—*
seizing—*
sequence—*
transfer—*
video—
audible ringing tone.

signal (*Surv.*). A device, such as a ranging rod, heliostat, etc., used to mark a survey station.

signal coloration (*Zool.*). Distinctive markings for the recognition of other members of the same species.

signal lamp (*Elec. Eng.*). An indicating lamp on a switch- or control-board.

signal/noise ratio (*Radio*). The ratio, usually expressed in decibels, of the strength of a wanted signal to that of the interfering noise present.

signal plate (*Cathode Ray Tubes, Television*). The electrode which carries the mosaic in an Iconoscope.

signature (*Bind., Typog.*). See **section (2).**

signature mark (*Bind., Typog.*). A number or letter of the alphabet placed on the first page of a signature as a guide to the binder in *gathering* (q.v.) the sections.

signing (*Acous.*). The manual sign-language used by deaf-mutes and by those who address them.

Sikes hydrometer (*Chem.*). A hydrometer used for determining the strengths of mixtures of alcohol and water.

sikyot'ic (*Bot.*). Parasitic by fusion of the plasma of host and parasite.

silanes (*Chem.*). A term given to the *silicon hydrides.*

silencer (*Automobiles*). See **exhaust silencer.**

silent discharge (*Diel.*). An obsolescent term for *corona.*

silhouette (*Photog.*). An image in which the elements are exhibited in black against a white background, or vice versa.

sil'ica (*Met., Min., etc.*). Dioxide of silicon, SiO_2, which occurs in the crystalline forms as quartz, cristobalite, tridymite; as cryptocrystalline chalcedony; as amorphous opal; and as an essential constituent of the silicate groups of minerals. Used in the manufacture of glass and refractory materials. Refractory materials containing a high proportion of silica (over 90%) are known as *acid refractories* (e.g. ganister), and are used in open-hearth and other metallurgical furnaces to resist high temperatures and attack by acid slags.

silica glass (*Min.*). Fused quartz, occurring in shapeless masses on the surface of the Libyan Desert, in Moravia, in parts of Australia, and elsewhere; believed to be of meteoric origin. See **tektites.**

silica valve (*Thermionics*). A valve in which the envelope is made of fused silica in order to withstand high temperatures.

sil'icane (*Chem.*). SiH_4. A gas formed by the action of concentrated hydrochloric acid on magnesium silicide. Also known as SILICO-METHANE and SILICON HYDRIDE.

sil'icates (*Min.*). The salts of the silicic acids, the largest group among minerals; of widely different, and in some cases extremely complex, composition, but all containing silica as an essential component. The micas, amphiboles, pyroxenes, feldspars, and garnets are examples of groups of rock-forming silicates.

silic'eous clay (*Geol.*). A clay rock with an admixture of silica in a finely divided state.

siliceous deposits (*Geol.*). Those sediments, encrustations, or deposits which contain a large percentage of silica in one or more of its modes of occurrence. They may be chemically or mechanically formed, or may consist of the siliceous skeletons of organisms such as diatoms and radiolaria. See also **silification.**

siliceous sinter (*Geol.*). Cellular quartz or translucent to opaque opal, found as incrustations or fibrous growths and deposited from thermal waters containing silica or silicates in solution.

silic'ic acid (*Chem.*). An acid formed when alkaline silicates are treated with acids. Amorphous, gelatinous mass. Dissociates readily into water and silica.

sil'icides (*Chem.*). Compounds formed by the combination of silicon with other elements, chiefly metals.

silicification (*Geol.*). The process by which silica is introduced as a cement into rocks after their deposition, or as an infiltration or replacement of organic tissues or of other minerals such as calcite. See also **novaculite.**

sil'icle, silic'ula, sil'icule (*Bot.*). A capsule derived from two united carpels, divided internally by a replum; contains many seeds, and is short (never more than four times as long as broad, and often not longer than broad).

sil'ico-manganese steel (*Met.*). See **manganese alloys.**

silico-methane (*Chem.*). See **silicane.**

sil'icole (*Bot.*). A plant which grows on soils rich in silica, and usually acid in reaction.

silico'lous (*Bot.*). Growing on rocks containing much silica.

sil'icon (*Chem.*). Symbol, Si. A non-metallic element in the fourth group of the periodic system. At. no. 14, at. wt. 28·06, valency 4. Amorphous silicon is a brown powder; sp. gr. 2·35. Crystalline silicon is grey; sp. gr. 2·42, m.p. 1420° C., b.p. 2600° C. This element is the second most abundant, silicates being the chief constituents of many rocks, clays, and soils. Silicon is manufactured by reducing silica with carbon in an electric furnace, and is used in making certain alloys.

silicon carbide (*Chem.*). SiC. Formed by fusing a mixture of carbon and sand or silica in an electric furnace at a very high temperature. Used as an abrasive and refractory. Also known as CARBORUNDUM and CARBON SILICIDE.

silicon dioxide (*Chem.*). *Silica* (q.v.).

silicon hydrides (*Chem.*). Four volatile hydrides, SiH_4, Si_2H_6, Si_3H_8, and Si_4H_{10}. See also **silicane.**

silicon iron (*Met.*). Iron or low carbon steel to which 0·75-4·0% silicon has been added. Has low magnetic hysteresis. Used for sheets for transformer cores. Typical composition: silicon 4%, manganese under 0·1%, phosphorus 0·02%, sulphur 0·02%, carbon 0·05%.

silicon nitride (*Chem.*). Formed by the combination of silicon and nitrogen.

silicon tetrachloride (*Chem.*). $SiCl_4$. Formed by the action of chlorine on a mixture of silica and carbon or silicon. Liquid.

silicon tetrafluoride (*Chem.*). SiF_4. A gaseous compound formed by the action of hydrofluoric acid on silica. Readily decomposes into silica and hydrofluoric acid.

silico'sis (*Med.*). *Pneumonokoniosis* (q.v.) due to the inhalation of particles of silica by masons and by miners who work in the presence of silica (e.g. gold-miners); tuberculosis of the lung is a common complication.

sil'iqua, silique, sil-ēk' (*Bot.*). A capsule having the general characters of a silicle, but at least four times as long as it is broad.

siliqua (*Zool.*). A pod-shaped structure; as the *siliqua olivae* of the Mammalian brain, a tract of fibres investing the olive.

Silit resistor (*Elec. Eng.*). A tubular resistance element made from a mixture of silicon carbide and silicon.

silk. A fabric made from the natural product of the silkworm, of which there are many varieties, both wild and cultivated. The best known of the cultivated type is the genus *Bombyx.* Of the wild varieties, the worm of the moth *Antheraea mylitta* produces the thread from which tussah or tussur silk is made. See **reeling, throwing, spun silk, schappe, rayon.** See also **silk** (*Zool.*) below. Natural silk is specially useful for the insulation of very fine wires not immersed in oil. Electric strength is about 400V per mil. For *artificial silk* see **rayon.**

silk (*Min.*). A sheen resembling that of silk, exhibited by some corundums, including ruby, and due to minute tubular cavities in parallel orientation. The colour of such stones is paler than normal by reason of the inclusions.

silk (*Photog.*). The silk stretched on a frame which is placed in front of a lens to soften the image registered on the negative.

silk (*Zool.*). A fluid substance secreted by various *Arthropoda.* It is composed mainly of fibroin, together with sericin and other substances, and hardens on exposure to air in the form of a thread. Used for spinning cocoons, webs, egg-cases, etc.

silk, artificial (*Textiles*). See **rayon.**

silky (*Bot.*). Said of a surface covered by fine hairs which lie down and glisten like silk.

sill (*Build.*). A timber or stone forming the lower boundary of a door or window opening.

sill (*Geol.*). A concordant minor intrusion of igneous rock injected as a tabular sheet between, and more or less parallel to, the bedding planes of rocks.

sill (*Hyd.*). The top level of a weir, or the lowest level of a notch.

sill-high (*Build.*). Reaching from floor- or ground-level to the level of the window sill.

sil'limanite (*Min.*). See **fibrolite.**

si'lo (*Civ. Eng.*). A tall construction, usually of reinforced concrete, serving as a container for the storage of loose materials, especially grain.

sil'oxen (*Chem.*). A crystalline substance resembling graphitic acid. Polymerised silicon analogue. Obtained by the action of hydrochloric acid on calcium silicide in the absence of air.

Silox'icon (*Chem.*). Trade-name for a material obtained by heating a mixture of silica with carbon at about 2500° C.; used as a refractory.

silt (*Geol.*). See **silt grade.**

silt (*Hyd. Eng.*). Material of an earthy character deposited in a finely divided form by flowing water. *

silt box (*San. Eng.*). A removable iron box placed at the bottom of a gulley; serves to accumulate the deposited silt, which can be taken away periodically.

silt grade (*Geol.*). Fine-grained sediments, the individual particles of which have the limiting diameters of 0·1 and 0·01 mm. This grade is sometimes subdivided into *coarse silt* (from 0·1 to 0·05 mm.) and *fine silt* (from 0·05 to 0·01 mm.).

Sil'umin (*Met.*). See **Alpax.**

silu'minite (*Diel.*). A substance made from cement and asbestos fibres with oil or bitumen impregnation. Used in place of slate for insulating panels.

Silu'rian System (*Geol.*). The rocks which succeed the Ordovician System and precede the Devonian System. They consist essentially in Great Britain of dark shales with interbedded fossiliferous limestones. Found in Wales, the Lake District, Shropshire, and the Southern Uplands of Scotland. Named by Sir R. I. Murchison after the ancient British tribe, the Silures. See also **Siluric.**

Silu'ric (*Geol.*). Equivalent to *Silurian.* See **Clinton, Medina, Monroan, Niagara, Salinian.**

silver (*Met., Min.*). A pure-white metallic element in the first group of the periodic system. Chem. symbol Ag, at. wt. 107·88, at. no. 47, sp. gr. at 20° C. 10·5, m.p. 960° C., b.p. 1955° C., casting temp. 1030-1090° C., Brinell hardness 37, specific electrical resistivity 1·62 microhms per cm. cub. The metal is not oxidised in air. Occurs massive, or assumes arborescent or filiform shapes. Native silver often has variable admixture of other metals—gold, copper, or sometimes platinum. Used in coinage (50% silver, the remainder nickel with a little copper) and jewellery, and for certain components in food and chemical industry where cheaper metals fail to withstand corrosion.

silver amalgam (*Min.*). A solid solution of mercury and silver, which crystallises in the cubic system. The percentage of silver is usually about 26%, but in the variety *arquerite* reaches 86%. It is of rare occurrence, and is found scattered either in mercury or silver deposits.

silver bromide, silver chloride, silver fluoride (*Chem.*). See **silver halides.**

silver glance (*Min.*). See **argentite.**

silver grain (*Bot.*). The light-greyish, shining flecking seen in oak timber, caused by vascular rays exposed in preparing the timber when it is cut radially through the centre of a log. Also seen in beech.

silver halides (*Chem.*). Silver fluoride, AgF; silver iodide, AgI; silver chloride, AgCl; and silver bromide, AgBr. The bromide and chloride are sensitive to light and are of basic importance in photography.

silver iodide (*Chem.*). See **silver halides.**

silver lead ore (*Min.*). The name given to galena containing silver. When 1% or more of silver is present it becomes a valuable ore of silver. Also called ARGENTIFEROUS GALENA.

silver oxide (*Chem.*). See **argentic oxide, argentous oxide.**

silver solder (*Met.*). See **brazing solders.**

silver voltameter (*Elec. Eng.*). An electrolytic cell used for determining accurately the average value of a current from the quantity of silver deposited from the silver nitrate solution forming the electrolyte.

silver white (*Paint.*). A paint base composed of pure white lead imported from Paris in drops. Also called FRENCH WHITE.

silvering (*Glass*). This process is carried out on a perfectly clean surface of glass by pouring on to it an ammoniacal silver solution, mixed with Rochelle salt, or with a nitric-acid–cane-sugar alcohol mixture. The silver film so formed is washed, backed with varnish, and then painted.

si'ma (*Geol.*). The continuous basaltic shell which underlies both the continental masses beneath the sial and the ocean floors. Samples at ground-level are afforded by the plateau basalts, the world-wide product of fissure eruptions.

sim'ian (*Zool.*). Pertaining to, or resembling, the anthropoid Apes.

Simmonds' disease (*Med.*). Hypophysial cachexia. A rare disease due to destruction of the pituitary gland; characterised by cachexia, atrophy of the skin and the bones, premature senility, loss of hair, and loss of sexual function. *Progeria* is thought to be an example of Simmonds' disease.

simoom' (*Meteor.*). A hot dry wind or whirlwind of brief duration, occurring in the African and Arabian deserts. It usually carries quantities of sand.

simple (*Bot.*). (1) Consisting of one piece.—(2) Unbranched.

simple curve (*Surv.*). A curve composed of a single arc connecting two straights.

simple eye (*Zool.*). See **ocellus.**

simple fruit (*Bot.*). A fruit formed from one pistil.

simple harmonic motion (*Phys.*). A type of vibration which may be represented by projecting on to a diameter the uniform motion of a point round a circle. A characteristic of simple harmonic motion is that the acceleration (and therefore also the restoring force) is proportional to the displacement of the vibrating body from its position of rest.

simple leaf (*Bot.*). A leaf in which the lamina consists of one piece, which, if lobed, is not cut into separate parts reaching down to the midrib.

simple sorus (*Bot.*). A sorus made up of a single sporangium.

simple steam-engine (*Eng.*). An engine with one or more cylinders in which the steam expands from the initial pressure to the exhaust pressure in a single stage.

simple tissue (*Bot.*). A tissue made up of cells all of the same kind.

simple umbel (*Bot.*). An umbel in which the flower stalks arise directly from the apex of the main stalk.

simple venation (*Bot.*). A type of venation in which the midrib alone is clearly visible.

simplex channel (*Elec. Comm.*). A channel of communication which transmits signals in one direction only at a time; complete reversal of apparatus is required for sending signals in the reverse direction. Cf. *duplex channel.*

simplex dialling (*Auto. Teleph.*). In subscriber dialling, use of the two line-wires in parallel, with earth return, to get the maximum change in current for impulsing.

simplex group (*Cyt.*). The haploid complement of chromosomes and factors.

Simplex piling (*Civ. Eng.*). A system of piling in which a cast-iron point is driven to the required depth by means of a steel pipe. The pipe is then filled with concrete and afterwards slowly withdrawn, the concrete filling adapting itself to the irregularities in the ground.

simplex system (*Teleg.*). A telegraph system which uses signals transmitted in one direction only.

simplex winding (*Elec. Eng.*). An armature winding through which there is only one electrical path per pole.

Simpson's rule (*Surv., etc.*). A rule for the estimation of the area of an irregular figure, which for this purpose is divided into an even number of strips of equal width. The lengths of the boundary ordinates of the strips are measured, and the area calculated from the rule which states that the area is equal to one-third the common widths of the strips multiplied by the sum of the first and last ordinates, plus four times the even ordinates, plus twice the odd ordinates.

Sims speculum (*Surg.*). A speculum, shaped like a duck's bill, for viewing the lining of the vagina and the cervix uteri.

simulation (*Zool.*). Mimicry; assumption of the external characters of another species in order to facilitate the capture of prey or escape from enemies.—*v.* **simulate.**

simultaneous broadcasting (*Radio*). Transmission of the same programme simultaneously from two or more transmitters. Abbrev. **S.B.**

si'napism (*Med.*). A mustard plaster.

Sindan'yo (*Elec. Eng.*). A synthetic insulating material of the vulcanite type, taking a very high polish, and consequently much used in place of slate for switch-board panels. *Ebony Sindanyo* is composed of cement and asbestos, with oil or bitumen impregnation.

sine bar (*Eng.*). A hardened steel bar carrying two plugs of standard diameter accurately spaced to some standard distance; used in setting out angles to close limits.

sine condition (*Optics*). A condition which must be satisfied by a lens if it is to form an image free from aberrations (other than chromatic). It may be stated $\mu_1 l_1 \sin \alpha_1 = \mu_2 l_2 \sin \alpha_2$, where μ_1 and μ_2 are the refractive indices of the media on the object and image sides of the lens respectively, l_1 and l_2 are the linear dimensions of the object and image, and α_1 and α_2 are the angles made with the principal axis by the conjugate portions of a ray passing between object and image.

sine galvanometer (*Elec. Eng.*). A galvanometer in which the coil and scale are rotated to keep the needle at zero. The current is then proportional to the sine of the angle of rotation. The arrangement can be made more sensitive than the tangent galvanometer.

sine wave (*Phys.*). A wave in which the particles execute transverse vibrations of a simple harmonic type. A sine wave may be represented by the general equation

$$y = a \sin 2\pi\left(\frac{t}{T} - \frac{x}{\lambda}\right),$$

in which y is the displacement of a particle at a distance x from the origin, the wave having travelled this distance in time t; a is the amplitude, T the period, and λ the wavelength. See **waves.**

singeing (*Textiles*). Removing outstanding fibres from the face of a cloth to increase the lustre; effected by passing the cloth over gas flames or over incandescent plates or rollers.

singing (*Elec. Comm.*). The continuous oscillation of audio frequency which is set up in a telephone circuit by energy feed-back round the circuit of a repeater; due to inexact impedance balancing of the lines to which the repeater is connected.

singing point (*Teleph.*). The degree of stability, as measured by the gain of a repeater, which is just possible before the repeater provides sufficient feed-back power to sustain self-oscillation; basically due to unbalance of the impedances supposed to match the connected lines in both directions. In a line, taken as a whole, the singing point is determined by the increased loss necessary to overcome the reflection of power by the distributed irregularities.

singing spark system (*Radio*). The same as *musical spark system.*

single-acting engine (*Eng.*). A reciprocating engine in which the working fluid acts on one side of the piston only, as in most I.C. engines.

single-beat escapement (*Horol.*). An escapement in which the balance receives impulse only at every alternate vibration, e.g. the chronometer and duplex escapements.

single block (*Teleg.*). A large condenser at the receiving end only of a submarine cable, to improve the definition of the received fluctuation of current. See **double block.**

single-break switch (*Elec. Eng.*). A switch having only one pair of main contacts.

single bridging (*Carp.*). Bridging in which a pair of diagonal braces are used to connect adjacent floor-joists at their middle points.

single-catenary suspension (*Elec. Eng.*). A catenary suspension system in which the conductor wire is hung from a single catenary or bearer wire.

single-channel (*Elec. Comm.*). Said of a transmission system when it carries one channel of communication only, although there is the possibility of carrying many more.

single-core cable (*Elec. Eng.*). A cable having only one conductor.

single current (*Teleg.*). In a telegraph system, the use of line-currents which are of one polarity for mark, and zero for spacing.

single-cylinder machine (*Paper*). A machine in which the wet paper is pressed on a polished heated cylinder and dried during one revolution. A high glaze is imparted to one side of the paper, while the other side remains rough. Also known as YANKEE MACHINE, M.G. MACHINE.

single-electrode system (*Elec. Eng.*). The electrode of an electrolytic cell and the electrolyte with which it is in contact. Also called HALF-CELL, HALF-ELEMENT.

single Flemish bond (*Build.*). A form of bond combining English bond for the body of the wall with Flemish bond for the facework.

single floor (*Carp.*). A floor in which the bridging joists span the distance from wall to wall without intermediate support.

single flower (*Bot.*). A flower with one set of petals and no indications of doubling.

single-hung window (*Build.*). A window having top and bottom sashes, of which only one (usually the bottom sash) is balanced by sash cord and weights so as to be capable of vertical movement.

single laths (*Build.*). Wood laths 1 in. by $\frac{1}{8}$ in. to $\frac{3}{16}$ in. thick in section.

single-layer winding (*Elec. Eng.*). A type of armature winding in which there is only one coil-side per slot.

single measure (*Join.*). Joinery work which is square on both sides.

single-needle system (*Teleg.*). A telegraph system which uses indicating galvanometers with single needles, deflections to the left or right indicating the coded signal.

single-phase (*Elec. Eng.*). A method of a.c. supply utilising only two conductors.

single-phase induction regulator (*Elec. Eng.*). An induction regulator for use on a single-phase circuit; the arrangement is such that the voltage on the secondary side is always in phase with that on the primary side. Cf. *three-phase induction regulator.*

single-pivot instrument (*Elec. Eng.*). An instrument in which the moving element is supported at its centre of gravity on a single pivot.

single-plate clutch (*Eng.*). A *friction clutch* (q.v.) in which the disc-shaped or annular driven member, fabric-faced, is pressed against a similar face on the driving member by springs, being withdrawn against them through a thrust collar; used in automobiles.

single-pole switch (*Elec. Eng.*). A switch for opening or closing one only of the two leads to an electric circuit.

single quotes (*Typog.*). See **inverted commas.**

single-rate prepayment meter (*Elec. Eng.*). A prepayment meter in which the circuit is broken and the supply cut off after a predetermined number of units have been consumed.

single-retort underfeed stoker (*Eng.*). An *underfeed stoker* (q.v.) consisting of a retort along the bottom of which coal is fed by a steam-driven ram or a screw conveyor, air being supplied through tuyeres round the upper edge of the retort and into the sealed ash-pit below.

single-row radial engine (*Eng.*). A *radial engine* (q.v.) in which the cylinders are disposed in one plane, operating on a common crank-pin.

single side-band system (*Radio*). A system of radio communication in which means are employed to remove either the upper or lower side-band from an amplitude-modulated transmission, with a view to reduction in the channel width occupied and improvement in the signal noise ratio.

single side-band transmission (*Elec. Comm.*). The transmission of one side-band, usually the lower side-band, as the minimum necessary frequency band-width for telephonic speech. The carrier and the other side-band are eliminated by filters after modulation, and before transmission with other similar channels, which occupy other frequency-bands.

single-sole shoes (*Shoes*). Generally, light-weight shoes, with the sole attached directly to the upper by some method of sewing.

single switch call (*Teleph.*). In international telephony, a transit call which involves two international circuits. See **double switch call.**

single transfer process (*Photog.*). The carbon process in which a single transfer is performed. Cf. *double transfer process.*

single-turn coil (*Elec. Eng.*). An armature coil consisting of a single turn of copper bar.

single-turn transformer (*Elec. Eng.*). A current transformer in which the primary winding takes the form of a single straight conductor of heavy cross-section, to which the cable or bus-bar is connected.

single-wave rectification (*Radio*). See **half-wave rectification.**

single-wire feeder (*Radio*). A feeder for an antenna, similar to an ordinary downlead, but connected to the antenna in such a manner that it is terminated in its characteristic impedance, so that no standing waves are formed on it.

single-wire system (*Elec. Eng.*). A method of d.c. distribution making use of a single outgoing conductor and using the earth as the return conductor.

singles (*Build.*). Small roofing slates about 12 × 8 in.

singles (*Textiles*). Threads of raw silk, as reeled from the cocoons, which consist of a small number of strands, slightly twisted.

singlet (*Chem.*). A chemical bond which consists of a single shared electron.

sin'istrorse (*Zool.*). Twisting in a spiral from right to left; said of gastropod shells. Cf. *dextrorse.*

sink (*Cinema.*). See **synchronisation.**

sink (*Horol.*). A recess: the spherical depression around a pivot hole for holding the oil.

sink (*San. Eng.*). A trough serving as a receptacle for dirty water, kitchen wastes, etc., fitted with an outlet to a trapped waste-pipe discharging to the drains.

sinkage (*Textiles*). The term used to indicate the losses in weight which occur in wool materials during the different processes of scouring and finishing. Also called SHRINKAGE.

sinker (*Bot.*). An absorbing organ formed by mistletoe, which penetrates the wood of the host.

sinker (*Hosiery*). The mechanism in a knitting machine that pushes a length of thread over the spring needles to form a new course of loops.

sinker bar (*Mining*). A heavy bar attached to the cable above the drilling tools used in percussive drilling.

sinking (*Civ. Eng.*). The operation of excavating for a shaft, pit, or well.

sinking (*Join.*). A recess cut below the general surface of the work.

sinter (*Chem.*). To coalesce into a single mass under the influence of heat, without actually liquefying.—(*Min.*) A concretionary deposit of opaline silica which is porous, incrusting, or stalactitic in habit; found near geysers, as at Yellowstone Park (U.S.A). Also called GEYSERITE.

sintering (*Elec. Eng.*). The process of consolidating the filament of an electric lamp by passing a relatively high current through it when in a vacuum.

sintering (*Met.*). The fritting together of small particles to form larger particles, cakes, or masses; in case of ores and concentrates, it is accomplished by fusion of certain constituents; in case of metal powders, by welding of the particles by heat and pressure. See **sintered carbides***.

sin'uate (*Bot.*). (1) Said of gills of agarics which show a sudden curvature as they reach the stipe. —(2) In general, having a margin divided into wide irregular teeth or lobes, separated by shallow notches.

sin'uose (*Bot.*). Waved from side to side.

sinuous flow (*Hyd.*). See **eddy flow.**

sinupal'liate (*Zool.*). (Of *Pelecypoda*) having a distinct indentation of the pallial line posteriorly, owing to the presence of a siphon.

si'nus (*Bot.*). A depression or notch in a margin between two lobes.—(*Zool.*) A cavity or depression of irregular shape.

sinus pocula'ris (*Zool.*). See **uterus masculinus.**

sinus rhomboida'lis (*Zool.*). In an early Vertebrate embryo, the posterior part of the neural groove before the medullary folds have closed over it: the wide diamond-shaped cavity of the lumbar region of the spinal cord into which this develops later.

sinus veno'sus (*Zool.*). In a Vertebrate embryo, the most posterior chamber of the developing heart: in lower Vertebrates, the tubular chamber into which this develops and which receives blood from the veins or sinuses and passes it into the auricle.

sinusi'tis (*Med.*). Nasal sinusitis. Inflammation of any one of the air-containing cavities of the skull which communicate with the nose.

sin'usoid (*Zool.*). In Vertebrates, a sinus-like blood space connected usually with the venous system and lying between the cells of the surrounding tissue or organ.

sinusoid'al (*Elec. Eng.*). An alternating quantity is said to be *sinusoidal* when its trace, plotted to a time base, is a sine wave.

si'pho-, sipho'no- (Greek *siphōn*, gen. *siphōnos*, tube). A prefix used in the construction of compound terms; e.g. *siphorhinal* (q.v.).

siphon (*Bot.*). An elongated cell which extends the whole length of a joint in some red algae.

siphon (*Civ. Eng.*). (1) A pipe line full of water connecting two reservoirs, and rising above the hydraulic gradient but not above the absolute hydraulic gradient, so that flow can take place under the action of atmospheric pressure.—(2) A pipe or aqueduct crossing a valley and rising again to somewhat less than its inlet-level, so as to have the necessary hydraulic gradient. More correctly called an INVERTED SIPHON.

siphon (*Zool.*). A tubular organ serving for the intake or output of fluid, as the pallial siphons of many bivalve *Mollusca*.—*adj.* **si'phonate.**

siphon spillway (*Civ. Eng.*). A siphon connecting the upstream and the downstream sides of a reservoir dam, thus enabling flood waters to pass as in the case of a *bye-channel* (q.v.).

siphon trap (*San. Eng.*). A trap having a double bend like an S on its side, the lower bend containing the water seal preventing reflux of foul gases. Fitted to closets and sinks.

Siphonap'tera (*Zool.*). An order of *Endopterygota* in which wings are lacking; the mouth-parts are adapted for piercing and sucking; the antennae are three-jointed, and the eyes, when present, are simple; the larvae are legless but active, and feed on organic debris; the adults are intermittent parasites of Mammals or Birds. Fleas.

sipho'neous (*Bot.*). Tubular.

si'phonet (*Zool.*). The cornicle or honeydew tube of an Aphid.

sipho'nium (*Zool.*). In *Loricata*, a membranous tube connecting the air-passages of the quadrate with an air-space in the os articulare of the mandible.—*adj.* **sipho'nial.**

si'phonogam (*Bot.*). A plant in which the contents of the pollen grain pass into the embryo sac through a pollen tube.

si'phonoglyph (*Zool.*). In *Anthozoa*, a longitudinal ciliated groove of the stomodaeum.

Siphonoph'ora (*Zool.*). An order of *Hydrozoa* the members of which form free-swimming colonies without skeletal structures developed from an original medusiform individual; the medusae usually remain attached, and polymorphism of both hydroid and medusoid persons occurs.

si'phonostele (*Bot.*). A hollow tube of vascular tissue, enclosing a pith and embedded in ground tissue.

siphonosto'matous (*Zool.*). Having a tubular mouth: (of *Gastropoda*) having the anterior end of the shell-aperture produced into a spout.

siphonozo'oid (*Zool.*). In *Alcyonaria*, a type of polyp lacking tentacles and gonads and having filaments only on the dorsal mesenteries. Cf. *autozooid.*

siphorhi'nal (*Zool.*). Having tubular nostrils.

si'phosome (*Zool.*). The lower part of a siphonophoran colony, to which the nutritive and reproductive individuals are attached.

si'phuncle (*Zool.*). In Aphids, the honeydew tube: in *Nautiloidea*, a narrow vascular tube extending from the visceral region of the body through all the chambers of the shell to its apex.—*adj.* **siphun'culate.**

Sippy treatment (*Med.*). The treatment of gastric ulcer by diet and by administering alkalies in order to neutralise the hydrochloric acid of the gastric juice.

Sipunculoi'dea (*Zool.*). A phylum of non-metameric worm-like *Coelomata*, bearing a simple circular retractile lophophore anteriorly and having a dorsal anus close to the mouth; there is a closed vascular system; solitary marine forms living in the sand or mud of the ocean floor.

Sir'apite (*Build.*). A proprietary form of gypsum plaster made by calcining certain gypsums naturally containing bitumen. Much used in two-coat work in place of three-coat lime plaster.

siren (*Acous.*). A powerful source of noise of a more or less pure tone; the noise is usually generated by the periodic escape of compressed air through a rotary shutter.

Sire′nia (*Zool.*). An order of large aquatic Mammals of herbivorous habit; the fore limbs are fin-like, the hind limbs lacking; there is a horizontally flattened tail-fin; the skin is thick with little hair, there are two pectoral mammae, and the neck is very short. Sea Cows, Manatees, and Dugongs.

sirenome′lus (*Med.*). A foetal monster with fused legs but no feet.

siroc′co, sciroc′co (*Meteor.*). A warm moist wind from the south or south-east, which blows before the eastward passage of a depression in Mediterranean regions.

sisal hemp (*Bot.*). A fibrous material used extensively for cordage and binder-twine. The chief source is *Agave sisalana*, which grows on waste ground in the Yucatan district and Mexico.

Sisalcraft (*Build.*). Trade-name for a sheathing paper.

sister cell (*Biol.*). One of the two cells formed by the division of a pre-existing cell.

sister nucleus (*Biol.*). One of the two nuclei formed by the division of a pre-existing nucleus.

site (*Build., Civ. Eng.*). An area of ground which is to be the location of engineering or building works.

site error (*Radio*). A stable error in direction-finding due to the presence of reflecting obstacles, or of a coast, near the site of the receiving antennae.

site rivet (*Struct.*). A *field rivet* (q.v.).

sit′fast (*Vet.*). A small hard lump on the skin of a horse's back.

sitos′terol (*Chem.*). $C_{29}H_{50}O$, a sterol derivative, found in corn oil, which resembles closely cholesterol.

sitotro′pism (*Zool.*). Reaction or response to the stimulus of food.

six-phase (*Elec. Eng.*). A term applied to circuits or systems of supply making use of six alternating voltage phases, vectorially displaced from each other by $\pi/3$ radians.

Six's thermometer (*Heat*). A form of *maximum and minimum thermometer* (q.v.) consisting of a bulb containing alcohol joined to a capillary stem bent twice through 180°. A long thread of mercury is in contact with the alcohol in the stem, and this mercury moves as the alcohol in the bulb expands and contracts. Each end of the mercury thread pushes a small steel index in front of it, one of which registers the maximum temperature and the other the minimum.

sixteen′mo (*Print.*). A book whose sheets are folded into sixteen leaves (thirty-two pages). Also called SEXTODECIMO and written 16*mo*.

sixty-fourmo (*Print.*). A sheet folded into sixty-four leaves.

size (*Paint., etc.*). An animal glue in powder or jelly form, used in cheap work as an undercoating for distempers and wall-papers in order to prevent the wall from absorbing moisture from them.

size water (*Paint., Plast.*). A solution of size in hot water. It is added to plaster to make it more slow-setting, or used as an undercoating on walls. See **size**.

size distribution (*Chem.*). The proportion of each group of particles, of about the same size from small to large, which in the aggregate make the whole.

size-grading (*Chem.*). The process of determining the general distribution of particles of different sizes in a material.

sizing (*Textiles*). The term *sizing* comprehends several processes employed at various stages and for different purposes in the manufacture of textile fabrics, e.g. the application of binding materials such as flours, starches, animal sizes; softeners such as lubricants; weighting materials.

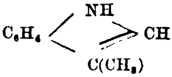
S.J. (*Build.*). Abbrev. for *soldered joint*.

skarn (*Geol.*). A Swedish mining term applied to the silicate-gangue minerals associated with the magnetite ores in Sweden. They occur in Archaean rocks, and have been formed by the replacement of carbonates through the action of hot solutions. The term is now extended to cover analogous deposits elsewhere.

skate (*Elec. Eng.*). The special type of sliding contact piece by which an electric tractor collects current in the surface-contact system of electric traction supply.

skate, sidetracking (*Aero.*). (1) A device to move an aeroplane sideways on the ground, for manœuvring in confined spaces, as when packing into sheds.—(2) A shoe for slipping beneath the wheels for handling an aeroplane on soft snow.

skat′ole (*Chem.*).



$C_6H_4\langle {}^{NH}_{C(CH_3)} \rangle CH$; 3-methylindole, colourless plates, of faecal odour; m p. 95° C.

skein (*Cyt.*). The nuclear reticulum.

skein (*Textiles*). (1) A fixed quantity of yarn or thread; wool, cotton, or silk yarn wound on a frame to a fixed length, and then doubled and secured by a knot for convenience in handling.—(2) The unit of length in the counting of woollen yarns and silk yarns. See **count**.

skeletal muscle (*Zool.*). See **striated muscle.**

skeletog′enous (*Zool.*). Forming or taking part in the formation of the skeleton.

skeleton (*Anat., Zool.*). The rigid or elastic, internal or external, framework, usually of inorganic material, which gives support and protection to the soft tissues of the body and provides a basis of attachment for the muscles.—*adjs.* **skel′etal, skeletog′enous.**

skeleton (*Surv.*). The network of survey lines providing a figure from which the shape and salient features of the survey may be determined.

skeleton crystals (*Geol.*). Imperfect crystals of very minute size occurring in glassy igneous rocks; often merely three-dimensional frameworks, the interstices in which would have been filled in under conditions of slower cooling. See also **dendrite.**

skeleton drums (*Paper*). Drums over which paper is dried after being animal-sized. Fans revolve in a direction opposite to the travel of the paper and expedite the drying process.

skeleton flashing (*Plumb.*). A *stepped flashing* (q.v.).

skeleton key (*Build.*). A special key of skeleton form, capable of operating a number of different locks.

skeleton movement (*Horol.*). A clock or watch movement the plates of which have been pierced or cut away to show the mechanism.

skeleton steps (*Build.*). Steps in a stair, made usually of cast-iron, in which there are no risers but only treads fixed at suitable positions above one another between side supporting pieces.

skeleton-type switchboard (*Elec. Eng.*). A switchboard consisting of a metal framework upon which the switches and other apparatus is mounted. Also called FRAME-TYPE SWITCHBOARD.

Skelgill Group (*Geol.*). The name given to the lower portion of the Llandovery Series of rocks in the Lake District and the North of England. They consist of pale mudstones and black shale yielding a rich graptolitic fauna.

skelp (*Met.*). Mild steel strip from which tubes are made by drawing through a bell at welding temperature, to produce lap-welded or butt-welded tubes.

skene arch (*Civ. Eng*). An arch having the shape of a circular arc subtending less than 180°. Also called SCHEME ARCH.

skep (*Mining*). See **skip.**

skew. Generally, irregular, unsymmetrical, oblique.

skew arch (*Build., Civ. Eng.*). An arch which has its axis or line of direction oblique to its face.

skewback (*Civ. Eng.*). The part of a pier which immediately supports a segmental arch. Its upper bed is inclined towards the centre of the arch, to correspond with those of the voussoirs, while its lower bed is horizontal, to correspond with those of the stones in the pier.

skew bevel gear (*Eng.*). A *hypoid bevel gear* (q.v.).

skew butt (*Build.*). A *skew corbel* (q.v.).

skew coil (*Elec. Eng.*). An unsymmetrical coil inserted in the armature winding of an alternator having an odd number of pole pairs.

skew corbel (*Build.*). The projecting masonry or brickwork supporting the foot of a gable coping.

skew fillet (*Build.*). A *tilting fillet* (q.v.).

skew flashing (*Plumb*). A flashing fixed down a gable wall.

skew nailing (*Carp.*). The operation of driving nails in obliquely.

skew rabbet plane (*Join*). A rabbet plane with its cutting edge arranged obliquely across the sole.

skew-table (*Masonry*). A stone which is bonded in with a gable wall, as a support for the foot of the coping.

skew wall (*Acous.*). In a studio, a wall which does not form a face of a parallelopiped; the walls are so arranged that continuous reflections between opposite walls are obviated.

skewed pole (*Elec. Eng.*). A field pole whose cross-section is a parallelogram instead of the usual rectangle.

skewed slot (*Elec. Eng.*). A slot whose diameter is not parallel to the axis of rotation.

ski'agraphs (*Photog.*). Photographs made by exposure of sensitive emulsions to X-rays. See **radiograph.**

skias'copy (*Med.*). See **retinoscopy.**

skid, skidding. Movement of a road vehicle under a condition of sliding friction, as distinct from rolling friction.

skid (*Aero.*). See **tail skid.**

skids (*Build.*). Small pieces of timber packed under a surface to bring it to the plane.

Skidda'vian (*Geol.*). An alternative name given to the lowest division (Arenig Series) of the Ordovician System in the British Isles, and applied particularly to the graptolitic shale facies of that formation in the Lake District.

Skiddaw Slates (*Geol.*). A thick group of highly cleaved slates, found in the core of the Lake District of England, and of Lower Ordovician (Arenigian to Llanvirnian) age.

skiffling (*Masonry*). The operation of breaking projecting pieces off stones in a quarry when they are being rough dressed.

skim coulter (*Agric. Mach.*). A form of coulter sometimes fitted to a plough, in advance of the coulter; it pares the edge of the furrow slice.

skimming coat (*Plast.*). The *setting coat* (q.v.).

skin. The protective tissue layers of the body-wall of an animal, external to the musculature. See **epidermis.**

skin (*Bot.*). (1) Epidermis.—(2) The plant material which forms the outer part of a periclinal chimaera.

skin (*Eng.*). The hard surface layer found on iron castings due to the rapid cooling effect of the mould.

skin effect (*Elec. Eng.*). The effect, especially prominent at radio frequencies, of the alternating current in a conductor, which tends to concentrate near the surface, thus increasing the effective resistance. The resistance to 50-cycle current of a 0·75-inch conductor is 1·02 times the d.c. resistance, the effect increasing with frequency.

skin gills (*Zool.*). See **papulae.**

skin wool (*Textiles*). Wool removed from the fleeces of slaughtered sheep, whether by a liming, sulphide, or sweating process. In the first two processes the skins are painted on the flesh side with lime, or sodium sulphide; in the last named, the skins are steeped in water and then hung in a closed chamber.

skinner (*Elec. Comm.*). The length of insulated wire between the point of connexion to a solder tag and the cable form from which it emerges.

Skinoff (*Civ. Eng.*). Trade-name of a retarder, which in use is applied to the shuttering in which concrete work is being moulded.

skintled (*Build.*). Said of brickwork in which the bricks are laid irregularly, so as to leave an uneven surface on the wall; also of a similar effect produced by protruding mortar squeezed from the joints.

skiophyte (*Bot.*). See **sciophyte.**

skip (*Civ. Eng.*). A bucket used for the transport of spoil or materials and hung for this purpose from a crane or cableway.

skip (*Mining*). A guided steel or duralumin box for hoisting coal or mineral up a shaft. A kibble hangs freely in the shaft. Also called SKEP.

skip distance (*Radio*). The minimum distance from a transmitter, beyond the zone where no signals are audible, where the reflected ray returns to earth and the signals become audible again.

skip draft (*Textiles*). An order for drawing warp threads through the eyes of the healds, a number of healds being *skipped*, or missed, at intervals.

skip effect (*Radio*). The effect, prominent at short wavelengths, of the signal from a transmitter becoming inaudible at a relatively short distance away, although being readily receivable at greater distances owing to reflection from the Heaviside layer.

skip-shaft draft (*Textiles*). An order for drawing warp threads through the eyes of the healds, alternate healds being *skipped*, or missed. A skip-shaft draft on 4 shafts is in the order 1, 3, 2, 4; on 8 shafts 1, 3, 5, 7, 2, 4, 6, 8.

skip-tooth saw (*Tools*). A saw from which alternate teeth are cut away.

skipping line scanning (*Television*). The same as *interlaced scanning*.

skipping printer (*Cinema.*). A contact printer of cinematograph film which prints selected frames rather than each one in turn.

skirt (*Elec. Comm.*). The lower side portions of a resonance curve.

skirting board (*Build.*). A board covering the plaster wall where it meets the floor. Also called BASEBOARD, MOP-BOARD, WASHBOARD.

skirtings (*Textiles*). Dirty or coarse wool removed from the skirt of a fleece after shearing.

skittle pot (*Glass*). A small pot, in shape resembling a skittle, which can be set in a furnace in some small corner to melt a special glass, e.g. a colour. Some small firms use a furnace holding only 4 or 6 of these, fired by coke.

skiv'er (*Leather*). The grain split from a sheepskin, used in the finished state for bags, purses, etc.

skot'ograph (*Photog.*). A developable image produced in a photographic emulsion by radiation from organic tissue in the dark.

Skraup's synthesis (*Chem.*). The synthesis of quinoline by heating aniline with glycerine and sulphuric acid, in the presence of nitrobenzene or arsenic acid as oxidising agent.

Skrinkle Sandstones (*Geol.*). A group of quartzitic sandstones and breccias of subangular quartz fragments; of Upper Devonian age; found in Pembrokeshire.

skull (*Zool.*). In *Vertebrata*, the brain case and sense-capsules, together with the jaws and the branchial arches.

skunk (*Furs*). The dressed skin of the skunk (*Mephitis*), an American burrowing animal. The fur is long, glossy, and usually black, with markings along the back, and the tail is tipped with white.

skut'terudite (*Min.*). Grey or whitish arsenide of cobalt, which crystallises in the cubic system and sometimes assumes a massive granular habit.

sky (*Meteor.*). See **blue of the sky.**

sky light (*Bot.*). The diffuse light falling on a plant from the sky, in contrast with direct sunlight.

skylight (*Build.*). A glazed opening in a roof.

skyscraper (*Build.*). A very tall, multistoreyed building.

sky wave (*Radio*). See **indirect ray.**

skyteens (*Textiles*). The name for satin weave shirting with a light blue ground and stripes of other colours.

S.L. (*Build.*). Abbrev. for *short lengths*.

S.L.-type cable (*Cables*). Separate-lead-type cable. Each core has its own lead sheath, and a fourth lead sheath encloses the whole.

slab (*Carp.*). An outer piece of a log cut away in the process of slabbing.

slab (*Civ. Eng.*). (1) The upper part of a reinforced concrete floor supported at intervals by beams underneath, which are continuous with it. See **T-beam.**—(2) A thin flat piece of stone, concrete, etc.

slab and girder floor (*Civ. Eng.*). A ferro-concrete floor in which the secondary beams are embodied with a thin slab for the floor surface.

slab coil (*Elec. Eng.*). A coil in the form of a flat spiral; the term is normally applied to inductance coils.

slabbing (*Carp.*). The operation of squaring a log.

slack (*Mining*). Small coal, coal dirt; as in SLACK HEAP, a tip or dump.

slack blocks (*Civ. Eng.*). A pair of wedge-shaped blocks of hard wood packed beneath each end of a centre, and placed in contact with their thin ends pointing in opposite directions, so that by moving them relatively the centre may be gradually lowered on completion of the work.

slack-water navigation (*Civ. Eng.*). River or canal navigation rendered possible by the construction of dams across the stream at intervals, dividing it into separate reaches, communication being maintained by the use of locks. Also called STILL-WATER NAVIGATION.

slade (*Agric. Mach.*). A flat plate attached to the body of a plough to take up the vertical reactions of the ground when the plough is working.

slade (*Build.*). An inclined pathway.

Slade Beds (*Geol.*). A group of green mudstones and thin limestones which form the highest part of the Ashgillian Series of the Ordovician System in South Wales.

slag (*Met.*). The top layer of the two-layer melt formed during smelting and refining operations. In smelting it contains the gangue minerals and the flux; in refining, the oxidised impurities.

slag cement (*Civ. Eng.*). An artificial cement made by granulating slag from blast furnaces by chilling it in water and then grinding it with lime, to which it imparts hydraulic properties.

slag wool (*Met.*). An aggregate of fine filaments of slag produced by blowing a blast of air through a stream of blast-furnace slag. Used for heat insulation in high-temperature furnaces, etc. Also called MINERAL WOOL.

slaked lime (*Build.*, *Chem.*, *etc.*). See under **caustic lime.**

slaking (*Build.*). The process of combining quicklime with water.

slamming stile (*Join.*). The upright member of a door case against which the door shuts and into which the bolt of a rim lock engages.

slap dash (*Plast.*). A rough finish given to a wall by coating it with a plaster containing gravel or small stones.

slashed (*Bot.*). Deeply cut by tapering incisions.

slasher (*Textiles*). (1) The slasher sizing machine; it performs the operations of sizing, drying, and beaming yarn intended for warp.—(2) The operative in charge of the slasher sizing machine.

slat (*Aero.*). An auxiliary aerofoil which constitutes the forward portion of a slotted aerofoil, the space between it and the main portion of the structure forming the slot.

slat (*Carp.*). A thin flat strip of wood.

slat conveyor (*Eng.*). See **apron conveyor.**

slate (*Geol.*). A sedimentary rock of the clay or silt grade which, as a consequence of regional metamorphism, has developed a good slaty cleavage. Cf. *Stonesfield Slate*, *Collyweston Slate.*—(*Build.*) A thin slab of slate used in roof or wall covering.—(*Elec.*) Slate is used for switchboard panels. Care must be taken to avoid the use of pieces with conducting veins of pyrites, magnetite, etc. The electrical strength is 5 to 7 kV per inch for 1 inch thickness.

slate axe (*Tools*). A *sax* (q.v.).

slate boarding (*Build.*). Close boarding laid as an underlining to, and a support for, roofing slates or tiles.

slate cramp (*Build.*). A piece of slate about 7×2¼×1 in. cut to a narrow waist at the middle, and fitted flush into mortises in adjacent stones to bind them together.

slate hanging (*Build.*). Similar to *weather tiling* (q.v.), slates being used instead of tiles.

Slatex (*Build.*). Trade-name of a bituminous waterproofing agent.

slating (*Build.*). A roof-covering formed of slates.

slating and tiling battens (*Build.*). Any pieces of square-sawn converted timber between ⅝ and 1¼ in. in thickness and from 1 to 3½ in. in width; commonly used as a basis for slating and tiling.

slaty cleavage (*Geol.*). The property of splitting easily along regular, closely spaced planes of fissility, produced by pressure in fine-grained rocks, the cleavage planes lying in the directions of maximum elongation of the mass.

slaughterhouse. A place in which cattle or sheep are killed.

slavery (*Zool.*). See **dulosis.**

slay (*Weaving*). See **sley.**

sledge-hammer (*Eng.*). A heavy double-faced or straight-paned hammer, weighing up to 100 lb. or over, swung by both hands.

sleekers (*Foundry*). Moulders' tools having a smoothing face made to various shapes, for smoothing over small irregularities in the sand of the mould. Also called SMOOTHERS. See **corner tool.**

sleep movement (*Bot.*). The folding together of the leaflets of a compound leaf at night, so that surfaces bearing numerous stomata are brought together; the significance of the movement is not yet understood.

sleeper (*Carp.*). A horizontal timber supporting a vertical shore or post, and distributing the load over the ground.—(*Rail.*) A beam passing transversely beneath the rails, which it supports and prevents from spreading apart. Also called CROSS-TIE, CROSS-SILL.

sleeper plate (*Build.*). A wall plate resting upon a sleeper wall.

sleeper wall (*Build.*). A low wall built under the ground storey of buildings having no basement, as a support for the floor joists. When in brick, the wall is built honeycombed to leave spaces for ventilation, and when in stone small piers at intervals provide the support required.

sleeping sickness (*Med.*). See **trypanosomiasis.**

sleeping sickness, avian (*Vet.*). See **spirochaetosis (avian).**

sleepy sickness (*Med.*). See **epidemic encephalitis.**

sleepy sickness of foxes (*Vet.*). Chronic bronchitis due to infection by nematode worms of the genus *Encoleus*.

sleet (*Meteor.*). A mixture of rain and snow, or partially melted snow.

sleeve (*Elec. Eng.*). See **plain coupler.**

sleeve (*Eng.*). A tubular piece, usually one machined externally and internally.

sleeve (*Teleph.*). (1) The thin slug which is placed over the core of the line relay in a subscriber's line circuit. Made of nickel-iron, so that the inductance of the relay, which also acts as a feeding bridge, is enhanced, with a reduction of the number of turns and consequent lower resistance.—(2) The outermost contact on three-conductor flexible cords, terminating in conductor plugs which terminate the cord circuit. It is connected to the S-wire of the circuit. See **S-wire.**

sleeve joint (*Elec. Eng.*). A conductor joint formed by a sleeve fitting over the conductor ends. It is either pinned or soldered to the conductors.

sleeve piece (*Plumb.*). A short length of brass or copper pipe, used in forming a joint between a lead pipe and one of some other material. Also called THIMBLE.

sleeve valve (*I.C. Engs.*). A thin steel sleeve fitted between the cylinder and the piston of a petrol- or oil-engine. It is given a reciprocating and rotary oscillating motion, thus causing ports cut in it to register alternately with corresponding inlet and exhaust ports in the cylinder wall.

slenderness ratio (*Struct.*). See **ratio of slenderness.**

sley or **slay** (*Weaving, etc.*). (1) To pass the warp threads through a reed, for dressing or weaving.—(2) The reed guiding the warp threads in a loom, and carrying the raceboard and shuttle boxes. It has a to-and-fro movement which enables it to beat up the weft to the edge of the cloth.—(3) A guideway in a knitting machine.—(4) The part of a lace machine, between the beams and the thread guides, which functions in keeping the threads properly arranged.

sley sword (*Weaving*). One of the two metal arms, attached to a rocking shaft, which support the sley in a loom.

slicing (*Cinema.*). Rotating a microphone so that its axis is diverted from the source of sound.

slick (*Join.*). A chisel with a wide cutting edge, used for paring the sides of tenons and mortises.

slick'ensides (*Geol.*). Smooth, grooved, polished surfaces produced by friction on fault-planes and joint faces of rocks which have been involved in faulting.

slicker (*Foundry*). A small implement used by a moulder for smoothing the surface of a mould.

slicker (*Leather*). A metal, vulcanite, stone, or glass implement, used for smoothing or stretching leather.

slide (*Mining*). A vertical crack in a vein, along which movement has taken place: the clay filling of such a crack: a fault.

slide (*Photog.*). See **dark slide; also projection lantern.**

slide-back (*Radio*). The depression of the mean potential of the grid of a thermionic valve which occurs when a relatively large alternating voltage is applied to it and the external grid to cathode path offers a high resistance to direct current.

slide bars (*Eng.*). See **guide bars.**

slide-rails (*Elec. Eng.*). Slotted rails, secured to the floor, on which the base-plate of an electric motor is fixed. As the driving belt stretches the motor can be moved along the rails to take up the slack.

slide-resistance (*Elec. Eng.*). A rheostat whose ohmic value is adjusted by sliding a contact over the resistance wire.

slide rest (*Eng.*). A slotted table carrying the tool post of a lathe. It is mounted on the saddle or carriage, and is capable of longitudinal and cross traverse.

slide rule. A device for performing mechanically arithmetical processes, as multiplication, division, etc. It consists of one rule sliding within another, so that their adjacent similar logarithmic scales permit of the addition and subtraction, corresponding to the multiplication and division, of the numbers engraved thereon.

slide valve (*Acous.*). The slide, containing holes, which is drawn across the supply of air to a rank of organ pipes, to stop the pipes speaking when a key is depressed. Operated by draw-stops through trackers and stickers.

slide valve (*Eng.*). A steam-engine inlet and exhaust valve shaped like a rectangular lid. It is reciprocated inside the steam chest, over a face in which steam ports are cut, so as alternately to admit steam to the cylinder and connect the ports to exhaust through the valve cavity. See **D-slide valve, piston valve.**

sliding caisson (*Hyd. Eng.*). A floating body used to open or shut the entrance to a dock or basin, and capable of being drawn for the former purpose into a recess at right-angles to the channel.

sliding contact (*Elec. Eng.*). A contact in which there is relative movement with another surface, e.g. the moving contact of a slide-wire resistance.

sliding growth (*Bot.*). The rearrangements which are presumed to take place in xylem as the tracheids and vessels elongate and fit in among one another.

sliding-mesh gear-box (*Automobiles*). A gear-box in which the ratio is changed by sliding one pair of wheels out of engagement and sliding another pair in.

sliding-panel weir (*Civ. Eng.*). A form of frame weir in which the wooden barrier consists of wooden panels, sliding in grooves between each pair of frames.

sliding sash (*Join.*). A sash that moves horizontally on runners, as distinct from a *balanced sash* sliding vertically.

sliding ways (*Ship Constr.*). The portion of a ship's launching ways which move with the ship on launching.

slimes (*Met.*). Particles of crushed ore which are of such a size that they settle very slowly in water and through a bed which water does not readily percolate. Such particles must be leached by agitation. By convention these particles are regarded as less than one four-hundredth of an inch in diameter (200 mesh).

slime flux (*Bot.*). An exudation of a watery solution of sugars and other substances from trees which have been wounded or are attacked by various parasites.

slime mould (*Bot.*). The popular name for a *Myxomycete*.

slime plug (*Bot.*). A mass of slimy material filling the pores in a sieve tube.

slime string (*Bot.*). A viscous mass of food material passing through a pore in a sieve plate.

sling (*Civ. Eng.*). A rope or chain fastened around an object which is to be raised by crane, etc., providing a point of suspension.

sling fruit (*Bot.*). A fruit from which the seeds are projected by elastic tissue.

slip (*Build.*). A long narrow piece of wood of the full thickness of a mortar joint, built into surface brickwork to provide material to which joinery may be nailed.

slip (*Civ. Eng.*). A sloping masonry or concrete surface for the support of a vessel in process of being built or repaired.

slip (*Elec. Eng.*). The fraction by which the rotor speed of an induction motor is less than the speed of rotation of the stator field, i.e. the ratio of the speed at which the rotor slips back from exact synchronism with the stator field to the latter's speed of rotation.

slip (*Eng., etc.*). (1) See **belt slip.**—(2) In a screw propeller, the amount by which the product of the pitch and r.p.m. exceeds the actual forward velocity, expressed as a percentage of the former.

slip (*Met.*). The process involved in the plastic deformation of metal crystals in which the change in shape is produced by parts of the crystals moving with respect to each other along crystallographic planes.

slip (*Pot.*). Clay reduced to the consistency of cream by the addition of water; used for coating coarser bodies by dipping, or, coloured, for decorative layers, and for glazing. *

slip (*Teleg.*). The continuous narrow strip of paper which is perforated with holes representing telegraphic signals intended for subsequent accurate and speedy transmission in a transmitter such as the *Wheatstone* (Morse code), or *Siemens Multiplex* (Baudot code).

slip bands (*Met.*). Steps or terraces produced on the polished surface of metal crystals as a result of the parts moving with respect to each other during slip.

slip dock (*Civ. Eng.*). A dock from which the water can be discharged, and which is equipped with a *slip* (q.v.).

slip feather (*Join.*). A wooden tongue for a *ploughed and tongued joint* (q.v.), distinguished as a *straight tongue, feather tongue,* or *cross tongue* (qq.v.) according to the direction of the grain.

slip kiln (*Pot.*). A shallow tank traversed by hot-air flues, in which clay, converted into slip with water, is dried for regrinding.

slip meter (*Elec. Eng.*). A device for measuring the slip of an induction motor.

slip mortise (*Join.*). A *slot mortise* or a *chase mortise* (qq.v.).

slip planes (*Met., Min.*). The particular set or sets of crystallographic planes along which slip takes place in metal and other crystals. These are usually the most widely spaced set or sets of planes in the crystals concerned. See **gliding planes.**

slip proof (*Typog.*). A proof taken from a galley of type matter before it is made up into pages.

slip regulator (*Elec. Eng.*). A regulating resistance connected in series with the rotor of a slip-ring type induction motor in order to alter the slip, and thus vary the speed of the machine.

slip-rings (*Elec. Eng.*). The rings mounted on, and insulated from, the rotor shaft of an a.c. machine, which form the means of leading the current into or away from the rotor winding.

slip-ring motor (*Elec. Eng.*). An induction motor having a wound rotor, the connexions to which are brought out to slip-rings.

slip-ring rotor (*Elec. Eng.*). The rotor of a slip-ring induction motor; it has a two- or three-phase winding brought out to slip-rings. Cf. *cage rotor.*

slip sill (*Build.*). A *sill* (q.v.) of length equal to the distance between the jambs of the opening.

slip stone (*Carp., etc.*). A small shaped piece of oilstone used for putting an edge on gouges.

slipstream (*Aero.*). The air current set up by an air screw.

slip tanks (*Aero.*). See under **fuel tanks.**

slipway (*Civ. Eng.*). A *slip* (q.v.).

slip winding (*Textiles*). The process of transferring yarn from a hank to flanged bobbins, for lace manufacture.

slip-winding engine (*Textiles*). A machine comprising drums and swifts, used for winding flanged bobbins in lace manufacture.

slipe wool (*Textiles*). Wool removed from the skins of slaughtered sheep by the process of liming. See **skin wool.**

slipped bank (or **multiple**) (*Auto. Teleph.*). A bank of outgoing trunks so connected that they are tested in the same order by all switches but starting from different points. See **straight bank.**

slipper brake (*Elec. Eng.*). An electromechanical brake acting directly on the rails of a tramway.

slipper jack (*Teleph.*). The original type of jack used in telephone exchanges.

slipper piston (*I.C. Engs.*). A light piston having the lower part or skirt cut away between the thrust faces, to save weight and reduce friction.

slipping zone (*Bot.*). A highly polished surface a little below the rim of a pitcher, on which insects slip and are projected to the bottom of the pitcher.

slit (*Cinema.*). The slit which is illuminated and focused on to the moving film, both in recording and projecting.

slit test (*Cinema.*). The routine test in which a photograph of the focused slit is made, either in sound-camera or projector, to ascertain whether it is of the correct dimensions and located exactly 90° with respect to the edge of the film.

slitless spectroscope (*Astron.*). See **objective prism.**

sliv'er (*Spinning*). A continuous strand of fibres formed after carding.

slope (*Build.*). See **splay brick.**

slope (*Civ. Eng.*). (1) The inclined side of a cutting or embankment.—(2) The angle of inclination of the above side.

slope, slope conductance (*Radio*). See **mutual conductance.**

slope correction (*Surv.*). A correction applied to the observed length of a base line to correct for differences of level between the ends of the measuring tape.

slope level (*Surv.*). A form of clinometer for determining the slope of cuttings and embankments.

slope resistance (*Thermionics*). See **differential anode resistance.**

slope staking (*Surv.*). The locating and pegging of points at which proposed earth slopes in cutting or bank will meet the original ground surface.

slot (*Elec. Eng.*). An axially-cut trench, cut out of the periphery of the stator or rotor of an electrical machine, into which the current-carrying conductors forming the winding are embedded.

slot leakage (*Elec. Eng.*). In an electrical machine, the leakage flux that passes across the slots.

slot link (*Eng.*). See **link motion, radial valve gear.**

slot meter. The common name for the usual coin-in-the-slot type of prepayment meter used for obtaining supplies of gas and electricity.

slot mortise (*Join.*). A mortise made in the end of a member.

slot permeance (*Elec. Eng.*). The total permeance of the several parallel portions of the slot-leakage flux path.

slot pitch (*Elec. Eng.*). The distance between successive slots round the periphery of an armature.

slot ripple (*Elec. Eng.*). The harmonic ripple in the e.m.f. wave of an electrical machine. It arises from the regular variation in the permeability of the magnetic path between stator and rotor, caused by the repeated change in air-gap length as the rotor and stator slots pass one another and the intervening teeth.

slot wedge (*Elec. Eng.*). A wood or metal wedge driven into the opening of an armature slot so as to keep the conductors in place against the action of centrifugal forces.

slotted aerofoil (*Aero.*). Any aerofoil having an air passage (or slot) directing the air from the lower to the upper surface in a rearward direction. Slots may be permanently open, closable, automatic, or manually operated.

slotted core (*Elec. Eng.*). The usual type of armature core, in which slots are provided for the windings. Cf. *smooth core.*

slotting machine (*Eng.*). A machine tool resembling a *shaping machine* (q.v.) but in which the ram has a vertical motion and is balanced by a counterweight, the tool cutting on the down stroke, towards the table.

slotting tools (*Eng.*). Cutting tools used for keyway cutting, etc., in a *slotting machine* (q.v.); they are of narrow edge and deep, stiff section, with top and side clearance but little rake.

slough, sluf (*Med.*). A mass of dead, soft, bodily tissue in a wound or infected area: to form dead tissue (said of the soft parts of the body): to come away as a slough.

slough (*Zool.*). The cast-off outer skin of a Snake.

slow-acting relay (*Elec. Comm.*). A relay designed to operate at an appreciable time after the application of voltage. A copper sleeve or slug is placed over the core, or a short-circuited winding is used.

slow-break switch (*Elec. Eng.*). A knife switch with a single rigid blade forming the moving part of each pole.

slub (*Textiles*). A fault in cotton yarn, which appears as a thicker part, with little twist. Slubs may be deliberately made in yarn at intervals for ornamentation.

slub yarns (*Textiles*). Fancy yarns with thickened parts at frequent intervals.

slubbing (*Spinning*). Sliver which has been fed from the draw frame to the slubbing machine, and there attenuated and wound on a bobbin in the form of coarse thread, with very slight twist.

sludge (*Mining*). Soft mud produced in drilling or boring, or settling out of water in a pump sump.

sludge (*Sewage*). A slimy material produced by the precipitation of solid matters from liquid sewage in sedimentation tanks. See **sewage gas.**

sludger (*Civ. Eng.*). A long cylindrical tube, fitted with a valve at the bottom and open at the top, used for raising the mud which accumulates in the bottom of a boring during the sinking process. Also called SAND PUMP, SHELL PUMP.

sludger (*Mining*). (1) A scraper for clearing mud out of a shothole.—(2) A centrifugal pump for sand and slime.

sludging (*Elec. Eng.*). The formation of a brown deposit in transformer and switch oil, the rate of deposition determining the 'grade' or 'class' of the oil.

sludging (*Hyd. Eng.*). (1) Free-running mud.—(2) The process of filling the crevices left in the dried clay of an embankment formed by the method of *flood-flanking* (q.v.).

slug (*Typog.*). A solid line of type as cast by the Linotype process.

slug (*Teleph.*). A thick copper cylinder placed over the core of a telephone-type relay to retard the rate of change of magnetic flux in the core. If placed at the armature end the relay is slow both in operation and release, but if placed at the heel end the release is slow but the time of operation hardly affected.

sluice (*Civ. Eng.*). A water channel equipped with means of controlling the flow, enabling a sudden rush of water to be used at harbours or canal-locks for the purpose of cleaning out silt, mud, etc. obstructing navigation.

sluice (*Mining*). A long trough for washing gold-bearing sand, clay, or gravel. Also called SLUICE BOX.

sluice gate (*Civ. Eng.*). A barrier plate free to slide vertically across a water or sewage channel or an opening in a lock gate, thereby controlling flow and enabling a sudden rush of water to be used.

sluicing (*Hyd. Eng.*). The process of deepening a navigation channel by discharging into it through an open sluice impounded water from a reservoir.

slump test (*Civ. Eng.*). A test for the consistence of concrete, made with a metal mould in the form of a frustrum of a cone with the following internal dimensions: bottom diameter 8 in., top diameter 4 in., height 12 in. This is filled with the concrete, deposited in layers 3 or 4 in. thick, and then the mould is removed and the height of the specimen measured when it has finished subsiding.

slurgalls (*Hosiery*). Faults in knitted fabrics which occur in a horizontal direction; due to trapping or tightening of the thread while it is being fed to the needles.

slurry (*Build.*). A thin paste produced by mixing some materials, especially Portland cement, with water.

slushed-up (*Build.*). A term applied to brickwork the joints of which are filled with mortar.

Sm (*Chem.*). The symbol for *samarium.*

small (*Paper*). A standard size of cut card 2⅝ × 3⅝ in.

smalls (*Build.*). A slate size, 12 × 8 in.

small arms. All weapons which can be fired with one hand or from the shoulder. The term includes machine-guns.

small bayonet cap (*Elec. Eng.*). A bayonet cap having a diameter of about ⅝ in.; used for small lamps, such as automobile head and side lamps.

small calorie (*Heat*). See **calorie.**

small capital (*Typog.*). A letter having the form of a *capital* (q.v.). but the height of a lower-case letter; e.g. c; indicated in manuscript or proof by two lines under the letter. See **even small caps.**

small circle (*Surv.*). A circle formed on the surface of a sphere by the intersection with it of a plane not passing through the centre of the sphere. Cf. *great circle.*

small Edison screw-cap (*Elec. Eng.*). An Edison screw-cap having a screw-thread of about ½ in. diameter and about 9 threads per in.

small pica (*Typog.*). The old name for a type size now standardised as 11-point.

smallpox (*Med.*). Variola. An acute infectious disease characterised by fever, severe headache, pain in the loins, and a rash which is successively macular, papular, vesicular, and pustular, affecting chiefly the peripheral parts of the body; the causative organism is thought to be a filter-passer.

small-shot effect (*Thermionics*). See **shot noise.**

smallwares (*Textiles*). The term applied to tapes, ribbons, and other narrow goods.

smalt (*Chem.*). A glass made by fusing cobalt oxide and silica.

smaltite, smaltine (*Min.*). Smaltite-chloanthite; essentially the diarsenide of cobalt, crystallising in the cubic system. Chloanthite (diarsenide of nickel) is also invariably present, and the two species graduate into each other; occur in veins; ores of cobalt and nickel.

smar'agdine (*Bot.*). Emerald or dark bluish-green.

smarag'dite (*Min.*). A fibrous green amphibole, replacive after the pyroxene, omphacite, in such rocks as eclogite.

smashing (*Bind.*). The pressing of a book in a machine after sewing, thereby crushing and expelling air. Also called CRUSHING, NIPPING.

smear (*Pot.*). A delicate, waxy or ivory-like glaze.

smegma (*Med.*). A thick greasy secretion of the sebaceous glands of the glans penis.

smell. The sensation produced by stimulation of the mucous membrane of the olfactory organs.

smell test (*San. Eng.*). *Scent test* (q.v.).

smelting (*Met.*). Fusion of an ore or concentrate with suitable fluxes, to produce a melt consisting of two layers—on top a slag of the flux and gangue minerals, and below molten impure metal.

smith'sonite (*Min.*). Carbonate of zinc, crystallising in the trigonal system. It occurs in veins and beds and in calcareous rocks, and is commonly associated with hemimorphite. The honeycombed variety is known as *drybone ore*. The name *calamine* is frequently used in Britain.

smoke (*Chem.*). A suspension, often colloidal, of a solid in a gas.

smoke box (*Eng.*). A cylindrical extension on the front of a locomotive boiler through which the flue gases pass from the tubes to the funnel, and in which draught is created by the exhaust steam blast. A door gives access to the tubes for cleaning.

smoke point (*Chem.*). In the testing of kerosene, the maximum flame height (in millimetres) at which a kerosene will burn without smoking, under prescribed conditions.

smoke shell (*Ammunition*). A shell which on explosion emits a thick cloud of smoke; employed either for blinding the enemy or for concealing the movements of friendly troops.

smoke test (*San. Eng.*). A test sometimes applied to drain-pipes suspected of leakage. The ends are plugged and dense smoke is introduced into the pipe, which is watched for any escape.

smoky quartz (*Min.*). See **cairngorm.**

smooth (*Bot.*). Said of a surface which is neither hairy nor roughened in any way.

smooth ashlar (*Masonry*). A block of stone dressed ready for use, usually for the stone-facing of walls.

smooth core (*Elec. Eng.*). An old form of armature core in which the windings were laid on the smooth cylindrical surface of the core and secured by binding wires or small pegs.

smooth-core rotor (*Elec. Eng.*). A rotor carrying a field winding embedded in tunnels, used in high-speed steam-turbine-driven generators.

smooth mouth (*Vet.*). See **mouth (smooth).**

smoothing circuit (*Radio*). A combination of inductance coils and condensers, arranged as a low-pass filter, for removing the ripple from the d.c. anode voltage supply to a valve derived from a rectifier or d.c. generator.

smoothing equipment (*Elec. Eng.*). A general term covering wave filters, resonant shunts, or other devices installed on d.c. circuits to smooth out any superimposed alternating currents or voltages.

smoothing plane (*Carp.*). A bench plane, about 8 in. long, which is not provided with a handle; used after the trying plane to give a smooth even finish to the work.

S.M.P.E. (*Cinema.*). The Society of Motion-Picture Engineers standard for sound-tracks on substandard cinematograph film in which the sound-track is located on the left-hand side of the picture as normally projected on the screen, as contrasted with the *D.I.N. standard*, at one time in considerable use in Europe, which places the sound-track on the right-hand side. In each type the sound-track replaces one set of sprocket holes on the side of the film.

smudge (*Plumb.*). A lampblack and glue size mixture which is painted over lead surfaces so that solder shall not adhere. Also called SOIL.

smut, smut fungus (*Bot.*). See **Ustilaginales.**

smut (*Mining*). (1) Bad soft coal containing earthy matter.—(2) Coal smuts.—(3) Worthless outcrop material of a coal-seam.

Sn (*Chem.*). The symbol for *tin*.

S/N curve (*Met.*). See **stress-number curve.**

snail (*Horol.*). A cam the contour of which may be a smooth curve or stepped. Used for the gradual lifting or discharge of a lever. The snail in the rack striking work controls the number of teeth picked up on the rack; e.g. at 12 o'clock sufficient motion is allowed to the rack for the gathering pallet to pick up twelve teeth.

snail plant (*Bot.*). A plant which is pollinated by snails.

snailed (*Horol.*). Said of (1) a surface finished with eccentric curves; (2) a barrel arbor so shaped that the inner coil of the mainspring passes over the hook without forming a kink.

snap (*Eng.*). (1) A form of punch with a hemispherically recessed end, used to form rivet heads.—(2) A limit gauge of plate or calliper type.

snap (*Horol.*). To hold parts together by springing one part over or into another. Thus the back of a watch case is snapped on, or a barrel cover snaps into the barrel.

snap (*Textiles*). The unit of length used in the West of England for woollen yarn; viz. 320 yards. See **counts of yarn.**

snap switch (*Elec. Eng.*). A switch which makes and breaks the circuit with a quick snap; it comprises blades whose rate of motion is controlled by a spring. Also QUICK-MAKE-AND-BREAK SWITCH.

snap the line (*Build., Civ. Eng.*). To pluck a well-chalked string, held taut in position, against work in order to mark a straight line.

snapped header (*Build.*). A half-length brick, sometimes used in Flemish bond.

snare (*Surg.*). A wire loop for removing soft tumours such as nasal polypi.

snarls (*Spinning*). Faults due to the yarn having been subjected to an excessive amount of twist. The yarn curls back when tension is released.

sneck (*Join.*). The lifting lever which passes through a slot in a door and actuates the fall bar. See **Norfolk latch.**

sneck (*Masonry*). One of the smaller stones used to fill in between the larger ones in a snecked masonry wall.

snecked (*Masonry*). Said of rubble walls in which the stones are roughly squared but of irregular size and uncoursed.

Snell's law (*Light*). For a ray of light refracted at a surface separating two media, the ratio of the sine of the angle of incidence to the sine of the angle of refraction is constant and is known as the index of refraction for the two media. See **refraction.**

Snett'isham Clay (*Geol.*). A clay rock of marine origin found in the Lower Greensand series of the Cretaceous System in Norfolk.

snore piece (*Mining*). The lower part of the pipe which admits the water to a mine pump: the nose or wind bore.

snow (*Meteor.*). Precipitation in the form of small ice crystals, which may fall singly or in flakes, i.e. tangled masses of snow crystals. The crystals are formed in the cloud from water vapour.

snow boards (*Build.*). Protective boards fixed over roof gutters to carry the weight of snow. The snow, on melting, drops into the gutter through gaps left between the boards. Also called GUTTER BOARDS.

snow guards (*Build.*). Horizontal boards fixed on edge, slightly above an eaves gutter, to prevent snow from sliding off a roof.

snow load (*Struct.*). The unit loading assumed in the design of a roof to allow for the probable maximum amount of snow which will collect upon it.

Snowcrete (*Build.*, *Civ. Eng.*). Trade-name of a white or cream-coloured Portland cement manufactured by the Cement Marketing Co., Ltd.

Snowdonian Lavas (*Geol*). A thick series of rhyolitic lavas and ashes exposed on Snowdon in North Wales; they belong to the Caradocian stage of the Ordovician System.

snuffles (*Med.*). Symptoms resulting from nasal discharge and obstruction of the nose in infants, due usually to congenital syphilis.—(*Vet.*) A nasal catarrh supervening upon rickets or osteomalacia: contagious rhinitis and bronchitis of rabbits.

soakers (*Plumb.*). Small pieces of sheet-lead or zinc bonded in for watertightness with the slates or tiles of a roof at joints with walls or at valleys and hips.

soaking (*Met.*). A phase of a heating operation during which metal is maintained at the requisite temperature until the temperature is uniform throughout the mass.

soaps (*Build.*). Bricks, 9×2¼×2¼ in. in size, which are often pierced for use as air bricks.

soaps (*Chem.*). (1) The alkaline salts of palmitic, stearic, or oleic acid. *Soft soaps* contain the potassium salts, whereas the sodium salts are *hard soaps*.—(2) The alkali salts of resins, so-called *resin soaps*.

soapstone (*Min.*, *etc.*). see **steatite.**

so'bole (*Bot.*). A creeping underground stem which develops leaf buds and roots at intervals.

sobolif'erous (*Bot.*). Having soboles.

social (*Zool.*). Living together; gregarious; living in organised colonies.

social parasitism (*Zool.*). A form of association between a colony of social animals and another species, in which the latter lives in the colony and either preys on the members or makes use of their food, without conferring any benefit in turn.—*n.* **social parasite.**

social plants (*Bot.*). Species which grow many together and occupy wide areas.

social symbiosis (*Zool.*). A form of association between a colony of social animals and another species which is mutually beneficial.

society (*Bot.*). A plant community of minor rank forming part of a consociation.

socket (*Elec. Eng.*). The female portion of a plug-and-socket connexion in an electric circuit.

socket (*Plumb.*). The enlarged end of a pipe, into which the end of another pipe of the same diameter can be fitted to form a joint between the two lengths. Called in America BELL or HUB.

socket chisel (*Join.*). A robust type of chisel used for mortising; it has a hollow tapering end to the steel shank into which the wooden handle can be driven.

socle (*Arch.*). A plain projecting block or plinth at the base of a pedestal, wall, or pier.

sod oil (*Oils*). See **degras** (2).

soda feldspar, soda-lime feldspar (*Min.*). See **feldspar.**

soda lakes (*Geol.*). Salt lakes the water of which contains a high content of sodium salts (chiefly chloride, sulphate, and acid carbonate). These salts also occur as an efflorescence around the lakes.

soda-lime glass (*Glass*). See **crown glass.**

soda nitre (*Min.*). Nitrate of sodium, crystallising in the trigonal system. It is found in great quantities in northern Chile, where beds of it are exposed at the surface and are known as *caliche*. Also called CHILE SALTPETRE.

soda recovery (*Paper*). Liquor resulting from the digestion of raw materials with caustic soda is concentrated, and organic matter burnt off in a furnace. The soda is recovered as soda ash and causticised for further use.

soda-syenite (*Geol.*). A syenitic igneous rock containing an excess of soda-feldspar or feldspathoid. Cf. *potash-syenite*.

so'dalite (*Min.*). A cubic feldspathoid mineral, essentially silicate of sodium and aluminium with sodium chloride, occurring in certain alkali-rich syenitic rocks.

so'damide (*Chem.*). $NaNH_2$; a compound formed when ammonia gas is passed over hot sodium.

So'derberg electrode (*Elec. Eng.*). An amorphous carbon electrode manufactured by a continuous electric-arc furnace process.

sodion, —ī'on (*Chem.*). A sodium ion.

sodium (*Chem.*). Symbol, Na. A metallic element in the first group of the periodic system, one of the alkali metals. At. no. 11, at. wt. 22·997. Sodium does not occur in nature in the free state, owing to its reactivity, but it is widely distributed combined as the chloride, nitrate, etc. Metallic sodium is made by electrolysis of fused caustic soda.

sodium-cooled valves (*I.C. Engs.*). High-duty engine exhaust valves cooled by filling the hollow stem (and head) with sodium to about 60% of the volume.

sodium hydroxide (*Chem.*). See **caustic soda.**

sodium-vapour lamp (*Illum.*). An electric lamp of the gaseous-discharge type whose electrodes operate in an atmosphere of sodium vapour.

so'doku (*Med.*). Rat-bite fever. A disease due to infection with the micro-organism *Spirillum minus*, conveyed by the bite of a rat; it is characterised by inflammation of the skin around the bite, relapsing fever, swelling of the lymphatic glands, and a dark red, patchy, erythematous rash.

sof'fit (*Build.*, *Civ. Eng.*). (1) A term often used for *intrados* (q.v.), but more particularly applied to that part of the intrados in the immediate vicinity of the keystone.—(2) The under surface of a stair or of the head of an opening such as a door or window opening.

soft bast (*Bot.*). The sieve tubes and phloem parenchyma.

soft commissure (*Zool.*). In Mammals, the point at which the thickened sides of the thalamencephalon touch one another across the constricted third ventricle.

soft-focus lens (*Photog.*). A pictorial lens of wide aperture for producing slightly diffused outlines.

soft-iron armature (*Elec. Eng.*). The attracted part of an electromagnet retaining little residual magnetism.

soft-iron instrument (*Elec. Eng.*). See **moving-iron instrument.**

soft knitting yarn (*Textiles*). Four-ply worsted yarns, for knitting stockings.

soft lighting (*Cinema.*). Lighting of objects to be photographed in which there is not strong demarcation between the high-lights and the shadows; the lighting, however, is not flat.

soft palate (*Zool.*). In Mammals, the posterior part of the roof of the buccal cavity which is composed of soft tissues only.

soft-paste (*Pot.*). See **paste.**

soft soaps (*Chem.*). See **soaps.**

soft solder (*Met.*). Alloys of lead and tin used in soldering. Tin content varies from 63%

to 31%. The remainder is mainly lead, but some types contain about 2% antimony and others contain cadmium. The best-known types are *tinman's solder* and *plumber's solder* (qq.v.).

soft valve (*Thermionics*). A valve in which there is an appreciable amount of gas left in the envelope after pumping, as opposed to a *high-vacuum* (or *hard*) *valve*.

softeners (*Chem.*). *Plasticisers* (q.v.).

softening (*Met.*). A process for removing arsenic, antimony, and tin from lead, after drossing. A bath of molten metal is oxidised by furnace gases and the addition of lead oxide. Impurities are oxidised and form a dross. Also called IMPROVING.

softening (*Photog.*). Reducing the hard lines and contrast in the lighting of objects to be photographed by interposing a diffuser of silk. A similar effect is obtainable by slightly defocusing during exposure or optical printing.

softening-point test (*Build.*, *Civ. Eng.*). See **melting-point test.**

softness (*Met.*). Tendency to deform easily. It is indicated in tensile test by low ultimate tensile stress and large reduction in area. Usually the elongation is also high. In notched bar test, specimens bend instead of fracturing, and energy absorbed is relatively small. See **toughness** and **brittleness.**

soil (*Plumb.*). See **smudge.**

soil flora (*Bot.*). Plants, chiefly fungi, living in the soil.

soil pipe (*Build.*, *San. Eng.*). A vertical cast-iron or lead pipe conveying waste matter from W.C.'s, etc., to the drains. Abbrev. **S.P.**

soil solution, soil water (*Bot.*). The dilute aqueous solution of mineral salts present around the particles of the soil and in the spaces between them, on which plants draw for supplies.

sol (*Chem.*). A colloidal solution, i.e. a suspension of solid particles of colloidal dimensions in a liquid.

sol′anine bases (*Chem.*). Alkaloid bases derived from the Solanum genus, e.g. *Atropa belladonna.*

solar (*Zool.*). Having branches or filaments radially arranged.

solar plexus (*Zool.*). In higher Mammals, a ganglionic centre of the autonomic nervous system—situated in the anterior dorsal part of the abdominal cavity—from which nerves radiate in all directions.

solar antapex (*Astron.*). The point on the celestial sphere diametrically opposite to the *solar apex* (q.v.).

solar apex (*Astron.*). The point on the celestial sphere towards which the solar system as a whole is moving at the rate of 20 kilometres a second. It is located in the constellation Hercules in equatorial co-ordinates R.A. 271° and declination +31° approximately.

solar attachment (*Surv.*). A fitting for a theodolite, enabling an observer to determine by solar observation the true meridian and latitude of the place of observation, and the true local time.

solar constant (*Phys.*). The quantity of energy received normally per sq. cm. per second by the earth, corrected for loss by absorption in the earth's atmosphere. The value (which is not constant) is about $1{\cdot}34 \times 10^6$ erg sec.$^{-1}$ cm.$^{-2}$

solar day (*Astron.*). See **apparent— mean—**

solar oil (*Fuels*). *Gas oil* (q.v.).

Solar System (*Astron.*). The term designating the sun and the attendant bodies moving about it under gravitational attraction; comprises nine major planets, many hundreds of asteroids, some comets, and various known meteor swarms.

solar time, apparent (*Astron.*). The hour angle of the true sun at any place; distinguished from *mean solar time*, from which it differs by the value of the *equation of time* (q.v.); the time given by sundials, or any astronomical observation of the true sun.

solarisation (*Bot.*). The temporary stoppage of photosynthesis in a leaf when this is exposed for a long time to bright light.

solarisation (*Photog.*). The reversal of an image because of excessive exposure to light; i.e. a supposed negative appears to be a positive.

solation (*Chem.*). The liquefaction of a gel.

solder (*Met.*). A general term for alloys used for joining metals by soldering. The principal types are *soft solder* (lead-tin alloys) and *brazing solders* (alloys of copper and zinc, sometimes containing silver).

soldered (*Bot.*). United.

soldered dot (*Plumb.*). A device for fixing sheet-lead to woodwork. A hollow formed in vertical boarding which is covered with sheet-lead, secured in the hollow by splayed screws, the hollow being then filled with solder.

soldering iron (*Plumb.*). See **copper bit.**

soldier (*Build.*). A term applied to a course of bricks laid so that they are all standing on end.

soldier (*Zool.*). In some social Insects, a form with especially large head and mandibles adapted for defending the community, for fighting, and for crushing hard food-particles.

sole (*Carp.*, *Join.*). The lower surface of the body of a plane.

sole or **sole plate** (*Eng.*). (1) The bed-plate of a marine engine; secured through bearers to the hull of the ship.—(2) A timber base for supporting the feet of *raking shores* (q.v.).

sole piece (*Build.*). The plate to which the feet of the shores, in a system of raking shores, are secured, and which forms an abutment for them at their lower ends.

soleil, so-li′ĕ (*Textiles*). A worsted dress fabric, with a fine cord of the Ottoman rib type formed from twist-way and weft-way yarns.

So′lenhofen stone (*Geol.*). An exceedingly fine and even-bedded limestone, thinly stratified, of Upper Jurassic age, occurring in S.E. Bavaria; widely used in lithography.

sole′nia (*Zool.*). In some hydroid colonies, diverticula of the enteron formed by hollow strands of endoderm.

Solenic′thyes (*Zool.*). An order of *Neopterygii* in which the mouth is situated at the tip of a long tubular snout; marine forms occurring in all tropical and temperate waters. Shrimp-fishes, Cornet-fishes, Snipe-fishes, Pipe-fishes, Sea-horses.

sole′nocyte (*Zool.*). In *Invertebrata* and lower *Chordata*, an excretory organ consisting of a hollow cell with branched processes, in the lumen of which occurs a bunch of cilia which by their movements maintain a downward current.

so′lenoid (*Elec. Eng.*). A multi-turn coil of wire wound in a uniform layer (or layers) on a cylindrical former. When carrying a direct current it behaves like a bar magnet.

solenoid brake (*Elec. Eng.*). An electro-mechanical brake in which the brake toggle is operated by the plunger of a solenoid.

solenoid-operated switch (or **circuit-breaker**) (*Elec. Eng.*). A switch in which the closing force is provided by a solenoid. Cf. *pneumatically operated switch, motor-operated switch.*

solenoid relay (*Elec. Eng.*). A relay in which the contacts are closed by the action of a solenoid-operated plunger.

solenoidal magnetisation (*Elec. Eng.*). The distribution of the magnetisation on a piece of magnetic material when the poles are at the ends. Cf. *lamellar magnetisation.* Also called CIRCUITAL MAGNETISATION.

sole′nostele (*Bot.*). A form of siphonostele in which there is an endodermis both outside and inside the tube of vascular tissues.

so'leus (*Zool.*). A muscle of the lower part of the hind limb in *Tetrapoda.*

Solex pneumatic micrometer (*I.C. Engs., etc.*). A device for rapidly grading the sizes of cylinder bores, etc. It consists of a plug gauge provided with radial air-holes. The pressure of the air supplied at the jets varies with, and provides a measure of, the clearance between the plug and the bore.

solfatar'a (*Geol.*). The name applied to a volcanic orifice which is in a dormant or decadent stage and from which gases (especially sulphur dioxide) and volatile substances are emitted. See **volcanoes.**

solid (*Chem.*). A state of matter in which the constituent molecules or ions possess no translational motion, but can only vibrate about fixed mean positions. A solid has a definite shape and offers resistance to a deforming force.

solid (*Geom.*). A figure having three dimensions. For *solid angle* see Supplement.

solid agate (*Pot.*). See **agate ware.**

solid bearing (*Build.*). The support underneath a beam when it is supported along its whole length.

solid carbons (*Illum*). A carbon electrode for electric arc lamps, in which a core of softer material is absent.

solid diffusion (*Met*). Movement of atoms through the crystals of a solid metal, as when carbon diffuses into or out of steel during carburising or decarburising respectively.

solid floor (*Build*). A floor made of wood blocks laid on a concrete subfloor.

solid head (*I.C. Engs.*). A cylinder or cylinder block cast in one piece, as distinct from one with a detachable head.

solid injection (*Eng*). See **airless injection.**

solid-laid cable (*Cables*). See **solid system of cable-laying.**

solid matter (*Typog.*). Type-matter set up without leads between the lines; or, in mechanical type-setting, type-matter cast on its own body size rather than on a larger one.

solid newel (*Build*). The centre post of a winding stair, as distinct from a *hollow newel* (q v).

solid panel (*Join.*). A panel whose surface is in line with the faces of the stiles.

solid pole (*Elec. Eng.*). A field pole of an electrical machine which is not built up from laminations.

solid skins (*Furs*). Furs from which unwanted parts have been cut away.

solid solubility (*Met.*). The extent to which one metal is capable of forming solid solutions with another. This varies widely between different pairs of metals, some of which are mutually soluble in all proportions, while others are practically insoluble in each other.

solid solution (*Chem., Phys.*). Usually a *primary solid solution*, but the term may also be applied to the case when an intermediate constituent dissolves one of its components. See **mixed crystal.**

solid system of cable-laying (*Cables*). A system of cable-laying in which the cables are laid in troughing in an open trench. The troughing is of stoneware, cast-iron, asphalt, or treated wood, and when the cable is laid the troughing is filled with a bituminous or asphaltic compound.

solid-type cable (*Cables*). See **straight-type cable.**

solidification range (*Chem., Phys.*). The range of temperature in which solidification occurs in alloys and silicate melts, etc., other than those which freeze at constant temperature. It extends from a point on the liquidus to one on the solidus.

solid'ium (*Masonry*). The body of a pedestal.

sol'idus (*Chem., Phys.*). A line in a constitutional diagram indicating the temperatures at which solidification is completed, or melting begins, in alloys and other melts of different composition. See **liquidus, solidification range.**

solifluction, solifluxion (*Geol.*). Soil-creep on sloping ground, characteristic of, though not restricted to, regions subjected to periods of alternating freezing and thawing.

Solif'ugae (*Zool.*). An order of *Embolobranchiata* having a prosoma with the last three somites free, and a segmented opisthosoma; there is no telson; the pedipalpi are slender and tactile, the tarsus ending in a suctorial sac; the chelicerae are very large and powerful; respiration is by tracheae; the femora of the fourth pair of legs bear five racquet-shaped organs (*malleoli*). Usually very hairy, active, carnivorous, tropical forms, diurnal or nocturnal in habits. Sun Spiders, False Spiders.

Solignum (*Build.*). Trade-name for a preserving agent for timber.

solitary (*Bot., Zool.*). Occurring singly.—(*Zool.*) Living alone; as opposed to animals living in a colony, and social forms.

solitary follicles, solitary glands (*Zool.*). See **Peyer's patches.**

sollar (*Build.*). A *loft* (q.v.) which is open to the sun.

sollar or **soller** (*Mining*). The landing between two ladders in a shaft.

Sollas' centre (*Zool.*). The centre or morphological centre of form in the skull of *Primates.*

solstices (*Astron*). The two moments in the year when the sun in its apparent motion attains its maximum distance from the celestial equator: (1) the *summer solstice* of June 21 is the sun's passage through the first point of Cancer; (2) the *winter solstice* of December 22 is the sun's passage through the first point of Capricorn.

solubility (*Chem*). The weight of a dissolved substance which will saturate 100 grams of a solvent.

solubility curve (*Chem.*). The curve showing the variation of the solubility of a substance with temperature.

solubility product (*Chem.*). The value, at saturation, of the product of the activities (concentrations) of the ions into which a dissolved substance dissociates.

soluble glass (*Chem.*). Solid sodium or potassium silicates.

soluble starch (*Chem.*). A product of the hydrolysis of starch obtained by treating starch with dilute acids, or by boiling with glycerine, or by the action of diastase.

sol'ute (*Chem.*). A substance which is dissolved in another.

solution (*Bot.*). The abnormal separation of parts normally united.

solution (*Chem.*). An extremely intimate mixture, of variable composition, of two or more substances, one of which is usually a liquid, which may be separated by simple physical processes. The term is generally restricted to *molecular solutions* (q.v.).

solution pressure (*Chem.*). The tendency of a substance to pass into solution.

solution treatment (*Met.*). The operation of heating suitable alloys (e.g. duralumin) in order to take the hardening constituent into solution. This is followed by quenching, to retain the solid solution, and the alloy is then age-hardened at atmospheric or elevated temperature.

Solva Series (*Geol.*). A series of grey, purple, and red sandstones, flags, and slates forming the lower group of beds which belong to the Middle Cambrian System in South Wales.

solvation (*Chem.*). The association or combination of molecules of solvent with solute ions or molecules.

Solvay's ammonia soda process (*Chem.*). A process based on the fact that when a concentrated solution of sodium chloride is saturated with ammonia, and carbon dioxide is passed through, sodium hydrogen carbonate is precipitated and ammonium chloride remains in solution. Used for the manufacture of sodium carbonate from chloride.

solvent (*Chem.*). That component of a solution which is present in excess, or whose physical state is the same as that of the solution.

solvent (*Paint*). A substance added to paint to make it work more freely.

solvent naphtha (*Chem.*). Middle and high-boiling benzene hydrocarbons chiefly consisting of toluene and xylene, obtained from the fractionation of light tar oils after the benzene fractions have been distilled off.

solvol'ysis (*Chem.*). See **lyolysis.**

so'ma (*Zool.*). The body of an animal, as distinct from the germ-cells; cf. *germen.*—*pl.* **somata.**—*adj.* **somatic.**

somac'tids (*Zool.*). In Fish, cartilaginous or bony rods placed in the basal part of the median fin-folds and supporting the dermotrichia.

somat'ic. See **soma.**

somatic apogamy (*Bot.*) The development of a sporophyte, having nuclei with the zygotic number of chromosomes, from a cell or cells of the gametophyte, the fusion of gametes being omitted.

somatic cell (*Zool.*). One of the non-reproductive cells of the parent body, as distinct from the reproductive or germ cells which give rise to the next generation.

somatic doubling (*Cyt.*). A doubling of the number of chromosomes in the nuclei of somatic cells.

somatic mitosis (*Cyt.*). Division of the metabolic nucleus.

somatic mutation (*Gen.*). A mutation arising in a somatic cell and not in a reproductive structure.

somatic segregation (*Bot.*, *Gen.*). A change in nuclear or hereditary constitution during vegetative growth.

so'mato- (Greek *soma*, gen. *somatos*, body). A prefix used in the construction of compound terms; e.g. *somato-genic* (q.v.).

so'matoblast (*Zool.*). In development, a cell which will give rise to somatic cells: in developing *Chaetopoda*, a micromere (d_2) which divides rapidly after gastrulation to form the ventral plate.

so'matocyst (*Zool.*). In some *Siphonophora*, a dilatation at the upper end of the central canal of a nectocalyx, sometimes containing an oil-drop.

somatogen'ic (*Zool.*). Arising as the result of external stimuli: developing from somatic cells, as opposed to germ cells.

so'matoids (*Chem.*). Small particles of definite shape and possessing a definite arrangement of matter, but, unlike crystals, not homogeneous.

so'matopleure (*Zool.*). The outer body-wall of coelomate animals: the outer layer of the mesoblast which contributes to the outer body-wall; cf. *splanchnopleure.*—*adj.* **somatopleur'al.**

somatotro'pism (*Bot.*). Directed growth movements in plants so that the members come to be placed in a definite position in relation to the substratum.

so'mite (*Zool.*). One of the divisions or segments of the body in a metameric animal: a mesoblastic segment in a developing embryo.

som'mering lines (*Civ. Eng.*). The radiating lines giving the direction of the bed-joints of the voussoirs of an arch.

somnam'bulism (*Med.*). (1) The fact or habit of walking in the sleep.—(2) A hysterical state of automatism in which the patient performs acts of which he is unaware at the time or when he comes out of the state.

sonims (*Met.*). Solid non-metallic inclusions in metal.

Sonne dysentery (*Med.*). Dysentery caused by bacteria described by Carl Sonne and differing from the usual dysentery bacilli described by Shiga and by Flexner.

scor (*Vet.*). See **oidiomycosis.**

Sopwith staff (*Surv.*). A telescopic form of self-reading staff.

sor'al membrane (*Bot.*) The wall surrounding the sorus in some lower fungi.

sora'lium (*Bot.*). A group of soredia surrounded by a distinct margin formed from the thallus of the lichen.

sorbite (*Met.*). The name applied to fine pearlite, or to the structure produced by tempering steel at temperatures above 550° C. In the latter case the structure consists of small globules of cementite in a matrix of fine interlaced crystals of ferrite.

sor'bitol (*Chem.*). A hexahydric alcohol, isomeric with mannitol.

sorb'ose (*Chem.*). A ketohexose, an isomer of fructose.

sor'des (*Med.*). Foul, dark brown crusts which collect on the lips and the teeth in prolonged fever (e.g. in typhoid fever).

sordid (*Bot.*). Dirt-coloured.

sore-heels (*Vet.*). See **horse pox.**

sore-shins (*Vet.*). An inflammation of the periosteum of the large metacarpus (shin bone), occasionally of the metatarsus, of young horses.

sore-teats (*Vet.*). Abrasions of the teats of milch cows.

sore'dial branch (*Bot.*). A branch of a lichen thallus formed by a soredium beginning to develop while still attached to the parent thallus.

sore'diate (*Bot.*). Having small patches on the surface.

sore'dium (*Bot.*). One or more algal cells enclosed in hyphae, forming a tiny mass which separates from the lichen thallus and gives rise to a fresh thallus if transported to a suitable place for growth.

Sorel's cement (*Chem.*). Calcined magnesite (MgO) mixed with a solution of magnesium chloride of a concentration of about 20° Baumé. It sets within a few hours to a hard mass. The basis of artificial flooring cements.

Sørensen's formol titration, sé'— (*Chem.*). See **formol titration.**

sorif'erous (*Bot.*). Bearing sori.

soro'sis (*Bot.*). A fleshy fruit formed from a number of crowded flowers, such as a pineapple.

so'rosphere (*Bot.*). A hollow ball of spores formed by some lower plants.

sorption (*Chem.*). A general term for the processes of absorption, adsorption, and persorption.

sorrel, salts of (*Chem.*). See **potassium oxalate.**

sorting (*Build.*). The process adopted when a roof is to be covered by slates of different sizes; the largest slates are nailed at the eaves and the smallest at the ridge.

sorting (*Textiles*). The selecting of yarns for weaving so that there may be no appreciable difference in types or tones.

sorts (*Typog.*). Particular type letters as distinct from complete founts. The term is usually applied to types missing from the case, a further supply of which is requisitioned from the caster or founder.

so'rus (*Bot.*). (1) In lichens, a powdery mass of soredia lying on the surface of the thallus.—(2) In fungi, ferns, etc., a group of sporangia usually accompanied by some protective structures.

Sothic cycle (*Astron.*). A period of 1460 years, familiar in ancient Egyptian chronology as the time in which the Egyptian calendar year of 365 days precessed through the seasons; so called because the Egyptian new year began with the heliacal rising of the star Sirius, whose Egyptian name was Sothis.

Soudley Sandstone (*Geol.*). An important sandstone found in the Caradocian Series in the Caradoc district of Shropshire; much used for building purposes.

souffle, soof'l (*Med.*). A murmuring, blowing sound, especially a murmur heard over the heart.

sough, suf (*Civ. Eng.*). A drain at the foot of a slope, e.g. an embankment, to receive and carry away surface waters from it.

sound (*Acous.*). The perception of external stimuli accepted through the ear and sense of hearing: also, the wave-motion or vibration which gives rise to such stimulus when applied to the ear.

sound (*Med.*). A solid rod used for exploring hollow viscera (e.g. the bladder, the uterus) or for dilating stenosed passages.

sound (or **acoustic**) **absorption factor** (or **coefficient**) (*Acous.*). The percentage of energy which is not reflected from a large plane uniform surface on the incidence of a sound-wave at a specified angle. See **sabin.**

sound articulation (*Elec. Comm.*). The percentage of all elementary speech-sounds received correctly, when logatoms are called over a circuit or in an auditorium, in the standard manner.

sound (or **sounding**) **board** (*Acous.*). A board actuated by forced vibration from a vibrating body; used because of its ability to radiate more sound-energy than the vibrating body alone.

sound boarding (*Carp.*). Boards fitted in between the joists of a floor, to carry the *pugging* (q.v.) which is to insulate the room from sound and smell from the room below.

sound box (*Acous.*). An enclosure supporting a diaphragm, terminated by a horn on one side and actuated by an armature on the other. At the end of the armature is clamped a needle, which is operated by the recorded track on a gramophone record.

sound camera (*Cinema.*). The machine in which photographic film is exposed for registration of the sound record in motion-picture production. Except in news-reel cameras, this machine is entirely distinct from the camera taking the scene.

sound energy density (*Acous.*). See **energy density of sound.**

sound-film (*Cinema.*). A combination of synchronised sound and cinematography giving the illusion of sound and scene. The sound is invariably reproduced from a sound-track, which is printed along the side of the cinematograph film.

sound-gate (*Cinema.*). The precise location in a sound-head where the sound-track is scanned by the constant focused beam of light from the exciter lamp, the transmitted light being received into the photo-electric cell.

sound-head (*Cinema.*). That unit in a projector which reproduces the sound-track on the edge of the film.

sound insulation (*Build.*). The property, possessed in varying degrees by different materials, of blocking the transmission of sound.

sound level scale (*Acous.*). The same as *phon scale*. See also **loudness level.**

sound locator (*Acous.*). An arrangement for determining the direction of arrival of sound-waves, particularly the noise from aircraft and submarines. See **predictor.**

sound pick-up (*Acous.*). A loose term for a part of a sound-reproducing system, such as a microphone, the sound-head in a projector, or a reproducer of gramophone recordings.

sound pressure (*Acous.*). The fluctuating pressure in air, or other fluid, which constitutes the presence of a propagating or stationary sound-wave. Measured in alternating dynes per square centimetre, either peak or r.m.s. Also called ACOUSTIC PRESSURE, EXCESS PRESSURE.

sound recording (*Acous.*). The practice of registering sound so that it can be reproduced at some subsequent time and be of further use. See **recording, recorder.**

sound (or **acoustic**) **reflection factor** (or **coefficient**) (*Acous.*). The percentage of energy reflected from a large plane surface of uniform material on the incidence of a sound-wave at a specified angle.

sound stage (*Cinema.*). The main floor of a motion-picture studio on which sets are built and the artists perform during shooting. See **scoring stage.**

sound-track (*Cinema.*). That section of the width of cinematograph film which is allocated to the continuous modulation associated with the photographic recording of the accompanying sound.

sound (or **acoustic**) **transmission factor** (or **coefficient**) (*Acous.*). The ratio of the transmitted sound-power to that incident on a wall or partition.

sounder (*Ocean.*). Any instrument used for determining the depth of the sea; e.g. *Lucas sounder* (by line and weight), *Kelvin sounder* (q.v.), *echo sounder* (q.v.).

sounder (*Teleg.*). An electromagnetic device which is operated by incoming morse-signal currents and makes, on operation and release, audible signals from which the operator interprets the received message.

sounding (*Surv.*). The depth of an under-water point below some chosen reference datum. Cf. *reduced level.*

sounding balloon (*Meteor.*). A small free balloon carrying a meteorograph, used for obtaining records of temperature, pressure, and humidity in the upper atmosphere.

sounding board (*Acous.*). A board placed above the head of a speaker standing on a rostrum, or in a pulpit, to deflect the sound of his voice towards the listeners.

sounding line (*Surv.*). A stout cord, divided into fathoms and feet and weighted at one extremity with a lead weight; used in finding soundings.

soup (*Photog.*). A colloquialism for photographic *developer*; so called from its appearance after developing backed film.

souple (*Textiles*). The term applied to silk yarns and fabrics from which the sericin has not been removed; they are not so lustrous as scoured silks. See **boiling-off.**

souring (*Textiles*). The treatment of yarn or cloth with dilute acid; it is part of the bleaching process.

south pole (*Elec.*). See **pole.**

Southern Cross (*Astron.*). A striking constellation of the southern hemisphere, only visible in latitudes below 30° N. It is a cruciform group of four stars, having the two bright stars α and β Centauri some way to the east, which makes it easy to identify.

Southerndown Beds (*Geol.*). A local series of massive and in part conglomeratic limestones found in South Wales and forming part of the Lower Lias; deposited as coastal deposits near islands of Carboniferous Limestone rising through the Liassic Seas.

Southey's tubes (*Med.*). Small cannulae which, inserted into oedematous tissues, drain off the excess fluid.

southing (*Astron.*). The word used of a star crossing the meridian at upper culmination; only applicable in the northern hemisphere, where, unless the star be north of the zenith, it will be due south of the observer at the moment of transit.

southing (*Surv.*). A south latitude.

Soxh'let apparatus (*Chem.*). A laboratory apparatus for the continuous extraction of a solid substance with a solvent, consisting of a distillation flask, a reflux condenser, and a cylindrical vessel fitted between them, to which a syphon system is attached.

S.P. (*Build.*, *San. Eng.*). Abbrev. for *soil pipe.*

S.P. (*Elec. Eng.*) Abbrev. for *single-pole.*

Sp. (*Chem.*). An abbrev. for *spirit.*

space. Continuous and boundless extension considered as a vacuous entity in which extended things may exist and move: the distance between points or objects, whether regarded as filled or unfilled.—(*Teleg.*) The period of time in transmission during which the key is open, i.e. not in contact.—(*Typog.*) A type less than type-height, and thinner than a quadrat; used to separate words, etc.

space box (*Typog.*). A small box with six or eight divisions for different spaces, used when making corrections to type matter.

space charge (*Thermionics*). The negative charge in the inter-electrode space of a high-vacuum thermionic valve created by the electrons emitted from the cathode; it tends to drive back the electrons into the cathode.

space-charge grid (*Thermionics*). A positively charged electrode placed close to the cathode to neutralise the effects of the space charge, thereby reducing the anode voltage necessary to maintain a given anode current.

space-charge limitation (*Thermionics*). The condition which obtains in a thermionic valve when the current leaving the cathode is limited by the balancing of the attractive force of the other electrodes by the repulsive force of the space charge. Cf. *filament limitation.*

space-charge pentode (*Thermionics*). See **beam pentode.**

space contact (*Teleg.*). The contact which is made and which retains the telegraphist's key when it is not depressed; by extension, the contact which is made by a machine when sending spacing-current to line.

space current (*Thermionics*). See **thermionic current.**

space draft (*Weaving*). Entering the warp threads in the healds or harness in the order necessary to suit the pattern to be produced.

space factor (*Elec. Eng.*). The ratio of the active cross-sectional area of an insulated conductor to the total area occupied by it.

space group (*Crystal.*). A grouping together of identical space lattices either by interpenetration or rotation about a definite axis.

space lattice (*Crystal.*). The network arrangement of the structural units of a crystal so that a straight line through any two points will, when produced, pass through a succession of similar points at equal intervals. The same is true for any parallel line through a similar point. The units are atoms or groups of atoms.

space parallax (*Acous.*). The difference in bearing between a moving object, such as a machine in flight, and the direction of arrival of the noise-waves emitted by it. This arises from the comparable velocity of flight with that of the propagation of sound-waves.

space parallax (*Cinema.*). In colour cinematography, the blurring of colours which arises from the registering of primary colours on side-by-side films with lenses having non-coincident axes.

space parasite (*Bot.*). A plant which inhabits intercellular spaces in another plant, obtaining shelter but possibly taking nothing else.

space velocity (*Astron.*). The rate and direction of a star's motion in space of three dimensions, as deduced from its observable components (1) in the line of sight by the spectroscope and (2) perpendicular to the line of sight by proper motions.

spaced antennae (*Radio*). Antennae used in connexion with diversity reception.

spaced-loop direction-finder (*Radio*). A direction-finding equipment including two loops spaced sufficiently in terms of the wavelength to enhance their normal directivity as exhibited by their polar diagram of response.

spaced slating (*Build.*). Slating laid with gaps between adjacent slates in any course.

spacing current (*Teleg.*). The current in the circuit which corresponds to the non-depression of the telegraphist's key, and which also, when there is no mark on the slip, operates the sending machine.

spacing ratio (*Illum.*). The ratio of the distance between equally spaced electric lights to their vertical distance above the plane to be illuminated.

spacing wave (*Radio*). The wave emitted during the spacing (no-signal) periods from a radiotelegraph transmitter in which the keying is achieved by changing the frequency. Formerly used in connexion with arc transmitters.

spade (*Artillery*). An attachment to the trail of a gun-carriage which digs into the ground and assists in keeping the gun still when in action.

spade tuning (*Radio*). A crude form of tuning in which the inductance of a coil is varied by moving a spade-shaped metal disc across the face of the coil.

spadic'eous (*Bot.*). (1) Having the colour of a date.—(2) Bearing a spadix; spadix-like.—(*Zool.*) Shaped like a palm-branch. Also SPADICIFORM, SPADICOSE.

spa'dix (*Bot.*). A spike with a swollen fleshy axis, enclosed in a spathe.

spadix (*Zool.*). In male *Nautiloidea*, a cone-shaped structure formed by the modification of four of the tentacles and believed to be homologous with the heterocotylised arm of male Squids: in some Coelenterate embryos, the endodermal anlage of the manubrium.

spall (*Masonry*). A stone splinter chipped off in the process of chiselling; also called GALET.*

spalling (*Masonry*). The operation of breaking off splinters of stone from a block by slanting blows with a chisel, when dressing to shape.

span (*Civ. Eng., etc.*). The horizontal distance between the supports of a bridge, arch, etc.

span (*Elec. Eng.*). (1) The distance between two transmission-line towers.—(2) The number of slots separating the two sides of an armature coil. Also called THROW.

span-piece (*Carp.*). The horizontal beam connecting the rafters of a collar-beam roof.

span pole (*Elec. Eng.*). The pole to which the span wires are attached.

span roof (*Build.*). A pitched roof with two sloping sides having the same inclination.

span saw (*Tools*). A *frame saw* (q.v.).

span-wire (*Elec. Eng.*). One of several wires by which the trolley-wire of a tramway or trolley-bus system is suspended from street poles or buildings.

spanae'mia, spane'mia (*Med.*). Poorness of the blood: deficiency of red cells in the blood: anaemia.

spandrel (*Civ. Eng.*). The space between the haunches and the road decking of an arch.

spandrel step (*Build.*). An individual stone step in a stair, which consists of a solid block, triangular in section, arranged so that one face is parallel to the slope of the stair.

spandrel wall (*Civ. Eng.*). A wall constructed upon the extrados of an arch.

Spanish blind (*Build.*). A vertical outside spring roller blind covering the upper two-thirds of the window, the lower part being shaded by a projecting canopy.

Spanish topaz (*Min.*). A trade name for orange-brown quartz, the colour resembling that of the honey-brown Brazilian topaz. It is often amethyst which has been heat-treated. See **citrine.**

spar (*Mining*). Any non-metallic mineral with a good cleavage; e.g. calcite or celestine.

spar, Iceland (*Min.*). See **Iceland spar.**

spar (*Timber*). A round timber more than 6 in. diameter in the middle.

spar-piece (*Carp.*). A *span-piece* (q.v.).

Sparag'mite (*Geol.*). A comprehensive term which includes the late Pre-Cambrian rocks of Scandinavia. These, like the Torridonian Sandstone of Northern Scotland, consist of conglomerates and red feldspathic grits and arkoses.

sparganо'sis (*Med.*). Infestation of bodily tissues with the larvae (spargana) of various tape-worms, the adult stage of which may be unknown.

sparging (*Brew.*). A process in which the grains in the mash tun are treated with water at a temperature of about 180° F., which is sprinkled on them after the sweet wort has been run off.

spark (*Elec. Eng.*). An electric discharge taking place in air.

spark absorber (*Elec. Comm.*). See **absorber.**

spark coil (*Radio*). An induction or Ruhmkorff coil used as the source of high voltage in a spark transmitter.

spark frequency (*Radio*). The frequency of repetition of the spark discharge in a spark transmitter.

spark gap (*Radio*). An arrangement of two or more electrodes between which the spark discharge takes place in a spark transmitter.

See **quenched—** **rotary—**

spark-gap arrester (*Elec. Eng.*). A type of surge arrester in which the overvoltage drives a spark discharge across an air-gap connected between the circuit and earth.

spark-over test (*Elec. Eng.*). See **flash-over test.**

spark plug. See **sparking plug.**

spark resistance (*Radio*). The resistance between the electrodes after the discharge has commenced. It is included in the oscillatory circuit, and if excessive causes a loss of power and a high decrement.

spark spectrum (*Phys.*). On account of the greater stimulus given to the atom by the condensed electric spark compared with the arc, the spectra obtained from spark sources are found to contain lines additional to those in the arc spectrum. These lines belong to the spectra of the ionised atoms, and may be obtained fully developed and without the arc lines in some cases.

spark system (*Radio*). The oldest form of radio-telegraphy, in which the high-frequency currents are generated by charging a condenser from an induction coil, or other source of high voltage, and then discharging it through an inductance coil in series with a spark gap. The inductance coil is coupled to the antenna, which may also form part, or all, of the condenser.

spark transmitter (*Radio*). A transmitter using the spark system.

sparking (*Elec. Eng.*). The occurrence of a spark discharge between the brushes and the surface of a commutator.

sparking contact (*Elec. Eng.*). An auxiliary contact used on circuit-breakers; designed to make circuit before, and to break circuit after, the main contact, so that any sparking takes place on the auxiliary contact. It has removable contact tips, usually of carbon.

sparking limit (*Elec. Eng.*). The limiting output of a d.c. machine as determined by considerations of commutator sparking.

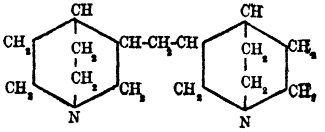
sparking plug or **spark plug** (*I.C. Engs.*). A plug screwed into the cylinder head of a petrol engine for ignition purposes, a spark gap being provided between an insulated central electrode, connected to the H.T. distributor, and one or more earthed points.

sparking potential (*Elec. Eng.*). The e.m.f. required to produce a spark discharge in an insulating medium.

sparkless commutation (*Elec. Eng.*). A term applied to methods of current commutation in which the reactance voltage is neutralised before actual commutation takes place, so that the formation of a commutation spark or arc is avoided.

spar'talite (*Min.*). An old name for *zincite.*

spar'teine, —ē-ēn (*Chem.*). $C_{15}H_{26}N_2$, an alkaloid of the quinuclidine group, obtained from the branches of the common broom, *Cytisus scoparius*; a colourless oil, b.p. 188° C. (18 mm.), sparingly soluble in water, soluble in alcohol, chloroform, or ether. It resembles coniine in its physiological action. It has the following constitution:



spasm (*Zool.*). Involuntary contraction of muscle fibres.—*adj.* **spasmod'ic.**

spasmodic torticollis (*Med.*). A nervous disorder in which the muscles of either side, or both sides, of the neck are in a state of continuous or of intermittent spasm.

spas'moneme (*Zool.*). In *Ciliophora* with contractile stalks, the powerful stalk-muscle formed by the union of the longitudinal myonemes.

spasmophil'ia (*Med.*). A term used to indicate the hypothetical heightened irritability of the nervous system of patients who have a tendency to spasms, convulsions, or tetany.

spasmus nutans (*Med.*). Nodding spasm. Rhythmic nodding of the head seen in babies in the first year of life.

spastic (*Med.*). Of the nature of spasm (sudden contraction) of muscle: characterised or affected by muscular spasm; rigid, or in a state of continuous spasm; e.g. *spastic paralysis.*

Spatangoi'dea (*Zool.*). An order of *Echinoidea* in which Aristotle's lantern is lacking, the anus and often the mouth are eccentric, the body is more or less heart-shaped, and the ambulacral areas are petal-shaped; sand-living forms. Heart Urchins.

spathe, spāth (*Bot.*). A large, usually coloured foliar organ which subtends and more or less encloses a spadix; the white part of the arum lily is a familiar example.—*adjs.* **spathaceous, spathate, spathed.**

spath'ic iron (*Min.*). See **chalybite.**

spath'ulate (*Bot.*). Shaped like a spoon or ladle, having a broad short lamina and a long petiole.

spatial effect (*Acous.*). The same as *auditory perspective.*

spatial harmony (*Photog.*). The aesthetic harmony provided by areas of juxtaposed colours.

spat'ula (*Zool.*). Any spoon-shaped structure.

spat'ulate (*Bot.*). Spathulate.—(*Zool.*) Spoon-shaped.

spav'in (*Vet.*). Chronic arthritis of the hock joint of a horse.

spawn (*Bot.*). The mycelium of a mushroom.

spawn (*Zool.*). To deposit eggs or discharge spermatozoa: a collection of eggs, such as that deposited by many Fish.

spay (*Zool.*). To remove or destroy the ovaries.

S.P.D. (*Astron.*). See **polar distance.**

speak (*Acous.*). An organ pipe is said to *speak* when, actuated by air-pressure, it emits sound.

speak-back (*Cinema.*). The subsidiary microphone-amplifier-reproducer in a motion-picture studio, by which the remote recordist can speak to the director on the sound-stage.

speaker (*Acous.*). Abbrev. for *loudspeaker.*

speaking pair (*Auto. Teleph.*). When wires are grouped for trunking through automatic switching, the pair carrying the speech-currents is termed the *speaking pair,* as contrasted with the guard wire, private wire, or meter wire.

speaking stop (*Acous*). A stop key on an organ console which controls a rank of pipes for potential operation by the keyboard, as contrasted with *non-speaking stops,* which are couplers or other devices not directly controlling pipes.

spear pyrites (*Min.*). The name given to twin crystals of marcasite which show re-entrant angles, in form somewhat like the head of a spear.

special (*Civ. Eng., etc.*). A term applied to a piece (e.g. a bend, tee, elbow, etc.) intended only for a particular use.

special apparatus rack (*Teleph*). In an exchange, the rack for apparatus which is not sufficiently numerous to warrant the provision of a complete rack. Abbrev. **S.A.R.**

special control position (*Teleph.*). The trunk position which deals with delayed calls, the operator dealing with all calls over a route, and allocating the lines to subscribers who require connexion but who must be recalled. See **trunk record position.**

special steel (*Met.*). See **alloy steel.**

specialisation (*Bot.*). The tendency of a parasite to attack only one species or variety of host plant.

species (*Bot., Zool.*). A term used in classification to denote a group of closely allied, mutually fertile individuals, showing constant differences from allied groups.—*adj.* **specific.**—In the system of *binomial nomenclature* (q.v.) of plants and animals, the second name (i.e. the name by which the species is distinguished from other species of the same genus) is termed the *specific epithet* or *specific name.* The latter, however, correctly refers to the full name—e.g. *Lilium candidum* (Madonna Lily), where *candidum* is the *specific epithet.*

specific (*Zool.*). (Of a parasite) restricted to a particular host: (of a stain) colouring certain tissues or structures only.—*n.* **specificity.**

specific characters (*Biol.*). The constant characteristics by which a species is distinguished.

specific conductance (*Elec. Eng.*). An obsolescent term for *conductivity,* the reciprocal of *resistivity.*

specific conductivity of wood (*Bot.*). The rate at which water flows through a piece of wood of standard area and length in a given time.

specific consumption (*Illum.*). The electrical energy, in watts, consumed by an electric lamp per candle-power of light emitted.

specific damping (*Elec. Eng.*). The attenuation constant per kilometre of a cable.

specific depression (*Heat*). See **depression of freezing-point.**

specific dielectric strength (*Elec. Eng.*). The dielectric strength of an insulating material, expressed in volts per millimetre.

specific electric loading (*Elec. Eng.*). The electric loading, in ampere-conductors, of the armature of a machine per centimetre of circumference.

specific energy consumption (*Elec. Eng.*). The energy consumption of an electric tractor, expressed in watt-hours per ton-mile.

specific epithet. See under **species.**

specific fuel consumption (*I.C. Engs.*). The weight of fuel used by an engine per unit horsepower per unit time; generally expressed in pounds per B.H.P.-hour (lb./B.H.P.-hr).

specific gravity (*Phys*). The ratio of the mass of a given volume of a substance to the mass of an equal volume of water at a temperature of 4° C.

specific gravity bottle (*Phys.*). See **density bottle.**

specific heat (*Phys.*). The ratio of the quantity of heat required to raise the temperature of a given mass of a substance through a given range to the heat required to raise the temperature of an equal mass of water through the same range. It may be defined rather less strictly as the quantity of heat necessary to raise the temperature of unit mass one degree.

specific heats of gases (*Phys.*). The *specific heat* of a gas at constant pressure is greater than that at constant volume on account of the energy necessary to expand the gas against the constant pressure. See **ratio of specific heats.**

specific inductive capacity (*Diel.*). *Dielectric constant* (q.v.).

specific magnetic loading (*Elec. Eng.*). The average flux density (i.e. the total magnetic loading divided by the peripheral area) in the armature of a machine.

specific magnetic resistance (*Elec. Eng.*). The obsolescent term for *reluctivity,* the reciprocal of *permeability.*

specific name. See under **species.**

specific output (*Elec. Eng*). The ratio of the electrical output of a machine to its weight, its volume, or some other function of its dimensions. Cf. *specific torque coefficient.*

specific reaction rate (*Chem.*). See **velocity constant.**

specific refraction (*Chem.*). The molecular refraction of a compound, defined by the Lorentz-Lorenz equation, divided by the molecular weight.

specific resistance (*Elec. Eng.*). See **resistivity.**

specific rotation (*Phys., Chem.*). The angle through which the plane of polarisation of a ray of sodium D light would be rotated by a column of liquid one decimetre in length, containing one gram of an optically active substance per cubic centimetre.

specific speed (*Elec. Eng.*). A comparative quantity enabling a direct comparison to be made, as regards angular velocity, between different sizes of hydraulic turbine. It is defined as the speed in r.p.m. that a geometrically similar machine would acquire in order to deliver an output of 1 h.p. under a head of 1 ft.

specific stain (*Zool.*). In zoological technique, a stain which will pick out certain structures or tissues in contrasting colours or shades. Cf. *general stain.*

specific surface (*Chem.*). The surface area per unit volume of a substance in a very finely divided state.

specific temperature rise (*Elec. Eng.*). The temperature rise of an electrical machine per unit of radiating surface.

specific torque coefficient (*Elec. Eng.*). A coefficient used in the design of electrical machines, giving a figure representing the torque per unit of volume enclosed by the air-gap periphery. Also called OUTPUT COEFFICIENT, ESSON COEFFICIENT.

specific volume (*Phys.*). The volume of unit mass; the reciprocal of density.

specific weight (*I.C. Engs.*). (Of an aero engine) the weight per horse-power, expressed in pounds per unit of maximum horse-power.

specimen stones (*Jewel.*). Faultless precious stones.

specpure (*Chem.*). A trade term for *spectroscopically pure.*

spectacle lens (*Photog*). A single uncorrected lens with a soft focus; used for pictorial work.

spectral distribution curve (*Illum.*). The curve showing the relation between the radiant energy and the wavelength of the radiation from a light source.

spectral sensitivity (*Photog.*). The comparative response of an emulsion to exposures of light of different wavelengths but constant intensity.

spectral series (*Light*). A system of lines in a spectrum in which there is an obvious regularity, the lines becoming fainter and closer together towards the short wavelengths. The recognition and measurement of series has been of great importance in atomic and quantum theories. See **Balmer series, Bohr theory, K-series, Rydberg formula.**

spectral transmission (*Photog*). The relative transmission, opacity, or density of a filter in respect of light of different wavelengths.

spectral type (*Astron*). The classification of a star by its physical constitution as revealed by the spectroscope, the sequence proceeding, on the Harvard system, in a graded list beginning with Type O, comprising gaseous, white, and very hot stars, and ending with Type M, comprising the red, cooler stars, with fluted band spectra and many metallic lines.

Spectre of the Brocken (*Meteor.*). See **Brocken.**

spec'trogram (*Photog.*). The photograph of a spectrum, either continuous or line.

spec'trograph (*Light*). An instrument used for photographing the spectrum. It may be a spectroscope, adapted by substituting a camera for the eyepiece, or a specially designed instrument such as the *Littrow spectrograph* (q.v.). See also **concave grating.**

spectrohe'liogram (*Astron*). The recorded result of an exposure on the sun by the spectroheliograph.

spectrohe'liograph (*Astron.*). An instrument for photographing the sun in monochromatic light. It consists essentially of a direct-vision spectroscope, with a second slit instead of an eyepiece, which can be set so that only light of a desired wavelength passes through it on to a photographic plate.

spectrohe'lioscope (*Astron.*). An instrument in principle the same as the spectroheliograph, but adapted for visual use by the employment of a rapidly oscillating slit which, by the persistency of vision, enables an image of the whole solar disc to be viewed in light of one wavelength; it also detects the velocities of moving gases in the solar atmosphere by an adjustment called the 'line-shifter.'

spectrom'eter (*Light*). An instrument similar in construction to the *spectroscope* (q.v.) but used for precise measurement of refractive indices, and therefore provided with divided scales, by means of which the angular positions of the telescope and prism table may be read.

spectrophotom'eter (*Photog.*). A spectroscope, with photometer, which determines quantitatively the relative intensity in different parts of a spectrum.

spec'troscope (*Light*). An instrument for observing spectra. Light from an illuminated slit is rendered parallel by a collimating lens, and falls on a prism or diffraction grating, where it is dispersed. The light is then viewed by means of a telescope in the focal plane of the eyepiece of which the spectrum is visible.

spectroscop'ic analysis (*Chem.*). See **spectrum analysis.**

spectroscopic binary (*Astron.*). See **binary (spectroscopic).**

spectroscopic parallax (*Astron.*). The name given to the indirect method of deducing the distances of stars too far away to have detectable annual parallaxes; it involves the inferring of their absolute magnitudes from spectroscopic evidence which then, combined with the observed apparent magnitudes, gives their distances.

spectros'copy (*Light*). The practical side of the study of spectra, including the excitation of the spectrum, its visual or photographic observation, and the precise determination of wavelengths.

spectrum (*Phys.*). An arrangement of radiated frequencies in order of their frequencies. The term is particularly used to denote an optical spectrum in which a number of images of a narrow slit are disposed in order of wavelength. The chief means of obtaining an optical spectrum are the prism and the diffraction grating. See **continuous—, secondary—*, spectroscope.**

spectrum analysis (*Chem.*). The analysis of a substance by observation of its spectrum. It is a valuable method for the detection of traces of metallic impurities.

spectrum lines (curvature of) (*Light*). See **curvature of spectrum lines.**

spec'ular density (*Photog.*). The photographic density in an image measured with parallel light, as contrasted with diffuse density, when the total light passed is measured, including that dispersed.

specular iron (*Min.*). The name given to a crystalline rhombohedral variety of haematite which possesses a splendent metallic lustre often showing iridescence.

specular reflection (*Illum.*). See **regular reflection.**

spec'ulum (*Med*). A hollow or curved instrument for viewing a passage or cavity of the body.

speech (*Acous.*). The fundamental method of communicating thoughts, which consists in regulating the pitch and intensity of voiced sounds, and the intensity of unvoiced sounds, by the larynx, and in modifying the spectral content of these elementary sounds by posturing the cavities of the mouth (assisted by the nasal cavities), which form double or triple Helmholtz resonators. See **articulation.**

speech-bands (*Teleph.*). The small elementary bands in the frequency-spectrum which contain essential frequencies for the recognition of specified speech-sounds.

speech-power (*Acous.*). See **average speech-power.**

speech-sound (*Acous.*). The least distinctive element in speech, such as vowels and consonants. For telephonic purposes about 30 English speech-sounds are sufficient for recognition in telephonic work, but phoneticians recognise about 60. See **logatom.**

speed. The ratio of the distance covered by a moving body to the time taken, either in a straight line or in a continuous curve. Uniform speed is a theoretical conception approached only in astronomical bodies. A practical uniform speed is a matter of approximate inference, and is always an average speed. Units of speed are *feet per second, miles per hour, knots*, and similar expressions. See **inertia** (*Phys.*).

See **air—** **minimum flying—**
ground— **stalling—**

speed (*Elec. Eng.*). The angular velocity of an electrical machine; generally expressed in revolutions per minute.

speed (*Photog.*). The measure of the rate of exposure required by an emulsion; i.e. *high-speed* means short exposure, in relation to the prevailing conditions of lens, lighting, etc. Specifically measured as an *H & D number* (q.v.), equal to the inertia divided into 34. This defined speed increases with over-development.

speed-adjusting rheostat (*Elec. Eng.*). A rheostat arranged in the field or armature circuit of an electric motor for varying the motor speed.

speed control (*Elec. Eng.*). The method by which the speed of an electric motor may be varied.

speed-distance curve (*Elec. Eng.*). The curve showing the relation between the speed of an electric tractor and the distance it has travelled.

speed-frequency (*Elec. Eng.*). The product of rotor speed and the number of pole-pairs in an induction motor.

speed governing (*Elec. Eng.*). The method of keeping the speed of a prime mover independent of the electrical load on the generator which it is driving.

speed indicator (*Eng.*). See **tachometer, speedometers.**

speed of rotation. In a rotating body, the number of rotations about the axis of rotation divided by the time (see **speed**). Units are *revolutions per second, minute*, or *hour*, or *radians per second, minute*, or *hour*. The axis of rotation may have a translatory speed of its own. See **inertia (moment of).**

speed-time curve (*Elec. Eng.*). A curve of train speed plotted against running time. It forms the starting-point in the determination of traction motor characteristics.

speed-torque characteristic (*Elec. Eng.*). The curve showing the relation between the speed of a motor and the torque developed. Also known as the MECHANICAL CHARACTERISTIC.

speed (*Vet.*). See **blackleg.**

speedom'eters (*Automobiles*). *Tachometers* (q.v.) fitted to the gear box or propeller shaft of a road vehicle, so graduated as to indicate the speed in miles per hour. They may be of centrifugal, magnetic, air-vane, chronometric, or electrical type.

speedy-cut (*Vet.*). Injury of the foreleg of a horse near the knee, made by the shoe of the opposite foot.

Speeton Clay (*Geol.*). A series of clays and marls, with beds of phosphatic nodules, occurring near Speeton on the Yorkshire coast; equivalent in age to the Gault, Lower Greensand, and Wealden of Southern England.

speise, speiss, spi'se, spis (*Met.*). A solution of mixed arsenides and antimonides produced in the smelting of arsenical and antimonical ores.

spelaeol'ogy, speleology (*Zool.*). The study of the fauna and flora of caves.

spelter (*Met.*). Commercial zinc. Formerly applied to all grades, the term is now to some extent applied only to grades of lower purity (under 99·6% zinc). High purity metal produced electrolytically, in vertical retorts, or redistilled, is called *zinc.*

Spence Shale (*Geol.*). A subdivision of the Middle Cambrian at Mt. Stephen in the Canadian Rockies, famous for its remarkable fossils.

Spergen Limestone (*Geol.*). See **Salem Limestone.**

sperm-, sperma-, spermi-, spermo-, spermato- (Greek *sperma*, gen. *spermatos*, seed). Prefixes used in the construction of compound terms; e.g. *spermatoplasm* (q.v.).

sperm (*Zool.*). A male germ-cell.

sperm morula (*Zool.*). A spherical mass consisting of a protoplasmic core with an investment of developing sperms, such as occurs in the vesiculae seminales of the Earthworm.

sperm pronucleus (*Zool.*). A male pronucleus.

spermace'ti (*Chem.*). A glistening white wax from the head of the sperm whale, consisting mainly of cetyl palmitate, $C_{15}H_{31}\cdot CO\cdot O\cdot C_{16}H_{33}$; m.p. 41°-52° C., saponification number 120-135, iodine number nil.

spermaceti candle (*Photog.*). The legalised standard candle, made from sperm-whale wax and giving one candle-power.

sper'maduct (*Zool.*). See **spermiduct.**

spermago'nium (*Bot.*). See **spermogonium.**

spermaphyt'ic (*Bot.*). Seed-bearing.

sper'mary (*Zool.*). See **testis.**

spermateleo'sis (*Zool*). The process by which a mature spermatozoon is developed from a spermatid; used also by some authors in the sense of *spermatogenesis* (q.v).

spermathe'ca (*Zool.*). A sac or cavity used for the reception and storage of spermatozoa in many Invertebrates; receptaculum seminis.

spermat'ic (*Zool.*). Pertaining to spermatozoa: pertaining to the testis.

sper'matid (*Zool.*). A cell formed by division of a secondary spermatocyte, and developing into a spermatozoon without further division.

sperma'tiophore (*Bot.*). A hypha which bears a spermatium.

sperma'tium (*Bot*). (1) The non-motile male gamete in the red algae, which is carried by water to the trichogyne.—(2) A spore-like structure which is formed by some lichens and some fungi, and which may have sexual functions.

sper'matoblast (*Zool.*). A spermatid.

sper'matocele, —sēl (*Med.*). A cyst of the epididymis or of the tubules of the testis as a result of blocking of the ducts of the epididymis; contains a clear fluid and spermatozoa.

sper'matocide (*Med.*). Any agent (especially chemical) which kills spermatozoa.—*adj.* **spermatoci'dal.**

sper'matocyte (*Zool.*). A stage in the development of the male germ-cells, arising by growth from a spermatogonium or by division from another spermatocyte, and giving rise to the spermatids.

spermatogen'esis (*Zool.*). Sperm-formation; the maturation divisions of the male germ-cells by which spermatozoa are produced from spermatogonia.

spermatogo'nium (*Zool.*). A sperm mother cell; a primordial male germ-cell.—*adj.* **spermatogo'nial.**

sper'matogons (*Zool.*). Clear cubical epithelium cells lying on the basement membrane of the seminiferous tubules in higher Vertebrates.

sper'matophore (*Zool.*). A packet of spermatozoa enclosed within a capsule.

Spermatophy'ta (*Bot.*). Seed-bearing plants.

sper'matoplasm (*Zool.*). The protoplasm of sperms.

sper'matoplast (*Bot.*). A male gamete.

spermatorrhoe'a, spermatorrhe'a (*Med.*). Involuntary, frequent discharge of seminal fluid in the absence of sexual excitement or intercourse.

spermatozeug'ma (*Zool.*). Union, by conjugation, of two or more spermatozoa.

spermatozo'id (*Bot.*). The motile male gamete of many lower plants.

spermatozo'on (*Zool.*). The characteristic form of male germ-cell, consisting of a head containing the nucleus and a whip-like tail.—*pl.* **spermatozo'a.**

spermatu'ria (*Med.*). The presence of spermatozoa in the urine.

spermidu'cal glands (*Zool.*). In many Vertebrates, glands opening into or near the spermiducts.

sper'miduct, spermaduct (*Zool.*). A duct by which sperms are carried from the testis to the external genital opening; vas deferens.—*adj.* **spermidu'cal.**

spermiogen'esis (*Bot.*). The conversion of a spermatid into a spermatozoid.

spermogo'nium, sper'mogone (*Bot.*). A flask-shaped structure in which spermatia are formed.

Sperry arc lamp (*Illum.*). An arc lamp used in searchlights, which has a positive carbon with a fast-burning impregnated core, thus giving rise to a deep crater of very high brilliancy.

sper'rylite (*Min*). Diarsenide of platinum, crystallising in the cubic system. It has a brilliant metallic lustre and is tin-white in colour.

spes phthi'sica (*Med.*). Euphoria and hopefulness of recovery in patients with advanced pulmonary tuberculosis.

spes'sartite, spes'sartine (*Min.*). Manganese garnet; silicate of manganese and aluminium, crystallising in the cubic system. Usually contains a certain amount of either ferrous or ferric iron. The colour is dark red, sometimes having a tinge of violet or brown. See **garnet.**

spew (*Acous.*). The superfluous irregular rim of wax which has to be removed from a gramophone record after it has been pressed between two stampers in the hot-pressing machine.

sp. gr. (*Chem.*). An abbrev. for *specific gravity.*

sphacelate, sfas'— (*Bot.*). Dark and shrunken.

sphaerid'ia (*Zool.*). Small rounded bodies containing ganglion cells, situated on the surface of the test in some *Echinodermata*; believed to be sense organs.—*sing.* **sphaeridium.**

sphaerocar'pous (*Bot.*). Having a globular fruit.

sphaeroceph'alous (*Bot.*). Having the flowers crowded in a rounded head.

sphae'rocrys'tal (*Bot.*). A rounded crystalline mass of calcium oxalate found in the cells of some plants.

sphaerra'phide (*Bot.*). A rounded spiky mass of calcium oxalate found, usually singly, in the cells of many plants.

sphagnic'olous (*Zool.*). Living in peat-moss.

sphagnoph'ilous (*Ecol.*). Living in peaty waters.

sphal'erite (*Min.*). See **blende.**

sphen-, spheno- (Greek *sphēn*, a wedge). A prefix used in the construction of compound terms; e.g. *sphenomandibular*, pertaining to the sphenoid and the mandibular.

sphene (*Min.*). See **titanite.**

spheneth'moid (*Zool.*). In *Amphibia*, a bone of the interorbital region which extends forward to the nasal region and replaces the orbitosphenoids.

Sphenisciforʹmes (*Zool.*). An order of *Colymbomorphae* in which flight feathers are lacking; the wings are stiff and used as paddles in swimming; the palate is schizognathous; the feet are webbed, with the hallux free; flightless marine forms, powerful swimmers and divers; confined to the southern hemisphere. Penguins.

sphe'noid, sphenoid'al (*Bot., Zool.*). Wedge-shaped.

sphenoid (*Crystal.*). A wedge-shaped crystal-form consisting of four triangular faces. The tetragonal and orthorhombic analogue of the cubic tetrahedron.

sphenoid (*Zool.*). A bone of the Vertebrate skull, one of the *sphenoidalia* (q.v.).

sphenoida'lia (*Zool.*). A set of cartilage bones forming the walls of the middle part of the brain-case in the Vertebrate skull.

sphenoidi'tis (*Med.*). Inflammation of the air-containing sinus in the sphenoid bone.

sphenolat'eral (*Zool.*). In the developing chondrocranium, a pair of dorsal bars situated in front of the basal plate and parallel to the trabeculae.

sphenot'ic (*Zool.*). A bone of the lateral wall of the auditory capsule of the skull in some Vertebrates.

sphere-crystal (*Bot.*). A sphaerraphide.

sphere gap (*Elec. Eng.*). An excess-voltage protective device comprising two metal spheres separated by an air gap.

spherical aberration (*Light*). A defect in the image formed by a lens or mirror having spherical surfaces, the spherical form being, in most cases, only an approximation to the ideal figure for the surfaces.

spherical astronomy (*Astron.*). See **positional astronomy.**

spherical candle-power (*Illum.*). The illumination on a sphere of unit radius having the source of light at its centre.

spherical excess (*Surv.*). The amount by which the sum of the three angles of a spherical triangle exceeds 180°. It is equal to the area of the triangle divided by the square of the earth's radius.

spherical reduction factor (*Illum.*). The ratio of the mean spherical candle-power of a lamp to the mean horizontal candle-power.

spherical roller-bearing (*Eng.*). A roller-bearing having two rows of barrel-shaped rollers of opposite inclination, working in a spherical outer race, thus providing a measure of self-alignment.

spherocyto'sis (*Med.*). Acholuric jaundice. A congenital and familial disease in which the red cells of the blood are smaller than normal, biconvex instead of biconcave, and abnormally fragile; it is characterised by jaundice and splenomegaly.

spheroidal jointing (*Geol.*). Spheroidal cracks found in both igneous and sedimentary rocks. Some are due to cooling and resultant contraction in the igneous rock body; others are due to a shell-like type of weathering.

spheroidal state (*Phys.*). Water dropped upon a clean, horizontal, red-hot metal plate gathers into spheroidal drops which roll about, rather like mercury drops, without boiling. This is prevented by a cushion of steam on which the drop rides, the rapid evaporation of the drop showing that its temperature is near the boiling-point.

spheroidal structure (*Geol.*). A structure exhibited by certain igneous rocks, which appear to consist of large rounded masses, surrounded by concentric shells of the same material. Presumably a cooling phenomenon, comparable with perlitic structure, but on a much bigger scale, and exhibited by crystalline, not glassy, rocks.

spher'ome (*Bot.*). A cell inclusion which gives rise to globules of fat and oil.

spheroplasts (*Cyt.*). Mitochondria.

spher'ulite (*Geol.*). A crystalline spherical body built of exceedingly thin fibres radiating outwards from a centre and terminating on the surface of the sphere, which may vary in diameter in different cases from a fraction of a millimetre to that of a large apple.

spherulit'ic texture (*Geol.*). A type of rock fabric consisting of spherulites, which may be closely packed or embedded in an originally glassy groundmass. Commonly exhibited by rhyolitic rocks.

sphincter (*Zool.*). A muscle which by its contraction closes or narrows an orifice. Cf. *dilator.*

sphingosine (*Chem.*). See under **phrenosin.**

sphyg'mogram (*Med.*). A tracing of the movements of the pulse made by a sphygmograph.

sphyg'mograph (*Med.*). An instrument for recording the movements of the arterial pulse by means of tracings.

sphyg'momanom'eter (*Med.*). An instrument for measuring the arterial blood-pressure (in millimetres of mercury), an inflatable bag being applied to the arm and attached to a manometer.

sphyg'mus (*Zool.*). The pulse; the beat of the heart and the corresponding beat of the arteries. —*adjs.* **sphygmic, sphygmoid.**

spi'ca (*Med.*). A figure-of-eight bandage with turns that cross one another.

spi'cate (*Bot.*). Spike-like.

spic'ula (*Bot.*). A small spike.

spicular cell (*Bot.*). A hard, thick-walled cell, spindle-shaped or branched, occurring among thin-walled soft tissues.

spic'ulate (*Bot.*). Said of a surface covered by fine points.

spic'ule (*Zool.*). A small pointed process: one of the small calcareous or siliceous bodies which form the skeleton in many *Porifera* and *Coelenterata*.—*adjs.* **spicular, spiculate, spiculif'erous, spic'uliform.**

spic'ulum (*Bot.*). A little spine.—(*Zool.*) Any spicule-like structure: in Snails, the dart.

spider (*Cinema.*). In a motion-picture studio, the local distributing box for lighting cables. It consists of a box with a number of paralleled substantial jacks, into which the ends of the lamp cables are plugged.

spider (*Elec. Eng.*). The centre part of an armature core, upon which the core stampings are built up.

spider (*Eng.*). See **cathead.**

spider webs (*Surv.*). Natural spider webs used to form the cross-hairs across a reticule or diaphragm.

spiegeleisen, spē'gel-i-zen (*Met.*). Pig-iron containing 15-30% manganese and 4-5% carbon. Added to steel as a deoxidising agent and to raise the manganese content of the steel.

Spige'lian lobe (*Zool.*). A division of the right lateral lobe of the Mammalian liver.

spigot (*Civ. Eng., etc.*). The plain end of a pipe which is fitted into the enlarged end of the next pipe to form a joint between the two lengths.

spigot-and-socket joint (*Civ. Eng.*). A common type of joint for cast-iron pipes, the plain or spigot end of one length fitting into the enlarged or socket end of the next length, the joint being made tight by caulking.

spike. A large stout nail more than 4 in. long.

spike (*Bot.*). An indefinite inflorescence with sessile flowers.

spike knot (*Timber*). A knot which has been cut lengthwise. Also called a SPLAY KNOT.

spi'kelet (*Bot.*). One of the units of the inflorescence of a grass. It consists of a central rachis bearing one or more sterile glumes at the base, followed by one or more flowers, each enclosed between a flowering glume and a pale; all the parts are crowded together.

spile (*Civ. Eng.*). A timber pile.

spi'lite (*Geol.*). A fine-grained igneous rock of basaltic composition, generally highly vesicular and containing the soda feldspar, albite. The pyroxenes or amphiboles are usually altered. These rocks are frequently developed as submarine lava-flows and exhibit pillow structure.

spilling (*Mining*). A method of tunnelling through loose ground, by driving *spills* (sharp-edged thick planks) ahead of and around timber frames.

spillway (*Civ. Eng.*). A *bye-channel* (q.v.).

spillway dam (*Civ. Eng.*). A reservoir dam over which flood water is allowed to flow to a downstream escape channel at the foot of the dam.

spi'losites (*Geol.*). Spotted slates formed by contact metamorphism near the junctions of basic igneous rock and shales or slates; frequently associated with adinoles.

Spilsby Sandstone (*Geol.*). A ferruginous sandstone, including some phosphatic nodules, forming the basal member of the Lower Cretaceous Series in Lincolnshire; important as a water-bearing stratum.

spin (*Aero.*). The movement of an aircraft in a continuous spiral dive, with the mean angle of incidence such that the planes are stalled.—FLAT SPIN, a spin such that the longitudinal centre line is nearer to the horizontal than to the vertical.

spi'na (*Zool.*). A small sharp-pointed process; a spine: in Insects, a median apodeme arising from the post-sternellum.

spina bifida (*Med.*). See **rachischisis.**

spina ventosa (*Med.*). A condition, resulting from tuberculous infection of a small bone (e.g. of the hand or foot), in which the centre part of the bone is destroyed and new bone is formed under the periosteum, the bone thus appearing to expand.

spinal (*Zool.*). Pertaining to the vertebral column, or to the spinal cord.

spinal canal (*Zool.*). The tubular cavity of the vertebral column which houses the spinal cord.

spinal caries (*Med.*). See **Pott's disease.**

spinal cord (*Zool.*). In *Craniata*, that part of the dorsal tubular nerve-cord posterior to the brain.

spinal reflex (*Zool.*). A reflex situated in the spinal cord, in which the higher nerve-centres play no part.

spinal shock (*Zool.*). The state of diminished excitability of the spinal cord, due to injury.

spina'les (*Zool.*). Muscles connecting the vertebrae. —*sing.* **spinalis.**

spindle (*Cyt., Zool.*). Any spindle-shaped structure; especially the framework of achromatin fibres which is formed between the centrioles during nuclear division by meiosis or mitosis.

spindle fibre (*Cyt.*). A delicate line seen in a preparation of a dividing nucleus, and with many others, making up the spindle. It is doubtful whether it is a material fibre, or merely a line of strain in the material of the nucleus.

spindle oils (*Lubricants*). See **loom and spindle oils.**

spine (*Bind.*). A name often used for the back of a book, i.e. the edge where the gathered sections are sewn together. The spine faces outwards when the book is placed on a shelf, hence the name often used, SHELF-BACK.

spine (*Bot.*). The end of a branch or leaf which has become rounded in section, hard and sharply pointed.

spine (*Zool.*). A small sharp-pointed process: the backbone or vertebral column: a pointed process of a vertebra, as the neural spine: a fin-ray: the scapular ridge.—*adjs.* **spi'nate, spi'niform, spi'nose, spi'nous.**

spinel (*Min.*). A group of closely related minerals crystallising, usually in octahedrons, in the cubic system. They occur typically as products of contact metamorphism of impure dolomitic limestones, and less commonly as accessory minerals in igneous rocks of basic composition. Chemically, spinels are aluminates, chromates or ferrates of magnesium, iron, zinc, etc., and are distinguished as *iron spinel* (hercynite), *zinc spinel* (gahnite), *chrome spinel* (picotite), and *magnesian spinel.* See also **ruby spinel, Balas ruby, chromite.**

spinel, synthetic (*Min.*). This is produced, in a wide variety of fine colours, by the Verneuil process; in chemical and optical characters identical with natural spinel, it is widely used as a gemstone.

spines'cent (*Bot., Zool.*). Spiny: tapering.—(*Zool.*) Showing a tendency to become spinous, as some animals during the declining period of the racial history.—*n.* **spines'cence.**

spinicar'pous (*Bot.*). Having spiny fruit.

spinif'erous (*Bot.*). Thorn-bearing.

spi'niform (*Bot.*). Like a thorn.

spi'niger, spinigerous (*Bot.*). Producing thorns.

spinner-gate or **whirl-gate** (*Foundry*). An in-gate incorporating a small whirl-chamber into and from which the metal flows tangentially, so releasing any dirt, which rises to the top of the chamber or up a riser. See **in-gate.**

spin'neret (*Zool.*). In Spiders, one of the spinning organs, consisting of a mobile projection bearing at the tip a large number of minute pores by which the silk issues.

spin'nerule (*Zool.*). In Spiders, a duct by which the fluid silk is discharged.

spinning (*Textiles*). The twisting together of short fibres in order to form a continuous length of thread.

spinning glands (*Zool.*). The silk-producing glands of *Arthropoda.*

spinning jenny (*Textiles*). A spinning machine invented by James Hargreaves about 1765.

spinning number (*Textiles*). See **quality number.**

spino-occipital (*Zool.*). Arising in the trunk region, and later becoming incorporated in the occipital region of the skull.

spi'nose (*Bot*). Bearing sharp, spiny teeth.

spi'nous (*Bot., Zool.*). Bearing spines.

spinous process (*Zool.*). A process of the proximal end of the tibia: a process of the sphenoid bone: the neural process or spine of a vertebra.

spin'ule (*Bot., Zool.*). A very small spine or prickle. —*adjs.* **spin'ulate, spinules'cent, spinulif'erous.** —*n.* **spinulation.**

Spinulo'sa (*Zool*). An order of *Asteroidea* in which the aboral or dorsal skeleton is composed either of close-set plates, overlapping plates, or a network of rods, which bear spines arranged singly or in groups; the tube-feet terminate in suckers, and pedicellariae are lacking.

spin'ulose (*Bot., Zool.*). Armed with minute spines or prickles.

Spi'onifor'mia (*Zool.*). An order of *Phanerocephala* comprising burrowing and tubicolous forms with small parapodia, of which the dorsal cirri are large and respiratory; the buccal region may be eversible but the pharynx is unarmed; tentacles and palps are lacking, and the peristomium is large and bears a pair of long tactile cirri; includes the Parchment-tube-worm.

spira (*Arch.*). The base of a column.

spir'acle (*Zool.*). In *Insecta* and some *Arachnida*, one of the external openings of the tracheal system: in Fish, the first visceral cleft, opening from the pharynx to the exterior between the mandibular and the hyoid arches: in amphibian larvae, the external respiratory aperture: in *Cetacea*, the external nasal opening.—*adjs.* **spirac'ular, spirac'ulate, spirac'uliform.**

spiral cell, spiral tracheide, spiral vessel (*Bot.*). A cell, tracheide, or vessel in which the secondary wall is laid down in the form of spirally arranged thickenings.

spiral (or alternating) cleavage (*Zool.*). A type of segmentation of the ovum occurring in many *Turbellaria*, most *Mollusca*, and all *Annelida*; the early micromeres rotate with respect to the macromeres, so that the micromeres lie opposite to the furrows between the macromeres; the direction of rotation (viewed from above) is normally clockwise (*dexiotropic*) but in 'reversed cleavage' it is anti-clockwise (*laeotropic*).

spiral flower (*Bot.*). A flower having its members arranged in spirals.

spiral ganglion (*Zool.*). In Mammals, a continuous ganglionic cord lying at the base of the spiral lamina and connected with the cochlear branch of the auditory nerve.

spiral gear (*Eng.*). A toothed gear for connecting two shafts whose axes are at any angle and do not intersect. The teeth are of spiral form (i.e. parts of a multiple-threaded screw), and engage as in a *worm gear* (q.v.).

spiral instability (*Aero.*). That form of lateral instability which causes an aircraft to develop a combination of side-slipping and banking, the latter being increasingly too great for the turn. This causes the machine to follow a spiral path.

spiral lamina (*Zool.*). In Mammals, the bony shelf which partially subdivides the bony labyrinth of the cochlea.

spiral ligament (*Zool.*). A projection of reticular connective tissue, by which the basilar membrane is attached to the outer wall of the cochlea in the Mammalian ear.

spiral nebulae (*Astron.*). The largest class of nebulae, so called because of their appearance in the telescope; in their distribution they avoid the galactic plane; they are found to have very high velocities of recession in the line of sight; from spectroscopic evidence they appear to be non-gaseous.

spiral reel (*Photog.*). In a light-tight developing tank, a reel on which film has been wound in a spaced spiral so that, on rotation, the developer has free access to the emulsion.

spiral scanning (*Television*). Scanning in which the spot traverses the scan area in a spiral path from the centre to the outside, whence it returns rapidly to the centre, or vice versa.

spiral spring (*Eng.*). A spring formed by coiling a steel ribbon into an elongated spiral or a helix of increasing diameter. When compressed completely it forms a true spiral.

spiral stairs (*Build.*). *Circular stairs* (q.v.) of small diameter and usually open.

spiral time base (*Cathode Ray Tubes*). An arrangement for causing the fluorescent spot to rotate in a spiral path at a constant angular velocity, so as to obtain a much longer base line than is possible with linear deflection. Used for detailed delineation of events relatively widely spaced in time.

spiral tracheide (*Bot.*). See **spiral cell.**

spiral valve (*Zool.*). In Lampreys, Selachii, and some Lung-fish, part of the intestinal canal, which is provided with an internal spiral fold to increase its absorptive surface.

spiral vessel (*Bot.*). See **spiral cell.**

spiral yarn (*Textiles*). A yarn with a spiral effect, generally produced by folding two threads of different counts, one fine and one coarse. The threads doubled are usually under unequal tension.

spire (*Build.*). A slender tower tapering to a point.

spi'reme (*Cyt.*). A stage in *prophase* (q.v.) in which the nuclear chromatin takes the form of a long thread.

spirillo'sis (*Vet.*). *Spirochaetosis (avian)* (q.v.).

spirill'um (*Bot.*). A spirally coiled bacterium.

spirit (*Chem.*). An aqueous solution of ethyl alcohol, especially one obtained by distillation.

spirit level (*Surv.*). A level tube.

spirit photography (*Photog.*). The faking of photographs by partial exposures or printings.

spirit stain (*Build.*). A stain for wood, consisting of colouring matter dissolved in methylated spirits.

spirits of hartshorn (*Chem.*). An old name for *ammonia*; derived from an old method of preparing ammonia by heating hoofs and horns in closed vessels.

spirits of salts (*Chem.*). Another name for *hydrochloric acid.*

spirits of wine (*Chem.*). *Ethyl alcohol* (q.v.).

spirochaeto'sis, spirochetosis (*Med.*). See **relapsing fever.**

spirochaetosis, avian (*Vet.*). A septicaemia of fowls, ducks, and geese due to infection by spirochaetes transmitted by ticks (*Argas* sp. and *Ornithodorus* sp.). Also called AVIAN SLEEPING SICKNESS.

spirochaetosis ic'terohaemorrha'gica (*Med.*). Weil's disease; infectious jaundice. An acute disease characterised by fever, jaundice, haemorrhages from the mucous membranes, enlargement of the liver, and nephritis; due to infection with *Spirochaeta icterohaemorrhagiae*, conveyed to Man by rats, which excrete the organism in their urine.

spirolo'bous (*Bot.*). Said of an embryo having spirally rolled cotyledons.

spirom'eter (*Med.*). An instrument for measuring the air inhaled and exhaled during respiration.

spi'roneme (*Zool.*). In certain *Ciliophora*, the contractile spiral thread of the stalk.

spitz'kasten (*Mining*). An open pointed box or cone classifier, for the water-sizing of crushed ore.

splanchnic (*Zool.*). Visceral.

splanchno- (Greek *splanchnon*, the inward parts) A prefix used in the construction of compound terms; e.g. *splanchnocoele* (q.v.).

splanch'nocoele, —sēl (*Zool.*). In Vertebrates, the larger posterior portion of the coelom which encloses the viscera, as opposed to the pericardium.

splanchnocra'nium (*Zool.*). That part of the skull constituted by the jaws and branchial arches. Cf. *neurocranium.*

splanchnomeg'aly (*Med*). Enlargement of bodily organs.

splanch'nopleure (*Zool.*). The wall of the alimentary canal in coelomate animals; the inner layer of the mesoblast which contributes to the wall of the alimentary canal; cf. *somatopleure.*—*adj.* **splanchnopleu'ral.**

splanchnopto'sis (*Med.*). Glenard's disease. General displacement downwards, or dropping, of the abdominal viscera.

splanchno'tome (*Zool*). In an early Vertebrate embryo, the ventral division of a mesoblastic somite.

splashproof fitting (*Illum.*). See **weatherproof fitting.**

splat (*Build.*). A cover strip for joints between adjacent sheets of building-board.

splat (*Furn.*). A thin, broad piece of wood forming the back of a chair or settee.

splay brick (*Build.*). A purpose-made brick bevelled off on one side. Also called SLOPE.

splay end (*Build.*). That end of a brick opposite to the end which is laid squarely by rule.

splay knot (*Timber*). See **spike knot.**

splayed grounds (*Join.*). Grounds with splayed or rebated edges, providing a key for holding the plaster to the wall in cases where the grounds also serve as screeds.

splayed jambs (*Build.*). Internal jambs or sides of a door or window opening which are not built at right-angles to the wall but slope away from it, to admit more light or to increase the width.

splayed skirting (*Build.*). A skirting board having its top edge chamfered.

splaying arch (*Build., Civ. Eng.*). An arch in which the opening at one end is less than that at the other end, so that the arch is funnel-shaped. Also called a FLUING ARCH.

spleen (*Zool.*). In *Craniata*, a ductless gland-like organ situated in the abdominal cavity close to the stomach, having a very vascular structure, and being responsible for the disintegration of worn-out erythrocytes and the birth of new leucocytes.—*adj.* **splenet'ic, sple'nic.**

splenec'tomy (*Surg.*). Surgical removal of the spleen.

sple'nial (*Zool.*). In some Vertebrates, a membrane bone on the inner side of the lower jaw behind the dentary.

splenial teeth (*Zool.*). A pair of large compound teeth in the lower jaw of some Lung-fish.

splen'ic anaemia (*Med.*). A chronic disease characterised by splenomegaly, anaemia, leucopenia, and a tendency to bleeding; when there is also cirrhosis of the liver the condition is known as *Banti's disease.*

splenic apoplexy (*Vet.*). See **anthrax.**

splenic organs (*Zool.*). In some Insects, certain bilateral groups of phagocytic cells, believed to give rise to fresh leucocytes.

spleni'tis (*Med.*). Inflammation of the substance of the spleen.

sple'nium (*Zool.*). A posterior bend of a commissure; as in the Vertebrate brain, that part of the corpus callosum which passes downwards and forwards to unite with the fornix.

sple'nius (*Zool.*). An anterior dorsal trunk muscle of higher Vertebrates.

splenomeg'aly (*Med.*). Abnormal enlargement of the spleen.

sple'nopexy (*Med*). Fixation, by suture, of the spleen to the abdominal wall.

splenot'omy (*Med.*). Incision of the spleen.

splice (*Carp.*). A *scarf* (q.v.).

splice (*Cinema.*). A joint in a cinematograph film made by removing emulsion and cementing the two bases together, either straight across at the edge of a frame or diagonally across a frame.

splice bump (*Cinema.*). The same as *bloop.*

splice piece (*Rail*). A *fish-plate* (q.v.).

spliced joint (*Elec. Eng.*). A cable joint in which the conductor strands are spliced, in the manner of a rope.

splicing (*Cinema.*). The jointing of strips of cinematograph film in repairing a break, or in editing.

splines (*Eng.*). A number of relatively narrow keys formed integral with a shaft, somewhat resembling long gear-teeth; produced by milling longitudinal grooves in the shaft (*external splines*); similarly, the grooved ways formed in a hole into which the splined shaft is to fit (*internal splines*). Used, instead of keys, for maximum strength.

splint (*Med.*). Any appliance used for the fixation of displaced or movable parts, especially of fractured and dislocated bones.

splints (*Vet.*). Exostoses on the small metacarpal or metatarsal bones of the horse.

splint bones (*Zool.*). In *Equidae*, the reduced second and fourth metacarpals and metatarsals; so-called on account of their position on either side of the third metacarpal or metatarsal.

splint wood (*Bot.*). Wood in which living cells are scattered throughout.

split (*Leather*). A hide that has been split into two or more layers, parallel to the surface.

split (*Mining*). (1) A divider for an air current. —(2) The upper or lower portion of a divided coal-seam.

split (*Weaving*). The name applied to (1) a wire in a reed; (2) the space between two adjacent wires.

splits (*Build.*). Bricks of the same length and breadth as ordinary bricks (i.e. 9 × 4½ in.), but of smaller thickness (e.g. 1, 1½, or 2 in.).

splits (*Textiles*). Two cloths that have been woven at the same time, side by side, and afterwards separated (*split up*).

split bearing (*Eng.*). A shaft bearing in which the housing is split, the bearing bush or brasses being clamped between the two parts.

split-conductor cable (*Cables*). A cable in which each conductor is divided into two sections lightly insulated from each other and connected in parallel at the ends. Used with special schemes of protection.

split-conductor protection (*Elec. Eng.*). A current-balance system of feeder protection avoiding the use of pilot wires by splitting each phase conductor into two parallel sections lightly insulated from each other.

split course (*Build.*). A course of bricks which have been cut lengthwise, so that the depth of the course is less than the normal depth of a brick.

split crankcase (*I.C. Engs.*). An engine crankcase split horizontally at about the centre line of the crankshaft. Cf. *barrel-type crankcase.*

split fitting (*Elec. Eng.*). A bend, elbow, or tee used in electrical installation work, which is split longitudinally so that it can be placed in position after the wires are in the conduit.

split mind (*Psychiatry*). A popular synonym for *schizophrenia* (q.v.).

split order-wire circuit (*Teleph.*). An arrangement for providing a B-operator with more than one order-wire circuit.

split-pastern (*Vet.*). Fracture of the second digit (os coronae) of the horse.

split-phase (*Elec. Eng.*). A term denoting a circuit arrangement for changing a single-phase to a two-phase supply.

split-pin (*Eng.*). See **cotter pin.**

split-pole convertor (*Elec. Eng.*). A synchronous convertor in which the flux distribution under the poles can be varied by means of auxiliary windings on the individual pole limits.

split pulley (*Eng.*). A belt pulley split diametrically, the halves being bolted together on the shaft; used when a solid pulley cannot be fitted.

split-ring clutch (*Eng.*). A small friction clutch commonly used in machine tools. It consists of a split ring which is expanded into a sleeve by a cam or lever mechanism. See **friction clutch.**

split-seconds chronograph (*Horol.*). A chronograph with two independent centre seconds hands, one underneath the other. On pressing the button the two hands travel together, but if a push piece in the band of the case is pressed one hand remains stationary, the other continuing until stopped by a second pressing of the button. A third pressing of the button causes both hands to fly back to zero.

splitter, beam (*Photog.*). See **beam-splitter.**

spo'dogram (*Bot.*). A preparation of the ash of a portion of a plant, especially a woody portion, used in investigating structure.

spod'umene or **triphane** (*Min.*). A silicate of aluminium and lithium which crystallises in the monoclinic system. It usually occurs in granite-pegmatites, often in very large crystals. The rare emerald-green variety *hiddenite* and the clear lilac-coloured variety *kunzite* are used as gems.

Spoerer's law spé'rer (*Astron.*). A formula due to Spoerer, in which he attempted, not very successfully, to express the rate of movement of sun spots in all solar latitudes, given the rate for one latitude.

spoil (*Civ. Eng.*). The excess of cutting over filling on any given construction. Also called **WASTE.**

spoil bank (*Civ. Eng.*). An earthwork bank formed by depositing spoil.

spoke (*Build.*). A *rung* (q.v.).

spokeshave (*Carp.*, *Join.*). A form of double-handled plane used in shaping concave surfaces.

spon'dyl (*Zool.*). A *vertebra* (q.v.).—*adj.* **spon'dylous.**

spondylarthri'tis (*Med.*). Inflammation of a vertebral joint.

spondyli'tis (*Med.*). Inflammation of a vertebra.

spondylitis defor'mans (*Med.*). A condition in which the ligaments of the spinal column become ossified and the vertebrae fused together, so that the spine is bent, rigid, and immobile.

spon'dylolisthe'sis (*Med.*). A forward displacement of the fifth lumbar vertebra (carrying the vertebral column with it) on the sacrum.

sponge beds (*Geol.*). Deposits, either calcareous or siliceous, which contain a large proportion of the remains of sponge organisms belonging to the phylum *Porifera.*

sponge cloth (*Textiles*). (1) A coarse cloth of plain (or irregular) weave, made from cotton yarns of about 4^s count.—(2) A coarse open cloth of gauze structure.

sponge weave (*Textiles*). A weave which produces an irregular or cellular effect by the grouping together of ends and picks.

spongic'olous (*Zool.*). Living in association with a Sponge, usually within the chambers of the water-vascular system.

spon'gin (*Zool.*). A horny skeletal substance, occurring usually in the form of fibres, in various groups of *Porifera.*

spon'ginblast, spon'goblast (*Zool.*). In *Porifera,* a cell which secretes spongin.

spongioblasto'ma (*Med.*). A soft, rapidly growing, malignant tumour occurring in the brain (or in the spinal cord) and derived from cells of the supporting structure of the brain.

spon'gioblasts (*Zool.*). Columnar cells of the neural canal which give rise to neuroglia cells.

spon'gioplasm (*Cyt.*). The more viscid constituents of cytoplasm, forming a meshwork.

spon'giose (*Bot*). Having the texture of a Sponge.

spon'gophare (*Zool.*). In the rhagon-type of Sponge colony, the upper wall containing the flagellated chambers. Cf. *hypophare.*

spongy layer, — mesophyll, — parenchyma, — tissue (*Bot*). A loosely constructed layer of irregularly shaped cells, separated by large intercellular spaces. It lies just above the lower epidermis of a dorsiventral leaf, and contains many chloroplasts.

spongy platinum (*Chem*). The spongy mass resulting from the calcination of ammonium chloroplatinate.

spongy skins (*Furs*). Skins having porous leather.

spontaneous generation (*Biol.*). The production of living matter or organisms from non-living matter.

spontaneous ignition temperature (*Eng.*). The temperature at which a liquid or gaseous fuel will ignite in the presence of air or oxygen, measured, for liquid fuels, by allowing a drop to fall into a heated pot. Abbrev. **S.I.T.**

spontaneous movements (*Bot.*). Movements of a plant which do not depend upon external stimuli.

spool (*Weaving*). A pirn or bobbin (usually a bobbin of weft).

spoon bit (*Carp.*). See **dowel bit.**

sporad'ic (*Bot.*). Scattered over a wide area.—(*Med.*) (Of disease) occurring here and there, not widespread or epidemic.

sporan'gial sac (or **vesicle**) (*Bot.*). A very thin-walled and often evanescent outgrowth from the sporangium of many lower fungi, in which the zoospores complete their development, and from which they are set free.

sporan'giocyst (*Bot.*). A thick-walled sporangium which is able to remain alive but inert under unfavourable conditions.

sporan'giole, sporangio'lum (*Bot.*). A sporangium which contains one spore or very few spores.

sporan'giolif'erous head (*Bot.*). A rounded group of sporangiola.

sporan'giophore (*Bot.*). A hypha or filament on which a sporangium is borne.

sporan'giospore (*Bot.*). A spore—especially a non-motile spore—formed within a sporangium.

sporan'gium (*Bot.*). A walled structure in which spores are formed.—(*Zool.*) In certain *Protozoa*, a capsule containing spores.

spore (*Bot.*). A reproductive body characteristic of plants. It consists of one cell or of a few cells, never contains an embryo, and when set free may, if conditions are favourable, give rise to a new plant.

spore (*Zool.*). In *Protozoa*, a minute body formed by multiple fission: more strictly, a seed-like stage in the life-cycle of *Protozoa* arising as a result of sporulation, and contained in a tough resistant envelope.

spore ball (*Bot.*). A globular mass of spores, either solid or hollow.

spore group (*Bot.*). A multicellular spore, each cell of which is capable of independent germination.

spore membrane (or **wall**) (*Bot.*). The firm membrane surrounding the living contents of a spore.

spore mother cell (*Bot.*). A cell which divides to give four spores, meiosis occurring during the process.—(*Zool*) In *Protozoa*, a stage in the life-history that will give rise to spores.

spore print (*Bot.*). The pattern obtained by placing the cap of an agaric, gills downwards, on paper, and allowing the sticky spores to fall and adhere to the paper.

spore sac (*Bot.*). The layer of cells in immediate contact with the sporogenous cells in the young capsule of a moss.

spore tetrad (*Bot.*). The group of four spores formed from a spore mother cell.

sporeling (*Bot.*). (1) The early stages of a plant developing from a spore.—(2) A young fern plant.

Spörer's law (*Astron*). See **Spoerer's law.**

spore'tia (*Zool.*). See **idiochromidia.**

spori- sporo- (Greek *sporos*, seed). A prefix used in the construction of compound terms; e.g. *sporogenesis*, spore-formation.

spo'ridesm (*Bot.*). See **spore group.**

sporidiif'erous (*Bot.*). Bearing sporidia.

sporid'ium (*Bot.*). (1) A spore formed from a promycelium.—(2) An old name for an *ascospore*.

spo'roblast (*Bot*). One cell or segment of a spore group.—(*Zool*) In *Protozoa*, a spore mother cell from which a spore will arise.

sporobo'la (*Bot.*). The path followed by a spore which is shot off horizontally from a basidium and then falls under the influence of gravity.

spo'rocarp (*Bot.*). (1) A multicellular structure in which spores are formed.—(2) The spore-containing structure of some water ferns.

spo'rocyst (*Zool.*). The tough resistant envelope secreted by, and surrounding, a Protozoan spore.

spo'rocyte (*Zool.*). A spore mother cell.

sporodo'chium (*Bot.*). A cushion-shaped mass consisting of many conidiophores crowded together.

spo'roducts (*Zool.*). In some *Gregarinidea*, ducts in the cyst through which the spores are ejected by the swelling of the residual protoplasm derived from the sporonts.

sporogen'esis (*Bot., Zool.*). Spore formation.

sporogen'ous (*Bot.*). Producing or bearing spores.

sporogenous cell (*Bot.*). A spore mother-cell.

sporogenous layer (*Bot.*). See **hymenium.**

sporogenous tissue (*Bot.*). A layer or group of cells from which spore mother cells are formed.

sporogo'nium (*Bot.*). The spore-bearing plant in the *Bryophyta*. It develops from the fertilised egg and lives as an almost complete parasite on the gametophyte.

sporog'ony (*Zool.*). In *Protozoa*, propagative reproduction, usually involving sexual processes and always ending in the formation of spores.

spo'ront (*Zool.*). A stage in the life-history of some *Protozoa* which, as a gametocyte, gives rise to gametes, which in turn, after a process of syngamy, may give rise to spores.

spo'rophore (*Bot.*). The spore-bearing structure in Fungi.

spo'rophyll (*Bot.*). A leaf, more or less modified, which bears one or more sporangia, or subtends a sporangium.

spo'rophyte (*Bot.*). The spore-bearing plant.

sporophyt'ic (*Bot.*). Pertaining to the sporophyte.

spo'roplasm (*Zool.*). (1) A binucleate amoebula stage in the life-cycle of some *Protozoa*.—(2) In the spores of certain *Sporozoa*, the body of protoplasm.

sporotricho'sis (*Med.*). An infection of the skin (and rarely of muscles and bones) with the fungi of the genus *Sporotrichum*, causing granulomatous lesions.

Sporozo'a (*Zool.*). A class of *Protozoa* comprising forms which are always parasitic, in the principal phase have no external organs of locomotion or are amoeboid, lack a meganucleus, and form large numbers of spores after syngamy.

sporozo'ite (*Zool.*). In *Protozoa*, an infective stage developed within a spore.

sport (*Gen.*). Any individual differing markedly from the normal by reason of genetical factors; it may be due to a *mutation* (q.v.) or to other causes, such as a rare recombination of factors.

sporula'tion (*Bot.*). The production of spores.—(*Zool.*) In *Protozoa*, a form of multiple gemmation in which the parent organism breaks up almost completely into buds, leaving a little mass of residual protoplasm.

spot or **spot-light** (*Cinema.*). An arc or incandescent light in a container with a lens. It emits a narrow beam of rays.

spot, blind (*Optics*). See **blind spot.**

spot board (*Plast.*). The square wooden board on which the plasterer works up the coarse or fine stuff prior to applying it to the walls.

spot cotton (*Cotton Trade*). Cotton available for immediate delivery.

spot level (*Surv.*). The reduced level of a point (usually on the ground surface) chosen at random.

spot recording (*Acous.*). Any recording done on location, particularly when there is one opportunity only, without rehearsal, for making the recording; as in news-reels.

spot welding (*Elec. Eng.*). An electric welding process in which two overlapping sheets of metal are held between a pair of electrodes between which a heavy current of short duration is passed.

spotted fever (*Med.*). Cerebrospinal fever. See also **Rocky Mountain fever.**

spotted slate (*Geol.*). Argillaceous rock which has been altered by low or moderate grade metamorphism so that the homogeneous colouring matter of the rock becomes concentrated at some points and an early stage of crystallisation of other minerals may be found in other points, giving a spotted appearance.

spotting (*Horol., etc.*). A method of finishing plates or other flat surfaces with a regular pattern of circular patches.

spotting (*Eng.*). The operation of turning a short length of a bar or forging to form a journal, by which the work is to be supported by the jaws of a steady rest. See **steady.**

spotting drill (*Eng.*). A flat drill having a point so shaped as to centre and face the end of a bar at one operation. See also **centre drill.**

spotting negatives (*Photog.*). Simple retouching, in which pinholes in negatives are made opaque, and the consequent defect is mitigated.

sprags (*Mining*). Timber props, or short pieces of wood, used to prevent the wheels of a train from revolving.

sprain (*Med.*). A wrenching of a joint with tearing or stretching of its ligaments, damage to the synovial membrane, effusion into the joint, occasionally rupture of muscles or tendons attached to the joint, but without dislocation.

spray arrester (*Elec. Eng.*). (1) A lightning arrester designed for removing accumulation of static charge; it consists of a spray of water from an earthed pipe impinging on a plate connected to the live circuit.—(2) A sheet of glass placed over an open accumulator cell to prevent splashing of acid spray.

spray gate (*Foundry*). An in-gate consisting of a number of small separate gates, fed from the runner; used for shallow castings where there is insufficient depth for a single large gate. See **in-gate.**

spray-gun (*Civ. Eng., Paint., etc.*). An apparatus for forming by pneumatic pressure a fine spray or mist of paint or cement mortar, which can be directed on to the work.

spray-shielded valve (*Thermionics*). See **metallised valve.**

spraying (*Met.*). The process of coating the surface of an article with metal by projecting on to it a spray of molten metal.

spread (*Biol.*). The establishment of a species in a new area.

spread (*Radio*). The angle, in degrees, within which fall a number of bearings, ostensibly of a distant radio-transmitter, when corrected for site and other errors.

spreadboard (*Textiles*). An endless belt on which sorted flax fibre is laid in handfuls for conversion into sliver.

spread factor (*Elec. Eng.*). See **distribution coefficient.**

spreader (*Radio*). A wooden or metal spar for keeping the wires of a multi-wire antenna spaced apart from each other.

spreading (*Bot.*). Diverging gradually outwards.

sprig (*Build.*). A small nail with little or no head.

sprigs (*Foundry*). Small nails pushed into a weak edge of sand in a mould in order to reinforce it during pouring. Also called BRADS.

sprig bit (*Join.*). See **bradawl.**

spring (*Elec. Comm., Eng., etc.*).
See **carriage— fly— relay—**
contact— helical— spiral—
x-contact y-contacts.

spring assembly (*Elec. Comm.*). The collection of contact springs in a relay. The moving springs are pushed by the movement of the armature, on operation of the relay, so that the appropriate circuit changes are made.

spring bows (*Instruments*). Small compasses whose two limbs are not hinged together but are connected by a bow of spring steel, the distance apart of the marking points being adjusted by means of a screw.

spring control (*Elec. Eng.*). A method of controlling the movement of an indicating instrument by means of a spring.

spring-loaded governor (*Eng.*). An engine governor consisting of rotary masses which move outwards under centrifugal force and are controlled by a spring. See **Hartnell governor.**

spring needle (*Hosiery*). A type of needle used to produce close and even texture in knitted fabrics. Also called BEARDED NEEDLE.

spring pawl (*Eng.*). See **pawl.**

spring safety valve (*Eng.*). See **safety valve.**

spring skins (*Furs*). The fur of animals caught in the spring (seconds).

spring wood (*Bot.*). Secondary wood formed during the spring and early summer, often distinguished by the larger and thinner walled elements of which it is composed. Cf. *summer wood.*

spring tides (*Astron.*). Those high tides occurring when the moon is new or full, at which times the sun and moon are acting together to produce a maximum tide.

springer or **springing** (*Civ. Eng.*). The lowest voussoir on each side of an arch. Also called REIN.

springing (*Horol.*). The operation of shaping and fitting the balance spring to its staff.

springings (*Build.*). The lines where the intrados of an arch meets the abutments or piers.

springing line (*Build.*). The line joining the springings on both sides of an arch.

sprinkler (*Build.*). A pipe system installed in a building, having at frequent intervals spray nozzles protected by connexions made of a fusible alloy; these, in the event of a fire, melt and release water for automatic fire-fighting.

sprocket (*Carp.*). A small wedge-shaped piece of wood nailed to the upper surface of the lower end of a common rafter in cases where the latter is carried beyond the pole plate to form a projecting eave. It provides a break in the slope of the roof near the eaves.

sprocket (*Cinema.*). A cylindrical wheel, with protruding pins on one rim or both rims for pulling film by means of perforations.

sprocket or **sprocket wheel** (*Eng., etc.*). A toothed wheel used for chain drives, as on the pedal shaft and rear hub of a bicycle.

sprocket holes (*Cinema.*). The accurately punched perforations on the edges of cinematograph film, for pulling it through cameras and projectors at the correct speed.

sprocket noise (or **hum**) (*Cinema.*). The extraneous noise, of 96 cps. fundamental, arising from a displacement of the film in a sound-gate, so that the light from the exciter lamp passes through the adjacent perforations and is thereby modulated.

sprocket wheel (*Eng., etc.*). See **sprocket.**

sprout cell (*Bot.*). A cell formed as a bud from a mother cell.

sprouting or **sprout germination** (*Bot.*). See **budding** (1).

sprue (*Foundry*). See **gate.**

sprue (*Med.*). Psilosis. A disease affecting the gastro-intestinal tract. Characterised by loss of energy, loss of weight, anaemia, inflammation of the tongue and the mouth, and by the frequent passage of pale, bulky, acid, frothy stools, there being inability to absorb adequately fat, glucose, and calcium.

spun silk (*Textiles*). Yarn made from silk waste which is spun in the same manner as woollen yarns.

spur (*Bot.*). (1) A tubular prolongation of the base of a petal or of a gamopetalous corolla.—(2) An extension of the base of the leaf beyond its point of attachment.—(3) See **short shoot.**—(4) A short branch in many trees on which flowers and fruit are borne.

spur (*Build.*). A strut.

spur (*Geol.*). A hilly projection extending from the flanks of a valley.

spur (*Print.*). See **machine points.**

spur (*Zool.*). See **calcar.**

spurs (*Pot.*). Supports, made of dense non-fusing material, for holding up articles in saggars in the glost kilns.

spur gear (*Eng.*). A system of gear-wheels connecting two parallel shafts. The pitch surfaces are cylinders with straight, helical, or double-helical teeth, generally of involute form.

spur marks (*Pot.*). Dry spots, not covered by glaze, sometimes seen on the base of ware which has been supported in saggars on spurs.

spur pelory (*Bot.*). An abnormal condition in which all the petals of an irregular flower develop spurs, so that the flower becomes regular.

spu'riae (*Zool.*). In Birds, the feathers of the bastard wing.

spurious dissepiment (*Bot.*). A partition in a fruit which is not an ingrowth from the edges of the carpels nor an upgrowth from the receptacle. Also called FALSE SEPTUM.

spurious fruit (*Bot*). A group of fruits having the appearance of a single fruit; a fig is a familiar example.

spurious oscillation (*Radio*). See **parasitic oscillation.**

spurious pregnancy (*Med.*). See **pseudocyesis.**

spurr'ite (*Min.*). A carbonate and silicate of calcium, $2Ca_2SiO_4{\cdot}CaCO_3$, occurring somewhat rarely in limestones containing silica in the metamorphic aureoles round igneous intrusions, as at Scawt Hill, Antrim.

sputtering (*Thermionics*). Disintegration of the material of the cathode in a vacuum or gas-filled discharge tube, and its subsequent deposition on the other electrodes or the walls of the envelope.

spu'tum (*Med.*). Matter composed of secretions from the nose, throat, bronchi, or lungs, which is spat out.

Spy Wood Grit (*Geol.*). A sandstone-grit bed which forms the basal member of the Caradocian stage in the Ordovician System in the Shelve district of Shropshire.

spyndle (*Textiles*). A unit of length (14,400 yards) used in counting jute yarns.

S.Q. (*Build*). Abbrev. for *squint quoin.*

squam'a (*Bot., Zool.*). A scale: a scale-like structure.—(*Zool.*) In some *Crustacea*, a scale-like body arising from the second joint of the antenna and believed to represent the exopodite: in *Diptera*, the *antisquama* (q.v.).

Squama'ta (*Zool.*). An order of *Reptilia* having (usually) procoelous vertebrae, upper temporal arcade only, a perforate palate, a movable quadrate, and no abdominal ribs. Snakes and Lizards.

squamate, squamose, or **squamous** (*Bot., Zool.*). Scaly.

squamation (*Zool*). See **pholidosis.**

squam'iform (*Zool.*). Scale-like.

squamo'sal (*Zool*). A paired membrane bone of the Vertebrate skull which overlies the quadrate.

squamous epithelium (*Zool.*). Epithelium consisting of one or more layers of flattened scale-like cells; pavement epithelium.

squam'ula (*Zool.*). A small scale: in *Insecta*, the tegula: in some *Gymnophiona*, one of the small rounded areas of the pouch scales.—*adj.* **squam'ulate.**

squam'ule (*Bot.*). A small scale.

squam'ulose (*Bot.*). Covered with small scales.

square (*Carp.*). The unit of area used in the trade for flooring, etc., the unit being 100 sq. ft.

square (*Timber*). A piece of square-section timber of size from 1 to 6 in. square.

squares (*Bind.*). The protrusion of the covers of a book beyond the edges.

square folding (*Bind*). The method of folding in which the second fold is at right angles to the first, the third to the second, and so on. Cf. *parallel folding.*

square joint (*Carp., Join.*). A joint formed between the squared ends of two jointing pieces which come together but do not overlap.

square law (*Illum.*). The law of inverse squares expressing the relation between the amount of light falling upon unit area of a surface and the distance of the surface from the light source.

square law condenser (*Radio*). A variable condenser, used for tuning, in which the capacitance is proportional to the square of the scale reading, so that the wavelength of the circuit which it tunes becomes directly proportional thereto. Also called STRAIGHT-LINE WAVELENGTH CONDENSER.

square law rectifier (*Radio*). A rectifier in which the rectified output current is proportional to the square of the applied alternating voltage.

square-mile foot (*Elec. Eng.*). A hydraulic constant often used in hydro-electric calculations; it is defined as the quantity of water that will cover an area of a square mile to a depth of 1 ft. It is equal to 27·88 million cub. ft., or 174 million gallons.

square rabbet plane (*Join.*). A rabbet plane with its cutting edge square across the sole.

square roof (*Build*). A roof in which the principal rafters enclose an angle of 90°.

square staff (*Build.*). An angle staff of square-section material, as distinct from an angle bead.

square step (*Build.*). An individual stone step in a stair which consists of a solid block, rectangular in section, either lapping over the back edge of the step below or rebated to fit over it.

square thread (*Eng.*). A screw-thread having twice the pitch of a similar V thread, with corners slightly rounded; used for transmitting a thrust, as in stop-valve spindles.

squared (*Horol.*). Formed to a square cross-section; e.g. the end of a barrel arbor that takes the winding key.

squared rubble (*Masonry*). Walling in which the stones are roughly squared to rectangular faces but are of irregular size.

squaring (*Furs*). The operation of shaping up furs for use.

squaring bands (*Spinning*). See **steadying bands.**

squaring-up (*Build., Civ. Eng.*). A process following *taking-off* in drawing up a bill of quantities, superficial areas of items being calculated by multiplying the relevant dimensions entered on the dimensions paper.

squar'rose (*Bot.*). Rough, with many scales or hairs standing out at right-angles.

squeaking (*Elec. Comm.*). Using a gliding tone, either from a beat (heterodyne) oscillator or from a record, for testing the frequency-response curve of lines, amplifiers, recorders, etc.

squeegee (*Photog.*). A rubber roller or brush for squeezing out surplus water, to ensure good contact between photographic surfaces or supports.

squeeze track (*Cinema.*). This indicates closing the light-valve ribbons in variable-density recording, or cutting off superfluous light or deflecting the modulating mirror in variable-area recording, so that the negative sound-track is as transparent as possible. It ensures that the positive print, allowing for the desired modulation, is as dense as possible, so that noise arising from scratches and grain is minimised.

squeezer (*Moulding*). A moulding machine, operated by hand, compressed air, hydraulic power, or magnetic means, in which the sand is squeezed or compressed into the box and round the pattern by a ram.

squegging (*Radio*). A mode of oscillation of an oscillator when operated under certain conditions, as with excessive resistance in the grid circuit. The oscillations build up to a certain value and then abruptly stop, the process being repeated at a rate determined by the time-constant of the capacitance and resistance of the grid circuit. Sometimes called SQUAGGING.

squegging oscillator (*Cathode Ray Tubes*). A form of linear time base which includes an oscillator operating in the squegging condition.

squinch (*Build.*). A small arch running diagonally across the corner of a square tower or room, to support a side of an octagonal tower or spire above. Also called a SCOINSON ARCH.

squint (*Build.*). A purpose-made brick of shape suiting it for use as a squint quoin.

squint (*Med.*). See **strabismus.**

squint quoin (*Build.*). A quoin enclosing an angle which is not a right-angle.

squirrel (*Furs*). The dressed skin of the squirrel, of which there are several varieties—red, grey, black. The fur is generally that of the grey squirrel, but frequently it is dyed.

squirrel-cage motor (*Elec. Eng.*). An induction motor whose rotor winding consists of a number of copper bars distributed in slots round the periphery, with the ends solidly connected to two heavy copper end-rings, the whole forming a rigid cage embedded in the rotor. See also **cage rotor, cage winding.**

squirted filament (*Illum.*). An electric-lamp filament prepared by squirting a composition through a die and subsequently applying heat treatment.

Sr (*Chem.*). The symbol for *strontium.*

S.T. (*Build.*). Abbrev. for *surface trench.*

stab (*Typog.*). See under **establishment.**

stabbing (*Bind.*). The operation of (1) piercing a book section prior to stitching or sewing, (2) wire-stitching a closed section or booklet near the back edge.

stabbing (*Build.*). The operation of making a brickwork surface rough in order to provide a key for plasterwork.

stabilisation (*Bot.*). The establishment of an equilibrium between the vegetation of a locality and external conditions, especially climatic conditions.

stabilised feedback amplifier (*Radio*). An amplifier in which the degree of amplification is stabilised against changes in supply voltages, etc., by the application of negative feedback.

stabiliser (*Chem.*). (1) A negative catalyst.—(2) A substance which makes a solution stable.

stabiliser (*Thermionics*). A device for ensuring the constancy of voltage or current, irrespective of variations of conditions of supply and/or load, over a certain range. A typical example is a neon-filled discharge tube, which maintains a constant P.D. across its terminals over wide ranges of current through it.

stabilising choke (*Illum.*). A reactive choke coil inserted in series with an electric discharge lamp in order to compensate its negative resistance characteristic.

Stab'ilit (*Elec. Eng.*). A vulcanised rubber insulating material similar to ebonite and vulcanite.

stability. A general property of mechanical, electrical, or aerodynamical systems, whereby the system returns to a state of equilibrium after disturbance, any consequent oscillation dying away through dissipation of energy.

stability (*Elec. Eng.*). The property of a transmission system whereby there is a general tendency for changes in load demand to be met without any falling out of step on the part of synchronous machines.

stability test (*Cables*). In this test the cable is subjected to working voltage (or a higher voltage) whilst it is alternately heated and allowed to cool. The power factor is measured during each heating and cooling period. If the power factor increases steadily during the test, the cable is said to be unstable.

stable (*Chem., etc.*). Possessing no tendency to change.

stable community (*Bot.*). A plant community which remains unaltered in its general characters for a long time.

stable equilibrium (*Mech.*). See **equilibrium.**

stable oscillation. Any oscillation in a mechanical body, electrical circuit, or aircraft which does not increase, but tends to die away because of natural dissipation of energy unless externally sustained.

stach'yose (*Chem.*). $C_{24}H_{42}O_{21}+4\frac{1}{2}H_2O$, a tetrasaccharose, found in the roots of *Stachys tuberifera* and of several *Labiatiae*; m.p. (anhydrous) 170° C.

stack (*Build.*). See **chimney stack.**

stack mixing (*Textiles*). A method of mixing cotton of different types by piling it in horizontal layers, to produce raw material suitable for spinning yarns of fine count. See **direct mixing.**

Staddon Grits (*Geol.*). A series of sandstones, grits, and quartzites found in Cornwall and South Devon, occurring typically on Staddon Heights, Plymouth, and of Lower Devonian age.

stadia hairs (*Surv.*). The two additional horizontal hairs, one on each side of the central hair, fitted to the diaphragm of a telescope to be used for tacheometric purposes.

stadia rod (*Surv.*). A special form of levelling staff bearing bold graduations suitable for the long sights usual in stadia tacheometry.

stadia system (*Surv.*). A tacheometric method in which distance is determined at one pointing only of the telescope.

stadium (*Zool.*). An interval in the life-history of an animal between two consecutive ecdyses.

staff (*Build.*). (1) A *rung* (q.v.).—(2) An *angle-staff* (q.v.).

staff (*Horol.*). An arbor or axis, especially that of the balance or pallets.

staff (*Surg.*). A grooved rod introduced into the urethra as a guide for cutting a stricture.

staff (*Surv.*). See **levelling staff.**

staff angle (*Build.*). An *angle-staff* (q.v.).

staff bead (*Build.*). An *angle-bead* (q.v.).

staffman (*Surv.*). The surveyor's assistant whose duty it is to hold the levelling staff while the instrument is sighted upon it and readings are being taken.

Staffordian Series (*Geol.*). The so-called Transition Group of the British Coal Measures, between the Middle and Upper Coal Measures in the Carboniferous System. They include the Newcastle-under-Lyme Group and the Etruria Marl, and the Blackband Group in North Staffordshire.

Staffordshire blues (*Build.*). Hard, dense, and almost impervious bricks of the *engineering brick* (q.v.) class, dark-blue in colour owing to an oxide of iron content.

stag-headed (*Bot.*). Said of a tree which, owing to a diseased condition, is devoid of twigs and leaves at the top, some dead main branches standing up like antlers.

stage (*Build., Civ. Eng.*). (1) A *landing* (q.v.).—(2) A *platform* (q.v.).

stage (*Build., Cinema.*). That part of a theatre auditorium which is reserved for the artists who are performing, or which accommodates the cinematograph screen and the associated sound-reproducers, scenery, lighting equipment, etc.

See **sound—** **scoring—**

stage (*Geol.*). A succession of rocks which were deposited during an age of geological time. It is a subdivision of a geological series.

stagger (*Aero.*). The condition in which one or more planes of a multiplane structure are placed ahead of the others. When the higher planes are ahead of the lower, the stagger is *positive,* and when the reverse, *negative.*

staggering (*Elec. Eng.*). A term signifying the displacement of the brushes of a commutator motor from the neutral zone.

staging (*Build.*). See **builders' staging.**

stagnic'olous (*Zool.*). Living in stagnant water.

stain (*Photog.*). Any extraneous marking on a photographic image due to deposition of chemical matter and insufficient washing.

stainer (*Paint.*). A pigment added to paint when a final colour is required which is different from that of the base used. Also called COLOURING PIGMENT.

staining (*Leather*). The operation of brushing the surface of leather with a solution of dyestuff. Also called BRUSH-DYEING.

staining (*Photog.*). The coloration of a black-and-white print with dye in colour cinematography.

staining power (*Chem.*). The degree of intensity of colour which a coloured pigment will impart when mixed with a standard white pigment under standardised conditions.

stainless steel (*Met.*). Corrosion-resistant steel of a wide variety of compositions, but always containing a high percentage of chromium (8-25%). The following are typical compositions: 13% Cr, 0·35% C; 18% Cr, 0·1% C; 18% Cr, 8% Ni, 0·08% C; 25% Cr, 12% Ni. These are highly resistant to corrosive attack by organic acids, weak mineral acids, atmospheric oxidation, etc. Used for cutlery, furnace parts, chemical plant equipment, stills, valves, turbine blades, ball-bearings, etc.

stair (*Build.*). A series of steps constructed to give access to parts of a building at different levels.

staircase (*Build.*). The space containing the stair.

stair clip (or **rod**) (*Build.*). A clip or rod used to hold a stair carpet in position at the re-entrant angle between a tread of one step and the riser of the step immediately higher.

stair-head (*Build.*). The top of a flight of stairs.

stairway (*Build.*). A *staircase* (q.v.).

stake (*Carp.*). A piece of timber pointed at one end for ease of driving into the ground.

staking machine (*Leather*). A machine in which leather undergoes a process of stretching and softening, to prevent cohesion of the fibres while drying.

stalac'tite (*Geol.*). A concretionary deposit of calcium carbonate which is formed by percolating solutions and hangs icicle-like from the roofs of limestone caverns and analogous places.

stalac'tited (*Masonry*). A term applied to a variety of rusticated work distinguished by having ornaments resembling icicles on the faces of the stone.

stalag'mite (*Geol.*). A concretionary deposit of calcium carbonate, precipitated from dripping solutions on the floors and walls of limestone caverns. Stalagmites are often complementary to stalactites, and may grow so that they eventually join with these.

stalagmom'etry (*Chem.*). The analysis of solutions by means of surface tension measurements.

staling (*Bot.*). The accumulation in the substratum of waste metabolic products from bacteria or fungi, rendering the substratum unfit to sustain further growth of the organisms.

stalk (*Civ. Eng.*). The upright part of a reinforced concrete retaining wall, springing from the horizontal base.

stalk (*Horol.*). The thin rod or wire which carries the hammer of a striking or chiming clock.

stall (*Aero.*). To have the planes of an aircraft at or above the angle of incidence corresponding with its maximum lift coefficient.

stall (*Eng.*). (Of an engine) to stop owing to the too sudden application of a load or brake.

stall (*Mining*). The working compartment or room in the bord-and-pillar method of working coal: a coal-miner's working place.

stallboard (*Join.*). A substantial and often wide sill at the foot of the window sash of a shop front.

stall riser (*Build.*). The upright part, of wood, marble, etc., between the pavement and the stallboard of a shop front.

stalling speed (*Aero.*). The airspeed of an aeroplane at which it experiences its maximum lift.

stalling torque (*Elec. Eng.*). The overload torque which is sufficient to slow down to zero the speed of an electric motor operating under load.

Stalloy (*Elec. Eng.*). A special high-grade 'electrical' steel manufactured in thin sheets and used in laminated cores.

sta'men (*Bot.*). One of the members of the flower which produces pollen. It usually consists of a slender filament surmounted by an anther in which the pollen develops.

stam'inal (*Bot.*). Pertaining to a stamen: derived from a stamen.

stam'inate (*Bot.*). Said of a flower possessing stamens but not carpels, and, by extension, of an inflorescence consisting of such flowers.

stam'inode (*Bot.*). An imperfectly developed or vestigial stamen.

stam'inose (*Bot.*). Said of a flower in which the stamens are very obvious.

stamp (*Mining*). (1) To crush.—(2) A freely falling weight, attached to a long rod and lifted by means of a cam; used for crushing ores.

stamp battery (*Met.*). A machine for crushing gold ores. Each battery contains five heavy stamps, which are lifted in turn by cams and dropped. The ore, mixed with water, is crushed on die blocks and splashed against a screen, the mesh of which controls the fineness of the product.

stamper (*Acous.*). The final negative record made by electroplating the mother. The stamper is used to imprint the final positive on the gramophone record which is used for reproduction.

stamping (*Elec. Eng.*). See **lamination.**

stanchion (*Civ. Eng.*). A pillar, usually of steel, for the support of a superstructure.

stand-by losses (*Elec. Eng.*). That part of the power expended in a generating station in order to maintain plant in instant readiness to take a sudden load.

stand-in (*Cinema.*). In motion-picture production, a duplicate, in figure and dress, of a leading artist. The stand-in takes the place of the actual artist during the adjustment of the lighting, etc., before a shot, so that the actual artist is not fatigued by these preliminaries.

stand-insulator (*Elec. Eng.*). An insulator on which stands the structure used for supporting an accumulator or battery.

stand pipe (*Eng.*). An open vertical pipe connected to a pipe line, to ensure that the pressure head at that point cannot exceed the length of the stand pipe.

stand sheet (*Build.*). A window having no frame. Also called FAST SHEET.

standstill (*Elec. Eng.*). A term pertaining to the electrical behaviour of a machine when at rest.

standstill torque (*Elec. Eng.*). The load torque which would bring an electric motor to a standstill.

standard (*Bot.*). The large petal which stands up at the back of the flower of the pea and related plants, and does much to make the flower conspicuous. Also called BANNER, VEXILLUM.

standard (*Build.*). One of the upright poles or members forming a principal part of a scaffold.

standard fitting (*Illum.*). An electric-light fitting designed to stand on a table, or on the floor. More commonly known as a STANDARD LAMP.

standard pile (*Civ. Eng.*). A form of bearing pile driven into the ground to provide support for sheet piling.

standard. Generally, a unit of reference, frequently legally defined; see **metre, pound, line standard.** Also used adjectivally in connexion with numerous specific entities to denote a value commonly accepted for purposes of reference or measurement. See the articles immediately following.

standard (*Timber*). See **board foot, Petersburg standard.**

standard ampere (*Elec. Eng.*). The international unit of current. It is defined as that steady current which, when passed through a solution of silver nitrate, deposits silver at the rate of 1·118 milligrams per second.

standard atmosphere (*Aero.*). A standard of measurement of atmospheric conditions used in comparing the performance of aircraft. Mean sea-level temperature 15° C., and pressure 1013 2 millibars. Lapse rate 6·5° C. per kilometre from sea-level up to 11 kilometres, above which the temperature is assumed constant at −56·3° C.

standard cable (*Elec. Comm.*). See **mile of standard cable.**

standard calomel electrode (*Chem.*). A half-element consisting of mercury, a paste of mercury and calomel (mercurous chloride), and a standard solution of potassium chloride saturated with calomel; used as a standard potential difference in e m.f. measurements.

standard (or **parliamentary**) **candle** (*Illum.*) A source of light of standard intensity once used in photometry but now replaced by more reliable standards such as the pentane lamp, the Hefner lamp, and the Carcel lamp. See **international candle.**

standard cell (*Elec. Eng.*). A voltaic cell selected as a standard because of stability of electromotive force and reproducibility to specification. The standard cell at the present time is the Weston cadmium cell, which has an electromotive force of 1·01823 volt at 20° C.

standard deviation (*Maths.*). The root of the average of the squares of the differences from their mean of a number of observations. The square root of their *variance* (q.v.).

standard electrode potential (*Chem.*). The potential of a chemical element dipping into a solution containing its ions at unit activity, referred to that of hydrogen under a pressure of one atmosphere as zero.

standard film stock (*Cinema.*). The normal size of film used in theatres and film studios, i.e. 35 mm. in width.

standard filter (*Photog.*). A filter which, when placed in front of a specified source, e.g. a tungsten lamp, gives a standard light—white of black-body temperature 4800 K.

standard frequency (*Elec. Eng.*). 50 or 60 cycles per second, the standards of frequency adopted in most countries of the world.

standard gauge (*Rail.*). In Great Britain and the United States of America the standard gauge is 4 ft. 8½ in.

standard knot (*Timber*). A knot which is 1½ in. or less in diameter.

standard measurement (*Build.*). The method recommended by the Chartered Surveyors' Institution for the measurement of building works.

standard mix (*Civ. Eng.*). Concrete mixed in the proportions: 1 of cement to 2 of sand to 4 of coarse material.

standard ohm (*Elec. Eng.*). The resistance of a column of mercury 106·3 cm. long and 1 sq. mm. in area at 15° C. The legal unit of resistance.

standard oxidation - reduction potential (*Chem.*). The potential established at an inert electrode dipping into a solution containing equimolecular amounts of an ion or molecule in two states of oxidation.

standard reflector (*Illum.*). A reflector which conforms with the British Standard Specification for industrial reflectors.

standard sections (*Eng.*). See **girder, H-beam.**

standard signal generator (*Radio*). An oscillator whose output is calibrated as regards frequency and amplitude, and sometimes depth of modulation; used for the testing of radio equipment, receivers, etc.

standard solenoid (*Elec. Eng.*). A laboratory standard of inductance consisting of an air-cored solenoid with a secondary coil located at its centre. The dimensions are such that a change of 1 ampere in primary produces a change of 10^6 flux-linkages in the secondary winding.

standard solution (*Chem.*). A solution whose strength is known. The most important standard solution is the *normal solution.*

standard specification (*Eng., Elec. Eng.*). The specification to which a machine must conform. In Great Britain standard specifications are drawn up by the British Standards Institution; in U.S.A. by the Bureau of Standards.

standard temperature and pressure (*Chem.*). See **S.T.P.** and **N.T.P.**

standard time (*Astron.*). The system of time reckoning with reference to some selected meridian for a large area, instead of using many local times differing according to longitude. For general (e.g. navigational) purposes, Greenwich mean time is the accepted standard. It is also the local standard for Great Britain and France. *Central European Time* (1 hour in advance of Greenwich) is the standard for Germany, Switzerland, and Italy. In the U.S.A. and Canada five zones are recognised, viz. *Atlantic* (Canada, 4 hours behind Greenwich), *Eastern* (5 hours), *Central* (6 hours), *Mountain* (7 hours), *Pacific* (8 hours).

standard wire gauge (*Eng.*). See **British Standard wire gauge, Birmingham wire gauge, Brown & Sharpe wire gauge.**

standing panel (*Join.*). A door panel whose height is greater than its width.

standing pier (*Civ. Eng.*). An isolated bridge-pier. Cf. *abutment pier.*

standing wave (*Elec. Eng.*). See **stationary wave.**

standing waves (*Radio*). A distribution of current and voltage on a conductor system formed by two sets of waves travelling in opposite directions. Characterised by the presence of a number of points of successive maxima and minima in the distribution curves.

standing ways (*Ship Constr.*). The portion of a ship's launching ways which are fixed to the ground. The sliding ways move on these ways and are positioned by an upstanding rib integral with the fixed ways.

stank (*Mining*). An air-tight and water-tight wall.

Stanley Kent's fibres (*Zool.*). The fibres which constitute the auriculoventricular bundle of the heart and maintain connexion between the muscle of the auricles and the muscle of the ventricles.

stannane (*Chem.*). Tin hydride, SnH_4.

stannates (*Chem.*). Analogous to the carbonates. Formed by heating solutions of, say, stannic chloride with alkaline carbonates.

stannic acid (*Chem.*). Acids of two types, formed by the action of alkalies on solutions of stannic chloride and by the action of nitric acid on the metal; called respectively α-stannic acid and metastannic acid or β-stannic acid.

stannic oxide (*Chem.*). SnO_2. Formed (1) by the combustion of tin and (2) when stannic acids are calcined. Forms alkali stannates when fused with alkali carbonates. See also **stannous hydroxide.**

stannite (*Min.*). A sulpho-stannate of copper, iron, and sometimes zinc, which crystallises in the tetragonal system. It usually occurs in tin-bearing veins, having been deposited from hot ascending solutions. Also called TIN PYRITES, BELL-METAL ORE.

stannites (*Chem.*). Salts of stannous acid. Formed when stannous hydroxide is dissolved in alkaline solutions.

Stannius' corpuscles (*Zool.*). In Fish, inter-renal glandular organs scattered in or on the ventral surface of the mesonephros.

stan'notype (*Photog.*). A photo-mechanical process in which an exposed and developed bichromated film is coated with tinfoil and used directly for pressure printing.

stannous hydroxide (*Chem.*). $Sn(OH)_2$. Precipitated when sodium hydroxide is added to a solution of stannous chloride. When heated in carbon dioxide forms black stannous oxide, SnO, which when heated in air forms stannic oxide, SnO_2. Converted into stannous salts when treated with acids.

stapedec'tomy (*Surg.*). Excision of the stapes.

Stapeley Volcanic Series (*Geol.*). A succession of andesitic lavas and volcanic ashes of Llanvirnian age, found in the Shelve district of Shropshire, notably on Stapeley Hill.

sta'pes (*Zool.*). In *Amphibia*, a small nodule of cartilage in connexion with the fenestra ovalis of the ear: in *Mammalia*, the stirrup-shaped innermost auditory ossicle.—*adj.* **stape'dial.**

staphylo'ma (*Med.*). Local bulging of the weakened sclera of the eye (as in glaucoma or myopia); bulging of a corneal scar in which the iris of the eye has become fixed.

staphylor'rhaphy (*Surg.*). The operation of closing a cleft in the soft palate.

staple (*Build.*). A metal loop used with a *hasp* (q.v.) and a *padlock* (q.v.) or peg to form a door or gate fastening.

staple or **staple pit** (*Mining*). An internal shaft connecting two coal-seams. Cf. *winze.*

staple (*Textiles*). The quality of a fibre, estimated by length and strength.

star (*Astron.*). Originally a term for any luminous body seen in the night sky, but now confined to any that is self-luminous and of the same general nature as the *Sun* (q.v.), though differing widely in size, distance, etc. With the aid of telescopes and photography, and the technique of statistical methods, the stars are now extensively studied from many points of view. See **constellation, star streaming, proper motion, magnitudes, spectral type.**

star charts (*Astron.*). The name given to systematic and accurately made maps of the heavens in which the star positions are generally plotted according to equatorial co-ordinates, the most important international publication of this kind, not yet completed, being the Astrographic Catalogue.

star connexion (*Elec. Eng.*). A method of connecting the several phases of a three-phase supply; the terminal voltage is $\sqrt{3}$ times the phase voltage.

star-delta startor (*Elec. Eng.*). A starting switch for an induction motor which, in the one position, connects the stator windings in star for starting and, in the other position, reconnects the windings in delta when the motor has gained speed.

star-like (*Bot.*). Said of a flower with rather narrow, pointed, radiating petals.

star lots (*Textiles*). Wool offered for sale at the London sales in lots not usually exceeding three bales.

star magnitudes (*Astron.*). See **magnitudes.**

star-mesh transformation (*Elec. Comm.*). The equivalence of three impedances radiating from one point to three points with impedances connecting these three points. The simplest case of the equivalence of any number of impedances radiating from one point to the same number of other points with impedances connecting every pair of these points.

Star Peak Group (*Geol.*). A group which comprises three great limestones with three intervening quartzites, totalling more than 10,000 ft., in the Triassic rocks of Nevada; succeeds the Koipato Group.

star point (*Elec. Eng.*). The common junction of the several phases of a star-connected three-phase system.

star-quad cable (*Cables*). See **quad cable.**

star ruby, —sapphire, —topaz, —quartz (*Min.*). The prefix 'star' has reference to the narrow-rayed star of light exhibited by varieties of the minerals named. The star is seen to best advantage when they are cut *en cabochon.* It is caused by reflections from exceedingly fine inclusions lying in certain planes. See also **asterism.**

star shake (*Timber*). The name given to a number of shakes radiating from the heart of a log.

star streaming (*Astron.*) A phenomenon, discovered from analysis of observed stellar motions (after removing the effects of the observer's own motions), by which the stars are found to have two preferential directions of motion, one towards the point R.A. 90°, declination 15° south, and the other towards R.A. 285°, declination 64° south; the first stream contains about 60% of the observed stars.

star wheel (*Horol.*). A wheel with pointed triangular teeth.

starch (*Chem.*). Amylum, $(C_6H_{10}O_5)_x$; a polyose found in all assimilating (green) plants. It is a white hygroscopic powder which can be hydrolysed to dextrin and finally to *d*-glucose. Diastase converts starch into maltose. Starch does not reduce Fehling's reagent and does not react with phenylhydrazine. It forms with iodine a blue compound.

starch crescent (*Bot.*). A strand of cells, crescentic in cross-section, containing starch grains which are presumed to act as statoliths.

starch grain (*Bot.*). A rounded or irregularly shaped inclusion in a cell consisting of a series of layers of starch, giving a stratified appearance, surrounding a central hilum.

starch gum (*Chem.*). Dextrin.

starch plant (*Bot.*). A plant in which the carbohydrate formed in excess of immediate requirements is stored in the cells of the leaf as temporary starch.

starch sheath (*Bot.*). (1) A one-layered cylinder of cells lying on the inner boundary of the cortex of a young stem, with prominent starch grains in the cells. It is homologous with an endodermis.—(2) A layer of starch grains around a pyrenoid in an algal cell.

Stark effect (*Phys.*). An effect similar to the *Zeeman effect* (q.v.) but produced by the action of an electrostatic field on a source of light.

starling (*Civ. Eng.*). Piling driven around a bridge pier to afford it some protection.

starlite (*Min.*). A name suggested (from a fancied resemblance to starlight) for the beautiful blue zircons which are heat-treated and used as gemstones.

starring (*Pot.*). A defect of glazes characterised by star-like figures.

start-stop (*Teleg.*). In machine telegraphy, the principle by which depression of a key on the keyboard of a transmitting machine sends the corresponding code to line, together with start and stop signals, the former to trip the printing machine so that it scans the sent code correctly, the latter to restore the scanning mechanism to the condition required for its operation by the next signal to arrive.

starting current (*Elec. Eng.*). The current drawn by a motor from the mains when starting up.

starting resistance (*Elec. Eng.*). A fixed resistance connected in series with the main circuit of a motor during starting-up

starting sheet (*Met.*). A sheet of pure metal used as the initial cathode on which the metal being refined is deposited during electrolytic refining.

starting torque (*Elec. Eng.*). The torque developed by a motor at starting.

starting winding (*Elec. Eng*). An auxiliary winding on the armature of a single-phase motor (enabling it to start up as a two-phase machine) or of a synchronous convertor.

startor (*Elec. Eng.*). A special type of regulating resistance used in starting-up an electric motor.

sta'simorphy (*Zool.*). Structural modification due to arrested development.

sta'sis (*Bot.*). Stoppage of growth.

stasis (*Med.*). (1) Complete stoppage of the circulation of blood through the capillaries and smallest blood-vessels in a part.—(2) Arrest of the contents of the bowel at any point from obstruction or weakness of the bowel wall.

Stassan'o furnace (*Elec. Eng.*). A type of electric furnace in which the heat is radiated from an arc which is not in contact with the furnace charge.

Stass'furt Deposits (*Geol.*). A series of saline minerals found in the Triassic rocks at Stassfurt, Saxony, which include halite, anhydrite, kieserite, gypsum and boracite.

stass'furtite (*Geol.*). A massive variety of boracite which sometimes has a subcolumnar structure and resembles a fine-grained white marble or granular limestone. See **boracite.**

stat'enchy'ma (*Bot.*). A tissue consisting of cells containing statoliths.

static. See **atmospherics.**

statics. See **mechanics.**

static balancer (*Elec. Eng.*). See **alternating-current balancer.**

static condenser (*Elec. Eng.*). A static piece of electrical apparatus having the characteristic property of drawing a leading current from an a.c. supply, in consequence of which it is widely used for power-factor correction.

static electricity. See **dynamic electricity.**

static frequency changer (*Radio*). A transformer having a magnetically saturated iron core arranged so as to accentuate the harmonic content of the secondary current; formerly used for the production of high-frequency currents for radio transmission.

static friction (*Mech.*). See **friction.**

static impedance (*Elec. Eng., etc.*). The electrical impedance of a machine or transducer when it is stopped from moving. In loudspeakers, it has the same meaning as *blocked impedance.*

static pressure tube (*Aero.*). See **pressure tube (static).**

static stability (*Elec. Eng.*). The stability of a transmission system with reference to gradual changes in load demand.

static tissue (*Zool.*). See **equilibration tissue.**

station (*Bot.*). The place where a plant grows.

station (*Elec. Eng.*). In general, a generating station. Specifically, a key point on an electricity supply system

station (*Surv.*). (1) A point at an apex of a triangle in a skeleton, or otherwise situated in a line of the skeleton.—(2) A point whose reduced level is to be found.

station (*Teleph.*). See **subscriber's main station.**

station pointer (*Surv.*). An instrument for obtaining a mechanical solution of the *three-point problem* (q.v.). It consists of a full-circle protractor with one fixed radial arm and two movable radial arms, which can be set to the correct mutual directions of the three points.

station pole (*Surv.*). A wooden rod used to mark a survey station conspicuously.

station roof (*Struct.*). A roof which is cantilevered out to one side or to both sides of a single line of stanchions; much used for roofing railway platforms.

stationary dredger (*Civ. Eng.*). The type of bucket-ladder dredger which discharges the dredged materials into attendant vessels, and consequently dredges more or less continuously.

stationary period (*Cinema.*). That fraction of the complete time-cycle, expressed in degrees, during which the mechanism holds the frame stationary in the gate. See **period.**

stationary points (*Astron.*). Those two points in a planet's orbit where it appears to have no motion as viewed from the earth, the condition being that the angular motions of the earth and planet are equal and opposite; the direct motion changes to retrograde motion at one such point, and conversely at the other.

stationary wave (*Elec. Eng.*). The multi-harmonic distribution of potential along a conductor when a transient electric wave is propagated along it and reflected from the far end.

stationary waves (*Acous.*). The phenomenon of interference between waves of the same frequency, whereby the combined intensity varies between maxima and minima over the region of interference because of the time-coincidence of in-phase and out-of-phase of the waves. In organ-pipes and strings, the interference is marked, the nodes (zero motion) being nearly perfect at resonance of the higher modes of vibration. In the sound-field in an enclosure, the aim is to avoid these maxima and minima by endeavouring to make the wave diffuse through multiple reflection. See **warble tone.**

stationary waves (*Radio*). See **standing waves.**

stat'oblast (*Zool.*). In some *Polyzoa*, an internal bud arising on the funiculus and becoming surrounded by a chitinous capsule which, unlike the colony, can survive the rigours of winter and germinate to produce a new colony in the spring.

stat'ocone (*Zool.*). One of a number of small calcareous granules occurring in the statocyst in various animals.

stat'ocyst (*Bot.*). A cell containing starch grains or other solid inclusions which act as statoliths. The contents of the cell are rather fluid, so that the statoliths move readily to the lower face of the cell if the position of the latter is altered by a displacement of the plant.

statocyst (*Zool.*). An organ for the perception of the position of the body in space, consisting usually of a sac lined by sensory cells and containing a free hard body or bodies, either introduced or secreted; an otocyst.

stat'olith (*Bot.*). A solid inclusion in a cell, such as a starch grain, which moves readily in the somewhat fluid contents of the cell, comes to rest on the portion of the protoplast lining the lower wall of the cell, and, it is said, plays some part in the perception of gravity by plants.

statolith (*Zool.*). A secreted calcareous body contained in a statocyst.

sta'tor (*Elec. Eng.*). The fixed part of an electrical machine.

stator core (*Elec. Eng.*). The assembly of laminations forming the magnetic circuit of the stator of an a.c. machine.

stator-rotor startor (*Elec. Eng.*). A combined stator-circuit switch and rotor-circuit regulating resistance for use with slip-ring induction motors.

stator winding (*Elec. Eng.*). That part of the electrical winding of a machine accommodated in the stator.

stat'orhab (*Zool.*). In some *Trachomedusae*, a tentacular process bearing the statolith and projecting into the cavity of the statocyst.

stat'oscope (*Aero.*). An instrument which indicates small changes in height, having greater sensibility than an altimeter, but not indicating absolute height.

sta'tus epilep'ticus (*Med.*). A succession of severe epileptic convulsions with no recovery of consciousness between each convulsion.

status lymphat'icus (*Med.*). An ill-defined condition in which there are hyperplasia of lymphatic tissue and enlargement of the thymus; patients in this state are liable to sudden death during anaesthesia.

staur'olite (*Min.*). Silicate of aluminium and iron with chemically combined water, commonly occurring as brown cruciform twins, and crystallising in the orthorhombic system. It is usually found in metamorphic rocks. Occasionally a transparent stone is cut as a gemstone. Also called STAUROTIDE.

Stauromedu'sae (*Zool.*). An order of *Scyphozoa* the members of which are all sedentary marine forms, without tentaculocysts; alternation of generations does not occur.

stave (*Textiles*). See **heald** (2).

stay (*Eng., etc.*). A *brace* (q.v.).

stay pile (*Civ. Eng.*). A pile which is driven into the earth as an anchorage for a *land tie* (q.v.).

stay tap (*Eng.*). A long tap for threading the holes for stays connecting adjacent plates in boilers, thus ensuring that the two holes are threaded in correct pitch relation.

stay tubes (*Eng.*). Boiler fire-tubes acting as stays to the flat surfaces which they join; sometimes threaded and nutted to the plates for extra strength.

stay-wire (*Elec. Eng.*). One of several steel cables by which a transmission-line pole is secured to the ground.

steady (*Eng.*). A support for backing up slender work in the lathe, attached either to the bed or the carriage. It consists of three slotted radial jaws, adjusted to bear on the rough-turned work. Also called BACK REST, BACK STAY.

steady flow (*Hyd.*). See **viscous flow.**

steady pin. A pin which permits mechanical parts to be fitted together accurately with one fixing screw.—(*Horol.*) A pin used where two parts have to be fixed accurately relative to one another; a steady pin is fixed to one part and is a close fit in a hole in the other part. Used for the location of bridges, cocks, etc.

steady state (*Elec. Comm.*). The continued repetition of a cyclicly repeated wave-form during an indefinite period, to ensure that the transient conditions arising at starting and cessation of this wave-form are practically negligible.

steadying bands (*Spinning*). Bands at each end of a mule carriage, used to ensure that the ends make the same movement as the centre of the carriage during its outward and inward run. Also called SQUARING BANDS.

steadying resistance (*Elec. Eng.*). The ballast resistance placed in series with a direct-current arc lamp, to counteract the negative resistance of the arc.

steam (*Phys.*). Water in the vapour state; it is formed when the latent heat of vaporisation is supplied to water at boiling-point. The latent heat varies with the pressure of formation, being approximately 539 C.H.U. per lb. at atmospheric pressure.

See **dry— saturated— superheated—**

steam accumulator (*Eng.*). A large pressure vessel, partly filled with water, into which surplus high-pressure steam is blown and condensed. A supply of saturated steam is thus available by lowering the pressure at the outlet valve, thus causing evaporation of the water stored. See **Ruth's accumulator.**

steam boiler (*Eng.*).

See **dry-back—**
Galloway—
Lancashire—
locomotive—
marine—
water-tube—

steam car (*Eng.*). An automobile propelled by steam. Oil-fired *flash boilers* (q.v.) are generally used, no gear-box is necessary, and control is simple. Water is recovered by condensing the exhaust steam in a radiator.

steam chest (*Eng.*). The chamber in which the slide-valve of a steam-engine works, and to which the steam pipe is connected.

steam distillation (*Chem.*). The distillation of a substance by bubbling steam through the heated liquid. It is a useful method of separation for substances which are practically insoluble in water. The rapidity with which a substance distils in steam depends on its vapour pressure and on its vapour density.

steam dome (*Eng.*). See **dome.**

steam economiser (*Eng.*). See **economiser.**

steam-electric generating set (*Elec. Eng.*). A generating set in which the prime-mover is a steam-engine, e.g. a steam turbine or reciprocating steam-engine.

steam-engine (*Eng.*).

See **compound engine**
high-speed steam-engine
mill do.
simple steam do.
triple-expansion do.
Unaflow do.

steam gauge (*Eng.*). See **pressure gauge.**

steam generating station (*Elec. Eng.*). A generating station in which the prime-movers driving the electric generators are operated by steam, e.g. steam turbines or reciprocating steam-engines.

steam generator (*Eng.*). A steam boiler.

steam injector (*Eng.*). See **injector.**

steam jacket (*Eng.*). A jacket formed round a steam-engine cylinder; supplied with live steam to prevent excessive condensation of the working steam in the cylinder.

steam lap (*Eng.*). See **outside lap.**

steam locomotive (*Eng.*). A steam-engine and boiler integrally mounted on a frame which is fitted with road wheels driven by the engine. The term is usually restricted to locomotives used to haul passenger or goods traffic on a railway. See also **traction engine.**

steam navvy (*Civ. Eng.*). A mechanical excavator having a single large bucket (½ to 8 cu. yds.) at the end of a long beam carried in a revolving jib. Also called STEAM SHOVEL.

steam nozzle (*Eng.*). See **nozzle, convergent-divergent nozzle.**

steam ports (*Eng.*). Passages leading from the valve face to the cylinder of a steam-engine; through them the steam is supplied and exhausted.

steam reversing gear (*Eng.*). A power reversing gear, used in steam locomotives, by which movement of the driver's reversing lever admits steam to an auxiliary cylinder, whose piston operates the reversing links of the valve gear.

steam shovel (*Civ. Eng.*). See **steam navvy.**

steam trap (*Eng.*). A device into which condensed steam from steam pipes, etc. is allowed to drain, and which automatically ejects it without permitting the escape of steam.

steam turbine (*Eng.*). A machine in which steam is made to do work by expanding so as to create kinetic energy, which is then partly absorbed by causing the steam to act on moving blades attached to a disc or drum.

See **back-pressure turbine**
disc-and-drum do.
extraction do.
impulse do.
mixed-pressure do.
reaction do.

steaning (*Civ. Eng.*). See **steining.**

steapsin, stē-ap′sin (*Zool.*). A fat-digesting enzyme occurring in the digestive juices of various animals, as the pancreatic juice of Vertebrates.

stearic acid, stē-ar′ic (*Chem.*). $C_{18}H_{36}O_2$, a monobasic fatty acid; m.p. 69° C., b.p. 287° C.; obtained from mutton suet, or by reducing oleic acid. It occurs free in a few plants, as glycerides in many fats and oils, and as esters with the higher alcohols in certain waxes.

ste′arin (*Chem.*). A term for the glyceryl ester of stearic acid. The name is also applied to a mixture of stearic acid and palmitic acid.

ste′atite or **soapstone** (*Min., etc.*). A coarse, massive, or granular variety of talc, greasy to the touch. On account of its softness it is readily carved into ornamental objects.—(*Diel.*) Fired at 800 to 1000° C., it becomes very hard and strong. Used in the making of sparking-plug insulators and giant high-voltage insulators.

steatite ware (*Pot.*). Ware made from a body containing steatite; used where great accuracy of size and resistance are needed.

ste′atopy′gia (*Med.*). Gross accumulation of fat in the buttocks. A Hottentot deformity.

ste′atorrhoe′a, ste′atorrhe′a (*Med.*). The presence of an excess of fat in the stools, due either to failure of absorption, or to deficiency of the fat-splitting enzymes in the digestive juices, as a result of disease of the pancreas.

steel (*Met.*). Essentially an alloy of iron and carbon. Contains less than 2% carbon, less than 1% manganese, and small amounts of silicon, phosphorus, sulphur, and oxygen. Mechanical properties can be varied over a wide range by changes in composition and heat treatment. See also **alloy steel, stainless steel.**

steel (*Mining*). The borer, consisting of shank, shaft, and bit or cutting edge, used for rock-drilling with drifters or jack hammers.

steel band (*Surv.*). See **band chain.**

steel-cored aluminium (*Elec. Eng.*). An electrical conductor consisting of a layer or layers of aluminium wire surrounding a core of galvanised steel strands.

steel-cored copper conductor (*Elec. Eng.*). A conductor made in the same way as steel-cored aluminium, except that the steel core is covered by a layer of insulating tape, to prevent corrosion of the surrounding copper.

steel-making (*Met.*). The process of making steel from solid or molten pig-iron, with or without admixture with steel scrap. The processes used are *Bessemer*, *open-hearth*, *crucible*, *electric-arc*, *high-frequency induction*, and *duplex*.

steel pipe pressure cable (*Cables*). See **pressure cable.**

steel-tank rectifier (*Elec. Eng.*). A mercury-arc rectifier in which the arc chamber is of steel. Cf. *glass-bulb rectifier*.

steel tower (*Elec. Eng.*). The framed steel structure carrying a high-voltage transmission line. Also called PYLON.

steening (*Civ. Eng.*). See **steining.**

steeping (*Malting*). Soaking barley for a period of about 50 hours in water at a temperature of 50-55° F., to induce germination; a preliminary stage in malting.

steeple (*Build.*). A structure surmounted with a spire.

steeple-head (*Med.*). See **oxycephaly.**

steering (*Radio*). Alteration by mechanical or electrical means of the direction of maximum sensitivity of a directional antenna.

steering-arm (*Automobiles*). An arm rigidly attached to a stub axle, to which it transmits angular movement from the motion of the steering-rod attached to it by a ball joint.

steering-box (*Automobiles*). The housing which encloses the steering-gear and provides an oil-bath for the working surfaces. It is rigidly attached to a side-member of the chassis frame.

steering-gear (*Automobiles*). The two geared members attached to the steering-column and the drop-arm spindle respectively. They transmit motion from the steering-wheel to the stub axles through the drop arm, steering-rod or drag link, steering-arms, and track rod.

See **cam-type—**
rack-and-pinion—
screw-and-nut—
worm-and-wheel—

steering-rod (*Automobiles*). See **drag link.**

steering-wheel (*Automobiles*). The spoked handwheel attached to the top of the inner steering-column, by means of which the *steering-gear* (q.v.) is operated by the driver.

Stefan-Boltzmann law, Stefan's law (*Phys.*). The total radiation from a black body is proportional to the fourth power of the absolute temperature, or: $S=\sigma T^4$, where S is the energy radiated per sq. cm. per second and σ has the value $5{\cdot}735\times10^{-5}$ erg cm.$^{-2}$ deg.$^{-4}$ sec.$^{-1}$. See **Planck's radiation formula, Wien's displacement law.**

stegma (*Bot*). A small elongated cell nearly filled with silica.

ste′gocarp′ous (*Bot.*). Said of the capsule of a moss when it is provided with a lid

stegocrot′aphy (*Zool.*). The condition of having the temporal region of the skull without fossae.—*adj.* **stegocrotaph′ic.**

Steinach's operation, stīn′ahh (*Surg.*). Ligature of the vas deferens (the excretory duct of the testis) for the purpose of increasing sexual vigour in the male.

steining (*Civ. Eng.*). The process of lining a well with bricks, stone, timber, or metal, so as to prevent the sides from caving in.

Steinmetz coefficient, stīn′mets (*Elec. Eng.*). The coefficient by which the 1·6th-power of the flux density must be multiplied in order to give the hysteresis loss in ergs per cycle, when a sample of iron is taken through successive cycles of magnetisation. Also called HYSTERESIS COEFFICIENT.

Steinmetz law (*Elec. Eng.*). The law relating hysteresis loss with flux density, discovered experimentally by Steinmetz.

Steke′lian analysis. The analytical method introduced by Stekel of Vienna which stresses mainly the importance of the active and intuitive approach, as contrasted with the more passive method of Freudian analysis. It uses the *shock factor*, intentionally producing profound emotional reaction, in lessening the duration of analytic treatment.

stele, stēl (*Bot.*). The central region of a stem or root, containing the vascular tissues, often with a central pith and an external parenchymatous sheath, the pericycle, in which some sclerenchyma may be present.

stellar interferometer (*Astron., Phys.*). A device, developed by Michelson, by means of which, when fitted to a telescope, it is possible to measure the angular diameters of certain giant stars (all of which are below the limit of resolution of even the largest telescopes) by observations of interference fringes at the focus of the telescope.

stellar magnitudes (*Astron.*). See **magnitudes.**

stellate (*Bot., Zool.*). Radiating from a centre, like a star.

stellate hair (*Bot.*). A hair which has several radiating branches.

stellite (*Met.*). A series of alloys containing cobalt, chromium, tungsten, and molybdenum in various proportions. The range is chromium 10-40%, cobalt 35-80%, tungsten 0-25%, and molybdenum

0-10%. Very hard. Used for cutting-tools and for protecting surfaces subjected to heavy wear.

stellited valves (*I.C. Engs.*). Poppet valves of high-duty petrol-engines having facings of *stellite* (q.v.) for resisting wear and corrosion by the combustion products of leaded fuels.

stel'lulate (*Bot.*). Resembling a small star.

stem (*Bot.*). The ascending axis of a plant.

stem (*Horol.*). In a keyless watch, the shaft to which the button is attached.

stem (*Zool.*). See **scapus.**

stem post (*Ship Constr.*). The portion of material forming the extreme forward end of a ship. The hull proper is secured thereto.

stem succulent (*Bot.*). A plant with a succulent stem and with very small leaves, often reduced to spines.

stem tendril (*Bot.*). A tendril which is a modified stem.

stem xerophyte (*Bot.*). A plant characteristic of very dry places, with ephemeral or much reduced leaves, and with the photosynthetic tissue located in the peripheral cells of the stem.

stemma (*Zool.*). See **ocellus.**

stemming (*Mining*). The stopping material (e g clay) used to tamp the explosive in a shot-hole. See **tamp.**

stench-trap (*San. Eng.*). See **air-trap.**

steno- (Greek *stenos*, narrow). A prefix used in the construction of compound terms; e.g. *stenostomatous*, narrow mouthed.

stenohal'ine (*Zool.*). Capable of existence within a narrow range of salinity only. Cf. *euryhaline*.

Steno'nian duct (*Zool.*). In Mammals, the duct of the parotid gland opening into the mouth near the molars of the upper jaw.

stenono'tal (*Zool.*). In Insects, having a small or narrow thorax.

stenopa'ic (*Photog.*). The term applied to *pin-hole photography*.

stenopet'alous (*Bot.*). Having narrow petals.

stenophyll'ous (*Bot.*). Having narrow leaves.

stenopo'dium (*Zool.*). The typical biramous limb of *Crustacea*, having slender exopodite and endopodite. Cf. *phyllopodium*.

steno'sis (*Med.*). Narrowing or constriction of any duct, orifice, or tubular passage as a result of disease.—*adj.* **stenosed.**

stenother'my (*Ecol.*). Tolerance of only a very narrow range of temperature.—*adj.* **stenother'mous.**

Stenson's duct (*Zool.*). See **Stenonian duct.**

Stenson's gland (*Zool.*). In *Amniota*, a large gland in the lateral ventral wall of the nasal cavity, opening into the vestibule.

stenter (*Textiles*). A frame or machine on which fabrics are stretched between hooks, or by means of rollers. Also called TENTER.

stentorphone (*Acous.*). Apparatus for the reproduction of sound at high level by the electromagnetic control of the flow of high-pressure air through a grid orifice.

step. (1) The unit part of a stair, bounded by a tread and a riser.—(2) A *rung* (q.v.).

step (*Aero.*). The discontinuity in the form of a hydrofoil, as in the bottom of a flying-boat, to facilitate take-off from the water surface.

step (*Elec. Comm.*). A change from zero-amplitude before a specified time to some other amplitude after that time, the rate of change being infinitely great, first positively and then negatively. This is the *Heaviside unit function*.

step (*Elec. Eng.*). Synchronous machines are said to keep *in step* when they remain in synchronism with each other.

step-by-step method (*Elec. Eng.*). A method of determining the hysteresis curve of a magnetic material, in which the field strength is increased and reversed in steps.

step cut (*Jewel.*). The dressing of precious stones with long, flat facets, slightly inclined, one above the other.

step-down transformer (*Elec. Eng.*). A transformer for changing a high-voltage supply into a low-voltage supply.—(*Elec. Comm.*) An audio-frequency transformer which couples a circuit of high impedance-level to one of low impedance-level; e.g. the output from a power-stage to a line.

step faults (*Geol.*). A series of tensional or normal faults which have a parallel arrangement, throw in the same direction, and hence progressively 'step-down' a particular bed.

step irons (*Build.*). See **foot irons.**

step printer (*Cinema.*). An intermittent printer which prints one frame at a time.

step-rate prepayment meter (*Elec. Eng.*). A prepayment meter in which a high charge per unit is made until a given number of units have been consumed, when the gear ratio is automatically changed to give a lower charge per unit until the mechanism is reset by hand.

step turner (*Plumb.*). A wooden tool for bending sheet-lead through a right-angle, as at the horizontal edges of the steps of a stepped flashing.

step-up instrument (*Elec. Eng.*). See **suppressed-zero instrument.**

step-up transformer (*Elec. Eng.*). A transformer for changing a low-voltage supply into a high-voltage supply.—(*Elec. Comm.*) An audio-frequency transformer which couples a low impedance to a higher impedance, or to an effective open-circuit; e.g. the grid of a thermionic valve when no grid-current flows.

Stepha'nian (*Geol.*). The name given on the Continent to the upper Stage of the Coal Measures which succeeds the Westphalian Stage. Rocks of this type and age are poorly represented in Britain, but the Upper Radstockian and the highest Coal Measures in South Wales may be of this age.

steph'anite (*Min.*). A sulphide of silver and antimony which crystallises in the orthorhombic system. It is usually associated with other silver-bearing minerals and is deposited from ascending solutions. Also called BRITTLE SILVER ORE.

stephanokont'an (*Bot.*). Bearing a crown of cilia.

Stephenson's link motion (*Eng.*). See **link motion.**

stepped flashing (*Plumb.*). A *flashing* (q.v.) much used where a brick chimney projects from a sloping roof, the lead being cut in steps so that the horizontal edges of the 'steps' may be secured into raglets cut in the joints of the brickwork.

stepping (*Block-making*). The cutting away of a block in a zigzag or 'step' fashion to allow the type to extend within the square area of the block.

stepping (*Civ. Eng.*). Laying foundations in horizontal steps on sloping ground. See **benched foundation.**

stepping (*Surv.*). The process of chaining over sloping ground by making the measurement in horizontal lengths with the chain always held horizontally.

stera'dian (*Maths.*). The unit of solid angular measure. It is defined as the solid angle subtended at the centre of a sphere by an area on its surface numerically equal to the square of the radius.

ster'colith, ster'corolith (*Med.*). A hard faecal concretion, impregnated with calcium salts, in the intestine. (Latin *stercus*, gen. *stercoris*, dung.)

stercoma'rium (*Zool.*). In some *Sarcodina*, the system of stercome-containing tubes.

ster'come (*Zool.*). In some *Sarcodina*, faecal matter in the form of masses of brown granules.

stercora'ceous (*Med.*). Consisting of, or pertaining to, faeces.

ster'coral (*Med.*). Of, pertaining to, or caused by, faeces.

ster'eide, —ēd (*Bot.*). Stone cell.

stereo- (Greek *stereos*, stiff, solid). A prefix used in the construction of compound terms; e.g. *stereotype* (q.v.).

stereoblastula (*Zool.*). An abnormal form of echinoderm larva.

stereochemistry (*Chem.*). The study of the spatial arrangement of the atoms in a molecule.

stereogno'sis (*Med.*). The ability to recognise similarities and differences in the size, weight, form, and texture of objects brought into contact with the surface of the body.

ste'reogram, ste'reograph (*Photog.*). General terms for photographs intended to be viewed in an apparatus to give the illusion of stereoscopy. See **parallax stereogram.**

stereoisomerism, —i-som'— (*Chem.*). The existence of different substances whose molecules possess an identical structure but different arrangements of their atoms in space.

ste'reome (*Bot.*). A general term for the mechanical tissue of the plant.

stereome cylinder (*Bot.*). A cylinder of strengthening tissue lying in a stem, usually just outside the phloem.

stereophon'ic (*Acous.*). Said of reproduced sound in which the illusion of auditory perspective is realised.

stereophonic radiotelephony (*Radio*). A system employing two complete communication channels, from microphones to loudspeakers or headphones, so disposed as to give a three-dimensional effect to the listener, in a manner analogous to stereoscopic reproduction of pictures.

ste'reoplasm (*Zool.*). The viscous part of protoplasm: a substance filling the spaces between the septa in some Corals.

stereop'ticon (*Photog.*). A double projection lantern, arranged for fading one projected image into the next.

ste'reoscope (*Photog.*). The original apparatus for realising the reproduction of views in three dimensions; different views are used for the two eyes.

stereoscop'ic camera (*Photog.*). A camera designed to give two displaced images by means of two matched lenses and shutters, so that the images, when viewed with the separate eyes, give a stereoscopic reproduction of the object photographed.

stereoscopic 'television (*Television*). Television in which the reproduced picture has the three-dimensional appearance of the original subject.

stereospon'dyly (*Zool.*). The condition of having the parts of the vertebrae fused to form one solid piece; cf. *temnospondyly*.—*adj.* **stereospon'dylous.**

stereotax'is (*Biol.*). Response or reaction of an organism to the stimulus of contact with a solid body; as the tendency of some animals to insert themselves into holes or crannies, or to attach themselves to solid objects.—*adj.* **stereotac'tic.**

stereotro'pism (*Biol.*). See **stereotaxis.**

ste'reotype (*Typog.*). A printing plate produced from type matter, or from another plate, by making a mould of papier-mâché or flong and from this taking a cast in stereotype metal. Stereotypes are made more durable by nickelling the surface.

ste'reotypy (*Med.*). The repetition of senseless movements, actions, or words by the insane.

steric hindrance (*Chem.*). The retarding influence of neighbouring groups on reactions in organic molecules; e.g. *ortho* substitution in aromatic acids considerably retards esterification.

sterig'ma (*Bot.*). A short, and often somewhat swollen, hypha on which a fungal spore is borne.—*pl.* **sterigmat'a.**

sterile. Unable to breed: freed from bacteria and moulds by treatment with heat or with antiseptics.—(*Bot.*) Unable to produce spores or seeds.

sterile cell (*Bot.*). The terminal cell of a chain of aecidiospores.

sterile flower (*Bot.*). A staminate flower.

sterile glume (*Bot.*). One of the glumes at the base of the spikelet of a grass, which does not subtend a flower.

sterile vein (*Bot.*). A strand or sheet of interwoven hyphae occurring with the spore-bearing hyphae in the fruit bodies of some fungi.

sterilisation (*Bot., Zool.*). (1) Loss of sexual function.—(2) The preparation, usually by heating, of a substratum free from any living organism, on which fungi, bacteria, or protozoa may subsequently be grown in pure culture.

sterlingite (*Min.*). See **zincite.**

stern post (*Ship Constr.*). The portion of material forming the after end of a ship, as distinct from the stern. The hull proper is secured thereto and the rudder post is hinged thereon.

sternal (*Zool.*). Pertaining to the sternum, or to a sternite.

sternal canal (*Zool.*). In some *Crustacea*, a median ventral cavity of the skeleton in which the thoracic part of the nerve-cord lies.

ster'nebrae (*Zool.*). In Mammals, a median ventral series of bones which alternate with the ribs.

sternel'lum (*Zool.*). In Insects, a ventral thoracic sclerite situated behind the eusternum.

sternite (*Zool*). The sternum in Arthropods when it forms a chitinous plate.

sternohy'oid (*Zool.*). In some Vertebrates, a muscle running from the hyoid to the sternum.

sternopleur'on, sternopleur'ite (*Zool.*). In Insects, a compound thoracic sclerite formed by the fusion of the episternum with the sternum.

sternum (*Zool.*). The ventral part of a somite in Arthropods: the breast bone of Vertebrates, forming part of the pectoral girdle, to which, in higher forms, are attached the ventral ends of the ribs.—*adj.* **sternal.**

sternuta'tion (*Med.*). The act of sneezing: a sneeze.

ster'ols (*Chem.*). A group of alcohols of high molecular weight, related to the terpenes. They are found in nature with fatty acids. The best-known sterol derivative is *cholesterol.*

steth'oscope (*Med.*). A tube adapted for listening to the sounds produced in the body.

Stevenson screen (*Meteor.*). A form of housing for meteorological instruments consisting of a wooden cupboard having a double roof and louvred walls, these serving to protect the instruments from the sun and wind while permitting free ventilation. The base of the screen should be 3 ft. 6 in. above the ground.

stew (*Cinema.*). Any undesired sound accompanying sound-film reproduction, particularly one arising from defective or badly adjusted apparatus.

Stewart's organs (*Zool.*). In some *Echinoidea*, internal gills associated with the lantern coelom.

stib'ialism (*Med.*). Antimony poisoning.

stibine (*Chem.*). SbH_3. Antimony hydride. A poisonous gas. Less stable than arsine.

stibnite (*Min.*). Trisulphide of antimony, which crystallises in grey metallic prisms in the orthorhombic system. It is sometimes auriferous and also argentiferous. It is widely distributed but not in large quantity, and is the chief source of antimony. Formerly called ANTIMONY GLANCE. See **antimonite.**

stichid'ium (*Bot.*). A special branch of the thallus in red algae on or within which the tetraspores are formed.

sti'chobasid'ium (*Bot.*). A basidium, usually elongated and cylindrical, in which the spindles of the dividing nuclei lie obliquely or longitudinally.

stick-and-rag work (*Plast.*). Plasterwork formed of canvas stretched across a wooden frame and coated with a thin layer of gypsum plaster.

sticking (*Join.*). The operation of shaping a *stuck moulding* (q.v.).

sticking board (*Join.*). A prepared board used to steady a piece of timber whilst shaping a moulding from it out of the solid.

stiffened expanded metal (*Build.*). See **self-centring lathing.**

stiffened suspension bridge (*Struct.*). A suspension bridge in which the tendency for the suspension cables to change shape under different load systems is counteracted by the provision of stiffening girders supported on the bridge piers and connected to the cables by suspension rods.

stiffener (*Struct.*). A steel angle or bar riveted or welded across the web of a built-up girder to stiffen it.

stiffness control (*Acous.*). In a mechanically vibrating system, the condition in which the motion is mainly determined by the stiffness of the restraining springs and negligibly by the resistance and mass of the system. The resonant frequency of such a system is then much higher than the frequencies of the driving forces.

stifle (*Vet.*). The femorotibial joint of animals.

stigma (*Bot.*). (1) See **eye spot.**—(2) The distal end of the style, more or less enlarged, on which pollen alights and germinates.

stigma (*Zool.*). In *Protozoa*, an eye spot: in *Arthropoda*, one of the external apertures of the tracheal system: in *Urochorda*, a gill-slit: generally, a spot or mark of distinctive colour, as on the wings of many Butterflies.—*pl.* **stig'mata.** —*adjs.* **stigmatif'erous, stigmat'iform.**

stigmat'ic (*Bot., Zool*). Relating to the *stigma*.

stilbene (*Chem.*). $C_6H_5 \cdot CH \cdot CH \cdot C_6H_5$, *s*-diphenylethylene; monoclinic plates or prisms; m.p. 125° C., b.p. 306° C.

stilbite (*Min.*). A zeolite; silicate of sodium, calcium, and aluminium with chemically combined water; crystallises in the monoclinic system, the crystals frequently being grouped in sheaf-like aggregates. Found both in igneous rock cavities and in metamorphic rocks. Also called DESMINE.

stil'boid (*Bot.*). Said of a fungus having a stalked head of spores or other reproductive structures.

stile (*Join.*). An upright member in framing or panelling. Often incorrectly spelt STYLE.

still (*Chem.*). A cylindrical or spherical metal vessel, usually made of mild steel or copper, which can be heated either externally or internally; used for the distillation of liquids.

still (*Cinema.*). A picture of artists in a studio, made with a portrait camera or an ordinary camera for record or publicity purposes, or for subsequent faking.

stillbirth (*Med.*). Birth of a dead child.

still-man (*Cinema.*). The photographer who takes still photographs in a motion-picture studio.

still-picture transmission (*Radio*). The transmission of individual pictures, as distinct from the transmission of moving pictures, which is *television*. See **facsimile telegraphy.**

still-water navigation (*Civ. Eng.*). See **slack-water navigation.**

Still's disease (*Med.*). Acute polyarthritis of children (resembling rheumatoid arthritis), with fever and enlargement of the spleen and of the lymphatic glands.

Stille machine (*Acous.*). The same as *Blattnerphone.*

Stilling's nucleus (*Zool.*). In higher Vertebrates, a group of large nerve cells at the base of the dorsal horn of the spinal cord; isolated grey nuclei lying in the white matter of the middle lobe of the cerebellum over the roof of the fourth ventricle.

stilt (*Pot.*). A support of non-fusible material for ware placed in saggars.

stilt root (*Bot.*). An adventitious root formed by a stem from a point above ground-level, passing downwards into the soil and affording support to the stem.

stilted arch (*Civ. Eng.*). An arch rising from points below its centre, and having the form of a circular arc above its centre.

stimulation (*Bot., Zool*). The application of stimuli.

stim'ulose (*Bot.*). Bearing stinging hairs.

stimulus (*Bot., Zool.*). An agent which will provoke active response or reaction in a living organism.—Especially (*Zool.*) an agent which will cause propagation of a nerve-impulse in a nerve fibre.—*pl.* **stimuli.**

sting (*Zool.*). A sharp-pointed organ by means of which poison can be injected into an enemy or a victim; as the poisonous fin-spines of some Fishes, the ovipositor of a worker Wasp.

stinging hair (*Bot.*). A multicellular hair with a brittle tip, which breaks off on contact with an animal, leaving a sharp edge which penetrates the skin and injects an irritant fluid.

stink damp (*Mining*). Sulphuretted hydrogen.

stink-trap (*San. Eng.*). An *interceptor* (q.v.).

sti'pate (*Bot.*). Crowded.

stipe (*Bot.*). (1) A general term for the stalk of the fruit body of a fungus when it consists of a large number of more or less interwoven hyphae; the stalk of a mushroom is a familiar example.—(2) The petiole of a fern up to the lowermost leaflet.

sti'pel (*Bot.*). One of the two small leaf-like appendages present at the base of a leaflet in some compound leaves.

sti'pellate (*Bot*). Having stipels.

Stiperstones (*Geol.*). A hard quartzite at the base of the Ordovician System which forms a prominent rocky ridge crossing the Shelve in South Shropshire. Also called STIPER QUARTZITE.

stipes, sti'pēz (*Zool.*). A stalk-like structure: an eyestalk: in *Insecta*, the second joint of the maxilla, articulating with the distal border of the cardo.—*pl.* **stip'ites.**—*adj.* **stip'itate, stip'iform.**

stip'itate (*Bot.*). Having a stalk.

stipple (*Block-making*). A fine pattern of dots, lines, or designs of different kinds, added to line blocks to give a certain variation in tone. Stipples are of special value in maps executed in a single colour. In line-colour work, stipples are used, singly or in combination, to give a limited range of intermediate colours.

stippler (*Paint., Plast.*). A special brush used for *stippling* (q.v.).

stippling (*Paint., Plast.*). The operation of breaking up the smoothness of a paint, distemper, plaster, or cement surface by dabbing it repeatedly with the point of a special brush.

stip'ular trace (*Bot.*). The vascular tissue running into a stipule.

stip'ulate (*Bot.*). Having stipules.

stip'ule (*Bot*). One of the two appendages, usually leaf-like, often present at the base of the petiole of a leaf.

stip'ulose (*Bot.*). Bearing conspicuous stipules.

Stirling boiler (*Eng.*). A water-tube boiler in which two upper drums and one lower drum are connected by highly inclined banks of water-tubes curved so as to enter the drums radially, the upper drums being also connected by horizontal steam- and water-tubes.

stirps (*Bot.*). A well-established variety which keeps its characters in cultivation.—*pl.* **stir'pes.**

stirrup (*Civ. Eng.*). A vertical steel rod which loops together the top and bottom reinforcing bars of a reinforced concrete beam and helps to resist the shear.

stirrup (*Horol.*). A support; such as the bottom of the rod of a mercurial pendulum on which rests the container for the mercury.

stitchdown shoes (*Boots and Shoes*). See **veldtschoen.**

stitching (*Bind.*). The process of joining the sections of an inserted book along the back by means of thread or wire.

sto'a (*Arch.*). A covered colonnade or portico.

Stobie furnace (*Elec. Eng.*). An electric furnace of the coreless induction type in which a definite path for the magnetic flux is provided in the form of an external laminated yoke.

stock (*Acous.*). The material from which pressed records are made before it is actually heated and placed between two stampers in the press.

stock (*Bot*). (1) The rooted stem into which the scion is inserted in grafting.—(2) The perennial portion of a herbaceous perennial.—(3) A race.

stock (*Carp., Join.*). The principal part of a tool, e.g. the body of a plane, in which the cutting iron is held: the stouter arm of a bevel, in which the blade is fastened.

stock (*Cinema.*). See **film stock.**

stock (*Eng.*) See **die-stock.**

stock (*Geol.*). Another name for ***boss*** (q.v.).

stock (*Gen., Zool.*). A direct line of descent: an individual originating a line of descent: an asexual zooid giving rise by budding to sexual zooids of one sex only.

stocks (*Build.*). Bricks which are fairly sound and hard-burned but are more uneven in colour than ***shippers*** (q.v.); the bricks most used for ordinary building purposes.

stocks (*Ship Constr.*). The massive timbers supporting a ship in course of construction.

stock board (*Build.*). A bottom made to fit the mould used in the handmoulding of bricks.

stock brush (*Plast.*). A brush used to moisten surfaces with water, prior to plastering, so that the surface shall not absorb moisture from the plaster.

stock lock (*Join.*). A form of rim lock contained in a heavy metal-bound wooden case.

stock lumber (*Timber*). Lumber which is sawn to stock market sizes.

stock rail (*Civ. Eng.*). The outer fixed rail against which the point (see **points**) works at a turn-out.

Stockbridge damper (*Elec. Eng.*). A vibration damper used to prevent the mechanical vibration of overhead lines.

stockless anchor (*Ships*). A form of anchor in which there is no crosspiece on the shank and the arms are pivoted so that both of them can engage at the same time; the shank can be drawn into the hawsepipe of the ship.

stockwork (*Geol.*). An irregular mass of interlacing veins of ore; good examples occur among the tin ores of Cornwall and in the Erzgebirge. (Ger. *Stockwerk.*)

stoep, stoop (*Build.*). See **stoop.**

sto'ichiom'etry (*Chem.*). The study of the numerical proportions in which substances react chemically.

stoke (*Eng.*). To supply fuel to a boiler furnace by mechanical means. See **mechanical stoker.**

stokehold (*Eng.*). A boiler room, more particularly of a ship.

Stokes' rule (*Phys.*). In most cases of fluorescence and phosphorescence, the emitted light is of longer wavelength than the exciting light. See **Raman effect** for an exception to this rule.

sto'lon (*Bot.*). (1) A weak stem, growing more or less horizontally from the main stem of the plant, bearing scale leaves and adventitious roots, and giving rise to one or more buds which develop into new plants, or end in a tuber, as in the potato. The term *stolon* is sometimes confined to underground stems having the characters given above, while similar stems lying on the surface of the soil are called *runners.*—(2) A long hypha produced by some fungi, which lies on the substratum, forming tufts of rhizoids and of sporangiophores at intervals.

stolon (*Zool.*). A cylindrical stem-like structure: a tubular outgrowth in hydroid colonies of *Coelenterata* and *Polyzoa* from which new individuals or colonies may arise: in *Urochorda,* the cadophore.—*adj.* **sto'lonate.**

stolonif'erous (*Bot., Zool.*). Producing stolons or runners.

sto'ma. A small aperture. Specifically (*Bot.*), a minute perforation in the epidermis of a leaf or a young stem, together with two guard cells, one on each side of the pore, and sometimes certain accessory cells. The term is sometimes used to denote the pore only. A stoma allows of the diffusion of gases and vapours from the interior of the leaf to the external atmosphere, and of gases from without into the leaf.—*pl.* **sto'mata.** Also STOMATE.

stomach (*Zool.*). In Vertebrates, the sac-like portion of the alimentary canal intervening between the oesophagus and the intestine. The term is loosely applied in *Invertebrata* to any sac-like expansion of the gut behind the oesophagus.—*adj.* **stomach'ic.**

stom'atal, sto'mate, stomatif'erous, stom'atose, stom'atous. *Adjs.* from *stoma.*

stomatal aperture, —opening, —pore (*Bot.*). The pore of a stoma.

stomatal transpiration (*Bot.*). The loss of water vapour from the interior of the leaf through the stomata.

stomati'tis (*Med.*). Inflammation of the mucous membrane of the mouth.

stomatitis, contagious pustular, equine vesicular (*Vet.*). See **horse pox.**

stom'atogas'tric (*Zool.*). Pertaining to the mouth and stomach; said especially of that portion of the autonomic nervous system which controls the anterior part of the alimentary canal.

Stom'atopo'da (*Zool.*). The only order comprised in the division *Hoplocarida,* having the characteristics of the division; they have a flattened body, a large abdomen, and powerful claws which resemble those of the Praying Mantis Insect, i.e. they work like the blade of a clasp-knife; they burrow in sand or live in crevices of rocks or corals. Mantis Shrimps.

stomid'ia (*Zool.*). In some *Actinaria,* apertures on the disc which represent the terminal pores of tentacles which have disappeared.

stomion (*Zool.*). See **ostium.**

sto'mium (*Bot.*). A part of the wall of a fern sporangium composed of thin-walled cells; splitting begins here when the sporangium dehisces.

stomodae'um (*Zool.*). That part of the alimentary canal which arises in the embryo as an anterior invagination of ectoderm; cf. ***proctodaeum, midgut.***—*adj.* **stomodae'al.**

-stomy (Greek *stoma,* mouth). A suffix used in the construction of compound terms, especially in Surgery; e.g. *caecostomy,* the surgical formation of an artificial opening into the caecum.

stone (*Bot.*). The hard endocarp of a drupe, as a cherry stone.

stone (*Horol.*). A jewel; used especially of the pallet jewels.

stone canal (*Zool.*). In *Echinodermata,* a vertical tubular organ leading upwards or downwards from the madreporite, having calcified walls and forming part of the water-vascular system.

stone cell (*Bot.*). A thick-walled cell, not much longer than broad, with lignified walls.

stone fruit (*Bot.*). A drupe, i.e. a fruit such as a plum or a cherry.

stone head (*Mining*). (1) The solid rock first met with in sinking a shaft.—(2) A heading or tunnel in stone.

stone insulator (*Elec. Eng.*). A low-voltage type of insulator made from stoneware.

stone saw (*Masonry*). A smooth-faced blade which in use is fed with an abrasive such as sand, carborundum, or diamond powder, as it cuts its way through stone.

stone tongs (*Masonry*). An accessory used in hoisting blocks of stone. It resembles a large pair of scissors with the points curved inwards. These clip into the sides of the block, while chains connect the loops of the tongs to the hoisting ring. Also called NIPPERS.

stoneware (*Pot.*). A fine earthenware made hard and partially translucent by firing at a high temperature, even without glazing; able to resist acids.—(*San. Eng.*) A material used for some sanitary fittings; made from plastic clays of the Lias formation, with a small amount of sharp sand, etc., added to reduce shrinkage.

Stonesfield Slate (*Geol.*). A stratigraphical subdivision of the Jurassic System occurring as thinly bedded sandy limestones; formerly exploited for roofing material in the Cotteswolds.

Stoniflex (*Build.*). Trade-name for a waterproof roofing material.

stony meteorites (*Geol.*). Those meteorites which consist essentially of rock-forming silicates. See **achondrite, aerolite, chondrite.**

stoop (*Build.*). A low platform outside the entrance door of a house. Also called STOEP.

stop (*Acous.*). The rank or ranks of pipes in an organ which are grouped together for operation by the manuals and pedals, each group being characterised by specific types of tone. See **draw knob, speaking stop, pitch of organ pipe stops.**

stop (*Carp., Join.*). (1) A projecting piece set in the top of a bench at one end and adjustable for height. It is used to steady work which is being planed.—(2) An ornamental termination to a stuck moulding.—(3) See **door stop.**

stop (*Light*). A screen having a circular aperture; used to limit the effective aperture of a lens, as in the photographic camera, or to limit the field of view in the eyepiece of an optical instrument. See **telecentric stop*.**

stop (*Photog.*). The geometrical factor associated with a camera and lens which contributes to the exposure. See **f-number.**

stop filter (*Elec. Comm.*). See **band-elimination filter.**

stop key (*Acous.*). A finger key for operating the stop mechanism and so bringing into potential action groups of pipes in an organ.

stop moulding (*Join.*). A stuck moulding terminating in a stop.

stop press (*Typog.*). See **fudge.**

stop slide (*Horol.*). See **all-or-nothing piece.**

stop valve (*Eng.*). The main steam valve fitted to a boiler to control the steam supply and to allow of isolating the boiler from the main steam pipe.

stop watch (*Horol.*). A watch, usually having seconds and minutes hands only, which is started and stopped by pressure of the winding knob. The normal type reads to one-fifth second, but special types read to one-fiftieth second.

stop work (*Horol.*). Mechanism to prevent the overwinding of a mainspring or a weight.

stope (*Mining*). (1) To excavate ore from a reef, vein or lode.—(2) The space left after the excavation of ore from a tabular deposit.

stoping (*Geol.*). A mining term applied by R. A. Daly to a process in the emplacement of some igneous rock bodies, by which blocks of the overlying country rock are wedged off and sink into the advancing magma.

stopped end (*Build.*). A square end to a wall.

stopped mortise (*Join.*). A *blind mortise* (q.v.).

stopped pipe (*Acous.*). An organ pipe which is closed at its outer end, so that the wavelength of its fundamental resonance is four times the length of the air-column.

stopper (*Elec. Comm.*). (1) A resistance situated next to the grid of a valve to reduce high-frequency potentials on the grid and consequent build-up of parasitic oscillations.—(2) The resistance-capacity combination for de-coupling anode or grid supply circuits, so as to obviate oscillation in thermionic amplifiers.

stopper (*Horol.*). A watch or clock which continually goes and stops, whatever may be the cause.

stopping (*Paint.*). A plastic material used to fill all holes, dents, and cracks in timber, especially prior to painting.

stopping knife (*Build.*). A special knife used for spreading putty. Also called PUTTY KNIFE.

stopping-out (*Photog.*). The same as *blocking-out.*

stopping motion (*Textiles*). A mechanism used on different kinds of machines, e.g. winding and warping machines, to effect stoppage of the machine when a thread breaks.

Stoprot (*Build.*). See **Pilcher's Stoprot.**

storage battery (*Elec. Eng.*). An assembly of secondary cells connected in series, so as to obtain the desired electromotive force. See also **accumulator.**

storage bin (*Civ. Eng.*). A *silo* (q.v.).

storage cell (*Elec. Eng.*). A secondary cell or accumulator.

storage pith (*Bot.*). Pith in which starch or water is stored by the plant.

storage tracheide (*Bot*). A thick-walled cell resembling a tracheide, without living contents, in which water is stored.

storey (*Bot.*). A layer of vegetation.

storey (*Build.*). The part of a building included between two adjacent floors.

storied cork (*Bot.*). A type of cork composed of short cells arranged in somewhat irregular radial groups.

storm pavement (*Civ. Eng.*). A *breakwater-glacis* (q.v.).

storm-water tanks (*Civ. Eng.*). Tanks into which, in times of storm, when the amount of surface water increases, sewage in excess of three times the mean dry weather flow passes, for the removal of road grit and other solid matters before final discharge into a river.

storm window (*Build.*). (1) A window arranged with double sashes enclosing air, which acts as a sound and heat insulator.—(2) A small upright window set in a sloping roof surface so as not to project beyond it. Cf. *dormer.*

story (*Build.*). See **storey.**

stout (*Brew.*). A dark-brown beer with a strong flavouring of hops; the colour is due to the amount of black malt in the grist. See **beer, malt.**

stovaine (*Chem.*). Amylocaine. A synthetic alkaloid, used as an anaesthetic, especially for spinal purposes.

stoving (*Textiles*). A bleaching process in which wool or woollen fabric, in a moist condition, is brought in contact with sulphur fumes.

S.T.P. (*Chem.*). Standard temperature and pressure, i.e. 0° C. and 760 mm. of mercury.

strabis'mus (*Med.*). Squint. A condition in which the visual axes of the eyes assume a position relative to each other which is abnormal.

straddle milling (*Eng.*). The use of two or more side-cutting milling-cutters on one arbor so as to machine, for example, both side-faces of a piece of work at one operation.

straddle scaffold (*Build.*). A *saddle scaffold* (q.v.).

straight (*Surv.*). A straight or tangent length connecting curves in a highway or railway.

straight arch (*Build.*). See **flat arch.**

straight bank (*Auto. Teleph.*). A bank of outgoing trunks connected in a regular way, so that they are tested in order, starting from the same one each time, by each switch having access to them. Also called STRAIGHT MULTIPLE.

straight eight (*I.C. Engs.*). An eight-cylinder-in-line engine, as distinct from an eight-cylinder-V-type engine.

straight-flute drill (*Eng.*). A conical pointed drill having backed-off cutting edges, formed by cutting straight longitudinal flutes in the shank; more rigid than a twist drill and often used for soft metals.

straight joint (*Build.*). A continuity of vertical joints in brickwork, giving rise to a very unsound construction, since the load which the wall is bearing has to be carried by the joint instead of by the bricks.

straight-line frequency condenser (*Radio*). A variable condenser in which the capacitance is inversely proportional to the square of the scale reading, so that the frequency of the circuit which it tunes is directly proportional thereto.

straight-line lever escapement (*Horol.*). A lever escapement in which the balance staff, pallet staff, and escape wheel are planted in the same straight line. The majority of watches with the club-tooth escapement are of this form.

straight-line rectification (*Radio*). See **linear rectification.**

straight-line wavelength condenser (*Radio*). The same as *square law condenser*.

straight-pane hammer (*Eng.*) A hammer with a pane consisting of a blunt chisel-like edge at right-angles to the shaft.

straight receiver (*Radio*). A receiver in which all the high-frequency amplification, if any, is carried out at the same frequency as that of the original signal. Cf. *supersonic heterodyne receiver*.

straight tie (*Weaving*). See **Norwich tie.**

straight tongue (*Join.*). A wooden tongue for a *ploughed-and-tongued joint* (q.v.) cut so that the grain is parallel to the grooves.

straight (or solid) type cable (*Cables*). A cable which has oil-impregnated paper as the dielectric. Used up to 66 kV in the form of single-core H-type cable.

straight-up-and-down filament (*Illum.*). A filament made in the form of long zigzags between an upper and lower spider support; used in the ordinary vacuum type of filament lamp.

straightening-up (*Furs*). The operation of placing seams in alignment, prior to finishing.

straightforward junction working (*Teleph.*). The system of manual operation in which the attention of a B-operator is obtained by an A-operator connecting to any one of a number of junctions leading to the B-operator.

strain (*Bot., Zool.*). A variety of a species, with distinct morphological and/or physiological characters.

strain (*Eng., Phys., etc.*). See **elasticity, modulus of elasticity, modulus of rigidity.**

strain-ageing (*Met.*). An increase in strength and hardness that proceeds with time, after cold-working. It takes place slowly at air temperature and is accelerated by heating. It is most pronounced in iron and steel, but also occurs in other metals.

strain-hardening (*Met.*). Increase in resistance to deformation (i.e. in hardness) produced by deformation. See **cold-working, work-hardening.**

strain insulator (*Elec. Eng.*). An insulator inserted in the span wire of an overhead trolley-wire system.

strain-slip cleavage (*Geol.*). A variety of cleavage in which the cleavage planes are parallel shear planes; between each pair the rocks are puckered into small sigmoidal folds.

straining (*Leather*). The operation of fastening hides or skins, in a damp state, on wooden frames to maintain their full size while drying.

straining beam (*Build.*). The horizontal beam secured between the heads of the queen-posts in a timber roof having no king-post, in order to prevent them from being forced inwards.

straining sill (*Build.*). A piece of scantling lying on the tie-beam of a timber roof and butting against the feet of the queen-posts, or between the feet of the queens and princesses, in order to keep them apart.

strait work (*Mining*). (1) Narrow headings in coal.—(2) A method of working coal by driving parallel headings and then removing the coal between them.

Straiton Group (*Geol.*). A group of marine conglomerates, grits, flags, and green shales of Wenlockian age found in the Girvan district in Scotland.

strake (*Mining*). A wide inclined launder for catching grains of heavy water-borne mineral. See **blanket strake, tye.**

strake (*Ship Constr.*). A row of plates positioned end to end, as normally found in ship construction.

stramin'eous (*Bot.*) Straw-coloured.

strand (*Elec. Eng.*). One of several wires which together constitute a stranded conductor.

strand space waxing (*Cables*). Waxing which occurs on the conductor side of a conductor paper between two strands. There is no waxing at the crest of the strand because of the good contact between paper and crest.

strand waxing (*Cables*). Waxing which occurs near the conductor because of the latter's stranded shape. It is a maximum at the crest of the strand.

strand plant (*Bot.*). A plant growing in a place where it is not submerged at high tide, but receives salt spray.

stranded cable (*Elec. Eng.*). A cable whose core (or cores) consists of stranded conductor.

stranded conductor (*Elec. Eng.*). Conductors woven from individual wires or strands, as in the case of a rope.

stranded caisson (*Civ. Eng.*). A watertight box, having a solid floor, which is floated over the site where a bridge pier is to be constructed. Construction goes on in the dry on the floor of the box, which sinks finally to a previously levelled bed under water, the sides of the box being kept always above water. Also called an AMERICAN CAISSON.

stranding (*Furs*). The same process as *dropping-out* (q.v.).

stranding effect (*Cables*). An increase (20-30%) of the stress at the surface of the conductor caused by stranding. A usual increase is 25%. Stranding effect is overcome by sector-shaped conductors or by lead sheathing the conductor.

strangler (*I.C. Engs.*). See **choke** (2).

strangles (*Vet.*). A contagious disease of horses, due to infection by *Streptococcus equi*, characterised by rhinitis and suppurative adenitis.

strang'ury (*Med.*). Slow and painful micturition.

strap (*Carp.*). A metal plate or band securing timbers together at a joint.

strap hinge (*Join.*). A hinge having one long leaf for securing to a heavy door or gate.

strapped wall (*Build.*). A wall to which strapping has been fixed.

strapping (*Build.*). A general term for battens fixed to the internal faces of walls as a support for laths and plaster.

strapping motion (*Cotton Spinning*). See **governor motion.**

strapping wires (*Elec. Eng.*). Parallel single-wire connexions between a pair of two-way electric light switches for dual control of a lighting point.

strata. *Pl.* of *stratum.*

strata, table of (*Geol.*). A column which depicts a series of rocks arranged in chronological order, the oldest being at the bottom. It is usual to draw this to scale so that the average thicknesses of the beds are also shown.

Strathmore Sandstones (*Geol.*). A series of unfossiliferous fine sandstones, shales, marls, and flags, usually placed at the top of the Lower Old Red Sandstone, and occurring in Strathmore, in the Central Lowlands of Scotland.

stratification (*Bot.*). (1) The banding seen in thick cell walls, due to the presence of wall layers differing in water content, chemical composition, and physical structure.—(2) The grouping of the vegetation of a wood into two or more well-defined layers differing in height, as trees, shrubs, and ground vegetation.

stratification (*Geol.*). The layering in sedimentary rocks due to changes in the rate of deposition, or in the nature of the sediment, or to contemporaneous recurrent pauses in the process of sedimentation. See also **lamination.**

stratified cambium (*Bot.*). A cambium in which the cells, seen in tangential section, appear arranged in fairly regular horizontal rows.

stratified epithelium (*Zool.*). A type of epithelium consisting of several layers of cells, the outer ones flattened and horny, the inner ones polygonal and protoplasmic.

stratified thallus (*Bot.*). A lichen thallus composed of a layer of algal cells between layers of fungal hyphae.

strat'iform, strat'ose (*Zool.*). Arranged in layers.

stratigraphical level (*Geol.*). See **horizon (geological).**

stratig'raphy (*Geol.*). The historical study of the rocks of the earth's crust, their relations and structure, their arrangement into chronological groups, their lithology and the conditions of their formation, and their fossil contents.

strat'ose (*Bot.*). Made up of well-defined layers; said particularly of the thallus of a heteromerous lichen.

strat'osphere (*Meteor.*). A layer of the earth's atmosphere, about six or seven miles above the earth, in which there is no convection and practically no vertical temperature gradient.

stratum (*Geol.*). A single bed of rock bounded above and below by divisional planes originally almost horizontal—the planes of *stratification* (q.v.). A stratum differs from a lamination only in thickness.—*pl.* **strata.**—*adj.* **stratified.**

stratum (*Zool.*). A layer of cells: a tissue layer.

stratum cine'reum, —lemnis'ci, —op'ticum, —zona'le (*Zool.*). Layers of the anterior *corpora quadrigemina* (q.v.).

stratum compac'tum, —spongio'sum (*Zool.*). Layers of the decidua vera in Mammals.

stratum cor'neum, —granulo'sum, —lu'cidum, —Malpigh'ii (*Zool.*). Layers of the skin in Vertebrates.

stratum society (*Bot.*). A plant society occurring as a well-defined layer in a plant community, as shrubs in a wood.

strawboards (*Bind.*). The cheapest boards, made from crude straw pulp. They are used for binding and mounting. Usual sizes 30×25 in., 32×22 in.

straw-rope (*Moulding*). Rough rope of twisted straw or hay wound on a bar or barrel to serve as a foundation for the loam in making a *struck core* (q.v.).

stray capacitance (*Radio*). Any capacitance occurring within a radio circuit other than that intentionally inserted by capacitors; e.g. the capacitance of connecting wires.

stray field (*Elec. Eng.*). A magnetic field set up in the neighbourhood of electric machines or current-carrying conductors, which serves no useful purpose and which may interfere with the operation of measuring instruments, etc.

stray flux (*Elec. Eng.*). The leakage flux in an a.c. machine or transformer.

stray induction (*Elec. Eng.*). The equivalent induction of the leakage flux effective in producing a reactive voltage drop.

stray losses (*Elec. Eng.*). The stray load losses of an electrical machine, due to stray fields and harmonic flux pulsations in the iron circuit and eddy currents in the windings.

strays (*Radio*). See **atmospherics.**

streak (*Bot.*). (1) A line of tissue differing in colour or structure from the tissues on each side of it.—(2) A furrow.—(3) A kind of virus disease in which necrotic streaks develop in the plant. Also called STRIPE.

streak (*Min.*). The name given to the colour of the powder obtained by scratching a mineral with a knife or file or by rubbing the mineral on paper or an unglazed porcelain surface (*streak plate*).

stream anchor (*Ships*). An anchor of lighter weight than a bower anchor; used as a stern anchor.

stream tin (*Min.*). Cassiterite occurring as derived grains in sands and gravels in the beds of rivers.

streaming potential (*Chem.*). The difference of electrical potential induced between the two ends of a capillary by forcing a liquid through it.

streamline burner (*Eng.*). See **fantail burner.**

streamline flow (*Hyd.*). See **viscous flow.**

streamline wire (*Aero.*). Bracing wire of approximately oval or lenticular cross-section, so formed to reduce head resistance when used externally on an aircraft structure.

street pole (*Elec. Eng.*). The pole at the side of a road or street from which the trolley-wire is suspended by means of the span-wire.

street refuge (*Civ. Eng.*). A small raised area in the middle of a street, surrounded by a kerb and protected by fender-posts, serving as a place of protection for pedestrians crossing the street. Also called SAFETY ISLAND.

strengths of acids (*Chem.*). The relative hydrogen ion *activities* (2), or concentrations, in solutions containing equivalent quantities of acid.

strepsine'ma (*Cyt.*). A stage in reduction division; *strepsitene* (q.v.).

strep'sitene (*Cyt.*). A stage in meiotic prophase during which *crossing-over* (q.v.) takes place.

Streptoneu'ra (*Zool.*). A subclass of *Gastropoda* in which the sexes are separate; the visceral mass and commissure show the maximum degree of torsion and there is generally only a single pair of cephalic tentacles. Limpets, Cowries, Periwinkles, etc.

streptoneu'ral, streptoneu'rous (*Zool.*). Having an asymmetrical nervous system; said especially of certain *Gastropoda* in which the visceral nerve loop is twisted into a figure of eight.

strep'tosty'ly (*Zool.*). In Vertebrates, the condition of having the quadrate movably articulated with the squamosal; cf. *monimostyly.*—*adj.* **streptosty'lic.**

streptotricho'sis or streptothrico'sis (*Med.*). A rare infection (especially of the lungs) with a branching fungus.

stress (*Cables*). In a single-core cable the stress at a point at distance x from the axis is $[E/x \log_e (D/d)]$, where E is the voltage of the conductor, d its diameter, and D the internal diameter of the lead sheath. Hence the stress varies from a maximum of $[E/d \log_e (D/d)]$ at the conductor to a minimum of d/D times this at the sheath. A modern 66 kV cable has a maximum stress of about 60 kV peak/cm.

stress (*Phys.*). See **elasticity.**

stress cone (*Cables*). A cone formed by wrapping paper tapes on the core of a cable from the place where the lead sheath ends. The purpose is to prevent flashover or tracking across the surface of the core. The stress cone is covered on its sloping face by a lead flare.

stress diagram (*Struct.*). See **force diagram.**

stress marks (*Photog.*). Markings on finished prints due to abrasion of the film surface. These can be removed with methylated spirit, possibly assisted by thiocarbamide.

stress minerals (*Geol.*). A term used for minerals occurring in metamorphic rocks whose formation is favoured by shearing-stresses. Such minerals are: kyanite, chlorite, chloritoid, epidote, albite.

stress-number (or **S/N**) **curve** (*Met.*). A curve obtained in fatigue tests by subjecting a series of specimens of a given material to different ranges of stress and plotting the range of stress against the number of cycles required to produce failure. In steel and many other metals there is a limiting range of stress below which failure will not be produced even by an indefinite number of cycles.

stress-strain curve (*Met.*). A curve similar to a *load-extension curve*, except that the load is divided by the original cross-sectional area of the test piece and expressed as tons or pounds per sq. in., while the extension is divided by the length over which it is measured and expressed in inches per inch.

stressed skin construction (*Aero.*). See **monocoque** and **Geodetic.**

stretch (*Cinema.*). (1) The relative increase in length of film during processing or exposure to moist conditions.—(2) The introduction of extra frames in a print by holding the negative in an intermittent printer, to obtain a slower motion of the images on projection, or to permit an increase in speed of projection without increasing motion of images.

stretched diaphragm (*Acous.*). A diaphragm in a microphone or loudspeaker which has its rigidity increased by radial stretching, frequently by screwing on to it a rim near its edge. Resonance then becomes marked, and the tension is adjusted so that the major resonant frequency becomes near the upper limit of the desired transmission frequency-band. The trend of the response curve is then adjusted by altering the damping.

stretcher (*Build.*). A whole brick which has been laid so that its length is in the line of the face of the wall.

stretcher (*Furn.*). A horizontal member joining two or more chair or table legs.

stretcher (*Mining*). A bar fixed across a narrow working place or tunnel to support a rock drill.

stretching bond (*Build.*). The form of bond, used largely for building internal partition walls of 4½ in. thickness, in which every brick is laid as a stretcher, each vertical joint lying between the centres of the stretchers above and below, so that angle closers are not required. See **chimney bond.**

stretching course (*Build.*). An external or visible course of bricks which is made up entirely of stretchers.

Stretton Group (*Geol.*). A group of purple and green flags, slates, and shales of Pre-Cambrian age occurring in the eastern Longmynd of Shropshire. See also **Longmyndian.**

stri'a or **stria'tion** (*Bot.*, *Zool.*). A faint ridge or furrow: a linear mark: a narrow groove or ridge: a streak.—*adjs.* **stri'ate, stri'ated.**

stria medull'aris (*Zool.*). See **habenula.**

stria vascular'is (*Zool.*). A vascular pigmented membrane of the organ of Corti.

striae or **striations** (*Min.*). Surface markings occurring on the faces of some crystals, taking the form of parallel lines; caused by oscillation between two crystal forms. The striated cubes of iron-pyrite are good examples.—(*Geol.*) Parallel lines or narrow grooves occurring on glaciated pavements, roches moutonnées, etc.; produced by hard stones frozen into the base of a moving ice-sheet; also seen on slicken-sided rock surfaces along which movement has taken place during faulting.

striae atroph'icae (*Med.*). Greyish-white bands of atrophied skin in areas where the skin has been unduly stretched, as in pregnancy (*striae gravidarum*).

stri'ate (*Bot.*, *Zool.*). Marked with parallel longitudinal lines, furrows, ridges, or streaks of colour.

stri'ated muscle (*Zool.*). A form of contractile tissue composed of multinucleate unbranched fibres enclosed by a sarcolemma, showing marked transverse striations and having the nuclei at the periphery. Cf. *unstriated muscle, cardiac muscle.*

strickle board (*Foundry*). A board profiled along one edge to the required shape of the surface of a loam mould or core; used to sweep or strike the loam to the correct section. See **loam.**

strict (*Bot.*). Stiff and rigid.

stricture (*Med.*). Any abnormal narrowing of a duct or passage in the body, especially the narrowing of the urethra due to gonorrhoeal inflammation. See also **stenosis.**

striding level (*Surv.*). A sensitive level-tube fitted at each end with a leg at right-angles to the tube, so that the striding level may be placed astride a theodolite by resting the V-shaped ends of the legs on the trunnion axis, enabling the latter to be accurately levelled.

stri'dor (*Med.*). A harsh vibrating noise produced by any obstruction in the respiratory tubes, e.g. in diphtheria of the larynx.

strid'ulating organs (*Zool.*). The parts of the body concerned in sound production by stridulation.

stridulation (*Zool.*). Sound production by friction of one part of the body against another, as in some Insects.

stri'ga (*Zool.*). See **stria.**—*adjs.* **stri'gate, stri'gose.**

strigil, strigilis, strij'— (*Zool.*). In certain *Hemiptera*, a curious asymmetrical organ consisting of rows of black comb-like plates situated on the dorsal surface of the abdomen: in some Bees, a mechanism for cleaning the antennae situated at the junction of the tibia and the tarsus of the first leg.

stri'gose (*Bot.*). Bearing hairs which are usually rough and all pointing in the same general direction.—*dim.* **strig'illose.**

strike (*Geol.*). The horizontal direction which is at right-angles to the dip of a rock.

strike (*Typog.*). To drive a hardened steel punch into a brass or copper bar, so producing a matrix from which types are cast. The term is also used to describe the impression itself.

strike (*Vet.*). See **struck.**

strike fault (*Geol.*). A fault aligned parallel to the strike of the strata which it cuts. Cf. *dip fault.*

strike note (*Acous.*). The note, largely subjective, which is initially prominent when a bell is struck. It rapidly attenuates, leaving the hum note and some overtones, which may not be exactly harmonic.

striking (*Build., Civ. Eng.*). The operation of removing temporary supports from a structure.

striking (*Foundry*). See **striking-up.**

striking clock (*Horol.*). A clock which strikes the hours only.

striking plate (*Carp., Join.*). A metal plate screwed to the jamb of a door case in such a position that when the door is being shut the bolt of the lock strikes against, and rubs along, the plate, finally engaging in a hole in the latter.

striking-up or **striking** (*Foundry*). The process of generating a loam mould surface by means of a *strickle board* (q.v.).

striking wedges (*Civ. Eng.*). A pair of wedge-shaped blocks of hard wood packed beneath each end of a centre and placed in contact, with their thin ends pointing in opposite directions, so that, by moving them relatively, the centre may be gradually lowered on completion of the work. Also called EASING WEDGES, LOWERING WEDGES.

striking work (*Horol.*). The mechanism of a clock which causes the striking.

string (*Carp.*). A sloping wooden joist supporting the steps in wooden stairs.

string (*Cinema.*). The phosphor-bronze flattened wires in a recording vibrator, and the Duralumin strip in a light-valve.

string (*Elec. Eng.*). The series of insulator units combining to form a suspension insulator.

string chart (*Elec. Eng.*). A diagram from which the relation between the sag of an overhead line and the temperature may be rapidly obtained.

string-course (*Masonry*). A projecting course in a wall.

string efficiency (*Elec. Eng.*). The ratio of the flash-over voltage of a suspension-insulator string to the product of the flash-over voltage of each unit and the number of units forming the string.

string galvanometer (*Cinema.*). A vibrator used in variable-area sound-film recording, which deflects the image of the slit across the track or along the track.

string galvanometer (*Elec. Eng.*). See **Einthoven galvanometer.**

string warp machines (*Textiles*). Lace machines which are supplied by spools as well as by beams in making warp laces.

stringer. A long horizontal member in a structural framework.—(*Aero.*) A light auxiliary member parallel to the main structural members of a plane, fuselage, float, or boat body. Its purpose is to assist in preserving the correct external shape.

string'halt (*Vet.*). A disease of horses, characterised by involuntary sudden and excessive flexion of one hind limb or both.

stri'olate (*Bot.*). Finely striate.

strip (*Timber*). A piece of timber of smaller size than 2 × 4 in.

strip-wound armature (*Elec. Eng.*). An armature whose winding consists of conductors in the form of copper strip.

stripe (*Bot.*). See **streak** (3).

striped (*Bot.*). Bearing longitudinal stripes of colour.

striping (*Furs*). The process of dyeing furs in stripes.

stripper and worker (*Textiles*). A pair of wire-covered rollers forming part of the mechanism of a roller carding machine.

stripping (*Acous.*). Removal of the copper electroplate from the original wax-record in gramophone-record manufacture.

stripping (*Furs*). The operation of dividing furs into strips.

stripping (*Paint.*). The operation of removing old paint surfaces or wall-paper prior to redecorating.

stripping (*Photog.*). The process of removing the negative emulsion film from its glass support for transfer to another glass or other support (as in process-block making).

stripping agent (*Acous.*). The substance which is coated on the surface of a copper matrix when a copy of this is made by electroplating. When copper is copperplated a silver iodide film is used, while the bichromate salt is used in nickelplating. For effective plating the stripping agent must be adequately conducting.

strobi'la (*Zool.*). In *Scyphozoa*, a scyphistoma in process of production of medusoids by transverse fission: in *Cestoda*, a chain of proglottides.—*adjs.* **strob'ilate, strobila'ceous, strobilif'erous, strob'iloid.**

strobila'ceous (*Bot.*). Of, or resembling, a cone.

strob'ilate (*Bot.*). Of the nature of a cone.

strobilisation (*Zool.*). Production of strobilae: in *Scyphozoa*, transverse fission of a scyphistoma to form medusoids: in *Cestoda*, production of proglottides by budding from the back of the scolex: in some *Polychaeta*, reproduction by gemmation.

strob'ilus (*Bot.*). A group of sporophylls with their sporangia, more or less tightly packed around a central axis, forming a well-defined group; a cone.

strob'oscope (*Elec. Eng.*). A speed-measuring device consisting of a slotted disc driven at synchronous speed; rapidly rotating objects appear to rotate at a speed equal to the actual speed difference.

stroke (*Eng.*). See **cylinder.**

stroke (*Med.*). An apoplectic seizure: a sudden attack of paralysis. See also **apoplexy.**

stroked (*Masonry*). A term applied to the face of an ashlar which has been so tooled as to present a regular series of small flutings.

stro'ma (*Bot.*). (1) The denser part of a chloroplast; it is colourless.—(2) A dense mass of interwoven hyphae, fleshy to horny in texture, cushion-like, columnar, club-shaped, or branched, in which many fungi develop their fructifications.

stroma (*Zool.*). A supporting framework, as the connective tissue framework of the ovary or testis in Mammals.—*pl.* **stro'mata.**—*adjs.* **stromate, stromat'ic, stromat'iform, stro'matoid, stro'moid, stro'matous.**

stroma starch (*Bot.*). Starch formed in the stroma of a chloroplast at times when photosynthesis is active.

stromatop'oroid limestone (*Geol.*) A calcareous sedimentary rock type, rich in the remains of the reef builder *Stromatopora*, important from Palaeozoic times onwards.

strombulif'erous (*Zool.*). Having the organs coiled in a spiral fashion: bearing spirally coiled structures.

strombu'liform (*Bot.*). Said of a spirally twisted fruit.

strombus (*Bot.*). A spirally coiled pod.

Stromness Flags (*Geol.*). The local representative of part of the Caithness Flagstone Group of the Middle Old Red Sandstone, occurring in the Orkney Islands, Scotland.

strong clay (*Build.*). See **foul clay.**

strong electrolyte (*Chem.*). An *electrolyte* (2) which is completely ionised even in fairly concentrated solutions.

stron'gyloid (*Zool.*). Said of a type of nematode larva: said of a biradiate monaxonic sponge spicule with rounded ends.

Strongyloid'ea (*Zool.*). A class of *Nematoda* in which the oesophagus is more or less club-shaped, and the males have a terminal or subterminal caudal bursa, supported by a series of six paired rays, and a dorsal branched median ray; includes the Hook Worms.

strongyloidi'asis, strongyloido'sis (*Med.*). Infestation of Man with the nematode worm *Strongyloides stercoralis*, the worm living in the intestines and causing diarrhoea; common in the Tropics.

stron'tianite (*Min.*). Carbonate of strontium, crystallising in the orthorhombic system. Its colour varies from pale green or grey to brown, and it is associated with limestones and less frequently with eruptive rocks. It is also a minor source of strontium compounds.

strontium (*Chem.*). A metallic element in the second group of the periodic system, one of the alkaline earth metals. At. no. 38, at. wt. 87·63. The metal is silvery white; sp. gr. 2·5, m.p 800° C. It is found naturally as *celestine* and as *strontianite*; it also occurs in mineral springs.

stro'phiolate (*Bot.*). See **carunculate.**

stro'phiole (*Bot.*). See **caruncle.**

strub rack (*Civ. Eng.*). A form of rack railway in which the rack is centrally located, and is made from a special section, resembling a flat-bottomed rail in its lower portion and thickened greatly at the top, where the teeth are cut.

struck (*Build.*). (1) Taken away, dismantled; said, for example, of scaffolding.—(2) Joints on an exposed face of a wall are said to be *struck* when the mortar is recessed in the upper part of the joint.

struck (*Vet.*). An acute toxaemia of sheep, due to *Clostridium welchii, type C* (*B. paludis*).

struck core (*Foundry*). A loam core formed by revolving the built-up core, loam-covered, against a *strickle board* (q.v.). See also **straw-rope.**

struck-joint pointing (*Build.*). See **weathered pointing.**

structural colours (*Zool.*) Colour effects produced by some structural modification of the surface of the integument, as the iridescent colours of some Beetles. Cf. *pigmentary colours.*

structural deviation (*Bot*). Any departure from the usual structure of a plant.

structural hybrid (*Gen.*). An organism in which the two sets of chromosomes in the diploid complement are different in composition.

structural timber (*Build.*). The Canadian name for *carcassing timber.*

structure (*Chem.*). See **molecular structure.**

structure of the atom (*Chem.*). See **atomic structure.**

stru'ma (*Bot.*). A swelling on one side at the base of the capsule of a moss.

struma (*Med.*). (1) *Scrofula* (q.v.).—(2) *Goitre* (q.v.).

stru'mose (*Bot.*). (1) Bearing a swelling at one side of the base.—(2) Bearing cushion-like swellings.

strut (*Eng.*). Any light structural member or long column which sustains an axial compressive load. Failure occurs by bending before the material reaches its ultimate compressive stress. See **column.**

Struthio'nes (*Zool.*). An order of *Neognathae*, having a typical desmognathous palate, a keelless sternum, and hookless barbules; the wings are reduced; the pygostyle, the syrinx, and the oil-gland are lacking. Ostriches, Emus, Cassowaries, Kiwis, and Rheas; large flightless birds with powerful legs and feet.

strutting (*Build.*). The process of employing props to give temporary support between two surfaces; e.g. the dead shoring of floors and roof prior to underpinning.

strutting (*Carp.*). See **bridging piece.**

Struve's bars (*Surv.*). Apparatus devised by the Russian astronomer F. W. Struve for base-line measurement on the Russian Survey.

strych'nine (*Chem.*). $C_{21}H_{22}N_2O_2$, a monoacidic alkaloid base, rhombic prisms, m.p. 265° C., b.p. 270°/5 mm.; extremely poisonous, causing tetanic spasms. It occurs in the seeds of *Strychnos Ignatii*, in *Strychnos nux vomica*, in *Upas Tieuté*, and in *Lignum colubrinum.* Strychnine is almost insoluble in water, but is readily soluble in chloroform and benzene.

strychnine bases (*Chem.*). A group of alkaloids obtained from *Strychnos nux vomica.* They include *strychnine* (q.v.) and *brucine* (q.v.).

Strypt (*Build.*). Trade-name for a fire-resisting door constructed of wood and metal.

stub (*Build.*). A small projection on the under surface at the top edge of a tile, enabling it to be hung on a batten.

stub axle (*Automobiles*). A short dead axle carrying a steered wheel. It is capable of limited angular movement about a swivel-pin carried by the end of the axle beam.

stub plane (*Aero.*). See **plane.**

stub tenon (*Carp., Join.*). A very short tenon for fitting into a blind mortise. Also called JOGGLE.

stub-tooth gear (*Eng.*). A gear tooth of smaller height and of more robust form than that normally employed; used in the manufacture of automobile gears.

stuc (*Plast.*). Plasterwork finished to resemble stone.

stuc'co (*Plast.*). A smooth-surfaced plaster or cement rendering applied to external walls, especially if it resembles stonework.

stuck moulding (*Join.*). A moulding shaped out of the solid of a member.

stuck-on soles (*Shoes*). Shoe soles in which the upper inner sole and the outer sole are attached together by means of strong cement; used for women's and children's shoes.

stud (*Carp.*). An upright scantling in a timber framework or partition.

stud (*Eng*). A shank, or headless bolt, generally screwed from both ends and plain in the middle. It is permanently screwed into one piece, to which another is then secured by a nut.

stud (*Horol.*). (1) The part to which the outer coil of a balance spring is attached.—(2) A short vertical pin.

stud partition (*Carp.*). A wooden partition based on rough timber framing.

stuff (*Build.*). (1) See **coarse stuff, fine stuff.**—(2) Timber sawn or manufactured from logs.

stuff chest (*Paper*). A large cylindrical vessel in which pulp is stored before passing forward to the strainers, etc. The fibres are kept in suspension by revolving paddles.

stuffed (*Bot*). Said of the stipe of an agaric when the interior is occupied by a cottony or spongy mass different in texture from the peripheral parts.

stuffing (*Leather*). A process, similar to currying, by which leather is impregnated with grease, generally in a stuffing drum.

stuffing-box (*Eng.*). A cylindrical recess provided in, for example, a cylinder cover, at the point at which the piston-rod emerges; it is filled with packing which is compressed by a *gland* (q.v.) to make a pressure-tight joint.

stuffing-drum (*Leather*). A heated drum in which leather is impregnated with grease.

stuke (*Plast.*). *Stucco* (q.v.).

stull (*Mining*). A timber prop between the walls of a stope.

stull covering (*Mining*). A platform in a stope, to carry men or mineral.

stump tenon (*Carp., Join.*). A tenon differing from a *stub tenon* (q.v.) in that it tapers so as to have a greater thickness at the root.

stupe (*Med.*). A piece of cloth, flannel, or the like, soaked in hot water, wrung out dry, and medicated for external application.

stu'por (*Med.*). A state of mental and physical inertia; inhibition of instinctive activity and indifference to social environment.—*adj.* **stu'porous.**

stu'pose (*Bot.*). Tow-like.

sturdy (*Vet.*). See **coenurosis.**

stu'rine (*Chem.*). A protamine isolated from fish testicles.

Stuttgart disease (*Vet.*). Nephritis (Bright's disease) of dogs.

sty or **stye** (*Med.*). Hordeolum. Staphylococcal infection of a sebaceous gland of the eyelid.

sty'lar (*Bot.*). Referring to the style.

stylar canal (*Bot.*). A tube or space occupied by loose tissue, through which the pollen tubes pass as they grow through the style.

style (*Bot.*). The portion of the carpel between the ovary and the stigma; it is often elongated and thread-like.

style (*Join.*). See **stile.**

style or **stylus** (*Zool.*). In *Hydrocorallinae*, a calcareous projection arising from the tabula at the bottom of each cup: in some of the lower orders of Insects, the unmodified outer gonapophysis of the ninth segment in the male: in some *Diptera*, an appendage of the antenna.—*adjs.* **sty'lar, sty'late.**

style of the house (*Typog.*). The customary style of spelling, punctuation, capitalisation, etc., used in a printing establishment. It is followed in the absence of contrary instructions.

sty'let (*Zool.*). A small pointed bristle-like process.

stylid'ium (*Bot.*). The upper portion of an archegonium.

sty'lifer (*Zool.*). A process or sclerite from which a style arises.

sty'liform (*Zool.*). Bristle-shaped.

stylo- (Greek *stylos*, pillar). A prefix used in the construction of compound terms; e g *styloglossal*, pertaining to the styloid process and the tongue.

sty'lobate (*Arch.*). A continuous pedestal supporting a row of columns.

stylocon'ic (*Zool.*). Said of a type of sensilla in Insects which consists of one or more basiconic pegs elevated on a cone.

stylogIos'sus (*Zool.*). In higher Vertebrates, a muscle connecting the styloid process and the tongue.—*adj.* **styloglos'sal.**

stylohy'oid (*Zool.*). Pertaining to, or connecting, the styloid process and the hyoid; as a ligament in higher Vertebrates.

sty'loid (*Zool.*). Pillar-shaped; as a process of the otic capsule in the Mammalian skull.

sty'lopised (*Zool.*). Of Bees, parasitised by *Strepsiptera* (after the principal genus *Stylops*).

stylopo'dium (*Bot.*) A swelling at the base of a style.

stylopodium (*Zool.*). The proximal segment of a typical pentadactyl limb; brachium or femur; upper arm or thigh.

sty'lospore (*Bot.*). See **pycnidiospore, pycnospore.**

sty'lus (*Acous.*). The cutter in a gramophone recording-head; its point is shaped to remove a thread of wax from a blank as it revolves, thus making the record. Generally made of sapphire.

stylus (*Zool.*). In primitive Insects, a small appendage attached to the coxae of the middle and hind pairs of legs: in Mammals, a molar cusp. See also **style.**

styph'nic acid (*Chem.*). $(NO_2)_3 \cdot C_6H \cdot (OH)_2$, the trinitro derivative of resorcinol; formed by the action of nitric acid upon many gum resins.

styp'sis (*Med.*). The application, or use, of styptics.

styp'tic (*Med.*). Astringent; tending to stop bleeding by coagulation: any agent that tends to stop bleeding by astringent action.

sty'rene (*Chem.*). Phenylethylene, $C_6H_5 \cdot CH:CH_2$, a constituent of essential oils and coal-tar. It is a colourless aromatic liquid, b.p. 145° C., soluble in alcohol and ether.

styrene joint (*Cables*). A joint filled with hot liquid styrene, which polymerises on cooling into a very hard solid and prevents displacement of the cores.

styrene resins (*Plastics*). Compounds, polystyrenes, formed by the polymerisation of styrene, $C_6H_5 \cdot CH\ CH_2$. The power factor and dielectric constant are lower than for other plastics, and they do not disintegrate at ultra-short-wave and television frequencies. They have excellent mechanical properties, and are resistant to moisture, concentrated sulphuric acid, strong alkalies, alcohol, and acetone.

styrol resins (*Plastics*). See **styrene resins.**

S.U. (*Acous.*). Abbrev. for *sensation unit*, now termed the *decibel*.

suaveo'lent (*Bot.*). Having a sweet smell.

sub- (Latin *sub*, under). A prefix used in the formation of compound words, in the following senses: (1) deviating slightly from, e.g. *subtypical*, not quite typical; (2) below, e g. *subvertebral*, below the vertebral column; (3) somewhat, e g. *subspatulate*, somewhat spatulate; (4) almost, e.g. *subthoracic*, almost thoracic in position.

sub (*Teleph*). An abbrev. for a telephone subscriber or his apparatus.

subacute (*Med.*). Said of a disease whose symptoms are less pronounced than those of the acute form: between acute and chronic.

subacute combined degeneration (*Med.*). Anaemic spinal disease. A condition in which there is degeneration of motor and sensory nerve tracts in the spinal cord, giving rise to paraplegia and loss of sensibility of the skin, the disease being associated with pernicious anaemia.

subarach'noid (*Zool.*). Beneath the arachnoid.

subarachnoid haemorrhage (*Med.*). Haemorrhage into the space between the arachnoid and the pia mater (inner two membranes covering the brain), especially as a result of rupture of an aneurysm of one of the arteries in this space.

subatom'ics (*Chem.*). The study of processes which involve changes inside an atom.

subcentric oösphere (*Bot.*). A fungal oösphere with the protoplasm surrounded by one layer of fatty globules and with two or three additional layers on one side only.

subche'la (*Zool.*). In *Arthropoda*, any subchelate appendage.

subche'late (*Zool.*). In *Arthropoda*, having the distal joint of an appendage modified so that it will bend back and oppose the penultimate joint, like the blade and handle of a penknife, to form a prehensile weapon. Cf. *chelate*.

sub-chord (*Surv.*). The chord length from a tangent point on a railway or highway curve to the adjacent chainage peg around the curve when this is less than the full chord distance employed in setting out the chainage pegs.

sub-circuit (*Elec. Eng.*). One of several lighting circuits supplied from a common branch distribution fuse-board.

subcla'vian (*Zool.*). Passing beneath, or situated under, the clavicle; as the *subclavian artery*.

subcla'vius (*Zool.*). A wing muscle of Birds.

sub-climax (*Bot.*). A community which has not attained the full development possible under the prevailing climatic conditions because of some limitation imposed by an edaphic or biotic factor

subconscious (*Psycho-an.*). See **pre-conscious.**

subcor'tical (*Zool.*). Below the cortex or cortical layer, as certain cavities in Sponges.

subcos'ta (*Zool.*). In Insects, one of the primary veins of the wing.—*adj.* **subcos'tal.**

subcostal (*Zool.*). Below the costae.

sub-culture (*Bot.*). A culture of bacteria or fungi prepared from a pre-existing culture.

subcuta'neous (*Zool.*). Situated just below the skin.

subdor'sal (*Zool.*). Situated just below the dorsal surface.

subdu'ral (*Med., Zool.*). Situated beneath the dura mater, e.g. *subdural abscess.*

subentire' (*Bot.*). Said of a margin which is very faintly indented.

subepider'mal tissue (*Bot.*). Hypodermis.

suberect' (*Bot.*). Upright below, nodding at the top.

suber'ic acid (*Chem.*). $HOOC\cdot(CH_2)_6\cdot COOH$, a saturated dibasic acid ; m.p. 140° C.

suberifica'tion (*Bot.*). See **suberisation.**

su'berin (*Bot.*). A complex mixture of fatty substances present in the cell walls of corky tissue, rendering them waterproof and resistant to decay.

suberin lamella (*Bot.*). A layer of wall material impregnated with suberin.

suberisa'tion (*Bot.*). The impregnation of cell walls with suberin, with consequent formation of cork.

su'berised (*Bot.*). Transformed into cork.

sub-erose (*Bot*). Appearing as if somewhat gnawed or eroded.

su'berose, su'berous (*Bot.*). Of corky texture.

sub-exchange (*Teleph.*). A small exchange, manually operated, which is dependent on a main exchange for completing its outgoing connexions.

subfloor (*Carp.*). A wooden floor serving as a base for the laying of a finished, e.g. parquet, floor.

subga'lea (*Zool.*). In Insects, an inner sclerite of the stipes ; parastipes.

subgen'ital (*Zool.*). Below the genital organs, as the subgenital pouches of *Aurelia.*

subgenital portico (*Zool.*). In some *Scyphozoa*, a spacious chamber lying below the stomach and formed by the fusion of the subgenital pouches.

subge'nus (*Bot., Zool.*). A subdivision of a genus higher than a species.

subglacial drainage (*Geol.*). The system of streams beneath a glacier or ice-sheet ; formed chiefly of melt-waters. Cf. *englacial streams.*

sub-harmonic (*Acous.*). See **sub-octave.**

subhe'dral (*Geol.*). See **hypidiomorphic.**

subhyme'nial layer (*Bot.*). A layer of hyphae immediately beneath a hymenium.

subic'ulum, su'bicle (*Bot.*). A felted or cottony mass of fungal hyphae underlying the fruit bodies of some fungi.

subima'go (*Zool.*). In *Ephemeroptera* (Mayflies), a stage in the life-history succeeding the nymph and passing into the true imago stage by a final ecdysis.—*adj.* **subimag'inal.**

subincis'ion. The formation of an opening into the urethra by incision of the under side of the penis ; practised by savage tribes.

subinvolu'tion (*Med.*). Partial or complete failure of the uterus to return to the normal state after childbirth.

subjective noise-meter (*Acous.*). A noise-meter for assessing noise-levels on the phon scale ; the loudness of the noise-level being measured is compared by ear with the adjusted reference tone, 1000 cycles per second. See **objective noise-meter.**

sub'limate (*Chem.*). The product of sublimation.

sublimate test (*Chem.*). *Schmidt's test* (q.v.).

sublimation (*Chem.*). The vaporisation of a solid (especially when followed by the reverse change) without the intermediate formation of a liquid.

sublimation (*Psychol.*). An unconscious mechanism whereby the energy attaching to an instinct finds indirect gratification by being diverted into socially and ethically useful channels.

sublimed white lead (*Chem.*). Basic lead sulphate fume.

sublin'gua (*Zool.*). In Marsupials and Lemurs, a fleshy fold beneath the tongue.

sublit'toral plant (*Bot.*). A plant which grows near the sea, but not on the shore.

sublunar point (*Astron.*). See **substellar point.**

subluxa'tion (*Med.*). Partial, incomplete dislocation of a joint.

submarine mine. A container for high explosive, floated at a predetermined depth or on the surface. It is fired electrically, magnetically, or by impact. See **magnetic mine.**

submarine telegraph cable (*Cables*). Deep-sea cable is invariably of gutta-percha with steel-wire armouring. Shallow sea cables have been made with dry paper, lead sheathed, steel-wire armoured.

submax'illary (*Zool.*). Situated beneath the lower jaw.

submen'tum (*Zool.*). The proximal sclerite of the basal part of the labium in Insects.

submerged, submersed (*Bot.*). Growing under water.

submerged dyke (*Hyd. Eng.*). A ground sill.

submi'cron (*Chem*). A particle with a diameter of 50-2000A.(5×10^{-7}—2×10^{-5} cms.), and therefore visible only with the ultra-microscope.

sub-microstructure (*Met.*). Structure of alloys the nature of which cannot be seen under the microscope, but has to be inferred from the results of X-ray analysis, or from the determination of electrical resistance, specific volume, etc.

submod'ulator (*Radio*). The low-frequency amplifier which immediately precedes the modulator in a radio telephony transmitter.

submuco'sa (*Zool.*). A tissue layer underlying a mucous membrane ; usually composed of vascular areolar tissue.

subno'tochord (*Zool.*). In some *Chordata*, a skeletal rod lying beneath the true notochord ; hypochord.

sub-octave (*Acous.*). (1) A frequency which is half a given frequency.—(2) The name of a stop in organs when the note sounded has half the nominal pitch of the key on the manual which controls it. Also called SUB-HARMONIC.

suboc'ular (*Zool.*). In the skull of *Cyclostomata*, an inverted cartilaginous arch lying below, and affording support to, the eyeball: below the eyeball.

subocular shelf (*Zool.*). In some Fish, an ingrowth from the suborbitals supporting the eyeball.

suboper'culum (*Zool.*). In Fish, a membrane bone of the gill-cover.

subor'bital (*Zool.*). One of a series of membrane bones surrounding, or lying below, the eye in some Fish.

sub-outcrop (*Mining*). See **blind apex.**

subpet'iolate (*Bot.*). Said of a bud which grows concealed by the petiole.

subra'dius (*Zool.*). In radially symmetrical forms, a radius of the fourth order, lying between an ad-radius and a per-radius or an ad-radius and an inter-radius.

subram'ose (*Bot.*). (1) Not branching freely.—(2) Having few branches.

subscriber (*Teleph.*). One who rents telephone apparatus for originating or receiving calls through an exchange. Abbrev. **sub.**

subscriber's extension station (*Teleph.*). The subset to which an incoming call can be extended from a main subset on a subscriber's premises.

subscriber's jack (*Teleph.*). The same as *answering jack.*

subscriber's line (*Teleph.*). The line which connects a subscriber through the exchange to his section of the multiple and also to his answering jack; more particularly, his line external to the exchange.

subscriber's main station (*Teleph.*). A subset for originating calls and for extending incoming calls to another subset, called an extension.

subscriber's meter (*Teleph.*). The meter in an exchange which indicates the number of unit-fee calls made by a subscriber. It is operated by the operator in a manual exchange before taking down the connecting cord-circuit; it is automatically operated when the distant subscriber answers over an automatic system, whether this is the desired number or not. In each instance the meter can be operated once only.

subscriber's set (*Teleph.*). See **subset.**

subscriber's station (*Teleph.*). See **sub-station.**

subset or **subscriber's set** (*Teleph.*). The collection of apparatus for originating and receiving calls which is permanently installed on a subscriber's premises.

subsidence (*Build., Civ. Eng.*). (1) The sinking or caving-in of the ground.—(2) The settling down of a structure, etc., to a lower level.

subsidiary cell (*Bot.*). See **accessory cell.**

sub-soil. Residual deposits lying between the soil above and the bed-rock below, the three grading into one another.

sub-soil drain (*Civ. Eng.*). A drain laid just below ground-level to carry off waters from saturated ground. It consists usually of unsocketed earthenware pipes laid end to end at the bottom of a trench, which is covered in with broken stones.

subsolar point (*Astron.*). See **substellar point.**

subspe'cies (*Zool.*). A category of individuals within a species distinguished by certain common characteristics from typical members of the species; a variety. The term is used in different senses by specialists in different groups.

subsponta'neous (*Bot.*). Said of a plant which has been introduced but maintains itself fairly successfully by its ordinary means of reproduction.

subsporan'gial vesicle (*Bot.*). A swelling on a sporangiophore immediately beneath the terminal sporangium.

substance (*Chem.*). A kind of matter, with characteristic properties, and generally with a definite composition independent of its origin.

sub-standard film stock (*Cinema.*). A type of film stock which is narrower than the standard. Sub-standard sizes in use are 17·5, 16, 9·5, and 8 mm., as contrasted with the standard 35 mm.

sub-standard instrument (*Elec. Eng.*). A laboratory instrument whose accuracy is very great and which has been calibrated against an international standard of measurement.

substan'tia (*Zool.*). Substance; matter.

substantive dyes (*Chem.*). Dyestuffs which can dye cotton and other fibres direct without the aid of a mordant. Many are derived from benzidine and its derivatives.

substantive variation (*Bot., Zool.*). Variation in the constitution of an organ or organism, as opposed to variation in the number of parts.

sub-station (*Elec. Eng.*). A switching, transforming, or converting station intermediate between the generating station and the low-tension distribution network.

sub-station (*Surv.*). A station of a subsidiary triangle in a skeleton.

sub-station or **subscriber's station** (*Teleph.*). A subscriber's telephone located on his premises.

substellar point (*Astron.*). The point on the earth's surface, regarded as spherical, where it is cut by a line from the centre of the earth to a given star; hence the point where the star would be vertically overhead, the point whose latitude is equal to the star's declination. Applied also to the sun and moon as *subsolar point* and *sublunar point* respectively.

substitution (*Chem.*). The replacement of hydrogen by other groups, e.g. halogen, alkyl, hydroxyl, etc.

substitutional resistance (*Elec. Eng.*). A resistance, equal to the normal resistance of an arc lamp, which is automatically cut into circuit upon the failure of any one of several arc lamps connected in series.

substomat'ic chamber (*Bot.*). A large intercellular space beneath a stoma.

sub'strate (*Bot.*). The substances used by a plant in respiration.

substra'tum (*Bot.*). Non-living material to which a plant is attached and from which it obtains substances used in its nutrition.—(*Zool.*) The solid underlying material or basis on which an animal moves, or to which it is attached; as the sea-bottom.

subsubmicron (*Chem.*). See **amicron.**

subsul'tus ten'dinum (*Med.*). Involuntary twitching of muscles or groups of muscles in patients whose vitality is lowered by prolonged fever, as in typhoid fever.

sub-synchronous (*Elec. Eng.*). Below synchronism.

subtec'tal (*Zool.*). Lying beneath the roof, as the roof of the skull; in some Fish, a cranial bone.

subtending (*Bot.*). Having a bud, or something developed from a bud, or a sporangium in its axil.

subtense' bar (*Surv.*). A horizontal bar, bearing two targets fixed at a known distance apart, used as the distant base in one system of tacheometry.

subterra'nean (*Bot.*). Growing beneath the surface of the soil.

subthal'amus (*Zool.*). A mass of grey matter lying below the thalamus and representing the prolongation of the tegmentum of the crus cerebri in the Mammalian brain; hypothalamus.—*adj.* **subthal'amic.**

subtraction (*Bot.*). The loss of a hereditary factor.

subtractive-coloured light (*Illum.*). The monochromatic illumination obtained from a polychromatic light source by the aid of an appropriate absorption screen.

subtractive primary colours (*Photog.*). In three-colour photography, the printing colours which are complementary to the colours of the analysing filters. They are magenta (minus green), blue-green (minus red), and yellow (minus blue).

subtractive process (*Photog.*). The printing of images, corresponding to the three primary colours, in their subtractive or complementary colours, so that transmitted light from a white source, or reflected light from a white support, loses in turn the minus colour of the original primary.

subtractor (*Photog.*). A filter which stops the transmission of a specified primary colour in three-colour subtractive printing.

sub'ula (*Bot.*). A delicate sharp-pointed prolongation of an organ.

sub'ulate (*Bot.*). Shaped like an awl.

subumbrel'la (*Zool.*). The concave inner or lower surface of the umbrella of a medusa.—*adj.* **subumbrel'lar.**

subun'gual (*Med.*). Situated, or occurring, beneath a nail.

subun'guis (*Zool.*). In Vertebrates, the ventral scale contributing to a nail or claw.

subway (*Civ. Eng.*). A tunnel driven beneath a road to provide an underground crossing-place for pedestrians wishing to get from one side of the road to the other.

succession (*Cyt.*). The tendency sometimes shown by the sex-chromosomes to pass to the poles of the meiotic spindle after the autosomes.

suc'cinam'ic acid (*Chem.*). $H_2N{\cdot}CO{\cdot}CH_2{\cdot}CH_2{\cdot}COOH$, mono-amidosuccinic acid.

succin'ic acid (*Chem.*). $HOOC{\cdot}CH_2{\cdot}CH_2{\cdot}COOH$, a saturated dibasic acid; monoclinic prisms; m.p. 185° C., b.p. 235° C., with partial decomposition into its anhydride. It occurs in the juice of sugar-cane, in the castor-oil plant, and in muscle, and is one of the oxidation products of fatty acids.

suc'cinite (*Min.*). (1) A variety of *amber* (q.v.), separated mineralogically because it yields succinic acid.—(2) The name given to an amber-coloured garnet of the grossularite species.

suc'cinyl (*Chem.*). The bivalent acid residue $-CO{\cdot}CH_2{\cdot}CH_2{\cdot}CO-$.

succise' (*Bot.*). Ending below abruptly, as if cut off.

suc'cubous (*Bot.*). Having the lower edge of the leaf in front of the stem and overlapping the upper edge of the next leaf below it on the same side of the stem.

suc'culent (*Bot.*). Juicy, soft, and thick. (*Succulent* is often used when *fleshy*—which is not specially juicy—should be employed.)

suc'cus (*Zool.*). A juice secreted by a gland, as the *succus entericus* (q.v.).

succus enter'icus (*Zool.*). The digestive juices secreted by the intestinal glands in *Vertebrata*.

succus'sion (*Med.*). The act of shaking a patient to detect the presence of fluid in a pleural cavity already containing air (pneumothorax).

sucker (*Bot.*). A strongly growing shoot arising from the base of the stem or from a root.

sucker (*Elec. Eng.*). A time-delay device of the dash-pot type employing a disc immersed in glycerine.

sucker (*Zool.*). A suctorial organ adapted for adhesion or imbibition, as one of the muscular sucking discs on the tentacles of Cephalopods: the suctorial mouth of animals like the Leech and the Lamprey: a newly born Whale: one of a large number of Fishes having a suctorial mouth or other suctorial structure, as the Remora (*Echeneis*), members of the genus *Lepadogaster*, etc.

sucking booster (*Elec. Eng.*). A booster whose function is to overcome voltage drop in a feeder.

sucking stomach (*Zool.*). In many Arthropods, a muscular dilatation of the alimentary canal which can produce imbibition of fluid by the mouth.

su'crase (*Chem.*). *Invertase* (q.v.).

su'crose (*Chem.*). See **cane-sugar.**

suction (*Plast.*). The pull or adhesion exerted by certain plasters on the trowel used to work their surfaces.

suction-cutter dredger (*Civ. Eng.*). A dredger in which rotary blades dislodge the material to be excavated, which is then removed by suction as in a *sand-pump dredger* (q.v.).

suction dredger (*Civ. Eng.*). See **sand-pump dredger.**

suction pressure (*Bot.*). The avidity with which the cell takes in water; it is equivalent to the difference between the osmotic pressure of the cell sap, which tends to bring water into the cell, and the pressure exerted by the elastic cell wall, which tends to force water out of the cell.

suction valve (*Eng.*). See **foot valve.**

Sucto'ria (*Zool.*). A subclass of *Ciliophora* in which only the young forms possess cilia, the adults being sedentary organisms devoid of cilia and capturing their food by means of tentacles.

suctor'ial (*Zool.*). Drawing in: imbibing: tending to adhere by producing a vacuum: pertaining to a sucker.

suctorial mouth-parts (*Zool.*). Tubular mouth-parts adapted for the imbibition of fluid nourishment; found in some Insects and many ectoparasites.

sudam'ina (*Med.*). Whitish vesicles on the skin, due to retention of sweat in the sweat glands.—*sing.* **suda'men.**—*adj.* **sudam'inal.**

suda'tion (*Bot.*). The exudation of a dilute watery solution of various substances from the plant.

Sudbury Series or **Sudbu'rian** (*Geol.*). See **Timiskaming Group.**

su'dor (*Med.*). Sweat or perspiration.

sudorif'erous, sudorip'arous (*Zool.*). Sweat-producing: sweat-carrying.

sudorif'ic (*Med.*). Connected with the secretion of sweat: stimulating the secretion of sweat: a drug which does this.

suede, swād (*Skins*). Skins used for gloves and shoe uppers; made from sheep or lamb skins dressed on the flesh side and finished without glaze.

Suffolk coulter (*Agric. Mach.*). A coulter shaped something like the prow of a boat; used on a drill to make a shallow trench for the seed.

Suffolk latch (*Join.*). A variant of the *Norfolk latch* (q.v.).

Suffolk whites (*Build.*). *Gaults* (q.v.).

suffrutes'cent, suffru'ticose (*Bot.*). Said of a plant in which many of the branches die after flowering, leaving a persistent woody base.

suffuse (*Bot.*). Spread out on the substratum.

sugar (*Chem.*). (1) A water-soluble, crystalline mono- or polysaccharose.—(2) The common term for *sucrose*, or cane-sugar, $C_{12}H_{22}O_{11}$.

sugar-dye (*Chem.*). See **caramel.**

sugar plant (*Bot.*). A plant which forms little or no temporary starch, the carbohydrate formed in photosynthesis remaining as sugar.

sugar soap (*Paint.*). A cleansing or stripping preparation for paint surfaces.

su'gent, suges'cent (*Zool.*). See **suctorial.**

suggestion (*Psycho-an.*). The acceptance by an individual of an idea or attitude based not on perception and reasoning but on an unconscious emotional tie with another person. Used as a method of treatment in psychotherapy, either alone or in conjunction with hypnosis.

sul'cate (*Bot.*). Marked by distinct longitudinal parallel furrows.

sul'culus (*Zool.*). The 'dorsal' siphonoglyph of *Anthozoa.*

sulcus (*Zool.*). A groove or furrow, as one of the grooves on the surface of the cerebrum in Mammals: in *Dinoflagellata*, a longitudinal groove in which a flagellum lies: in *Anthozoa*, the 'ventral' siphonoglyph.

sullage (*Civ. Eng.*). The mud and silt deposited by flowing waters.

Sully Beds (*Geol.*). A series of fossiliferous grey and greenish marls which are found exposed in Somerset and Glamorganshire. They belong to the lower division of the Rhaetic Stage in the Jurassic System.

sulphae'moglobinae'mia, sulphe'moglobine'mia (*Med.*). The presence in the blood of sulphaemoglobin, due to the combination of haemoglobin with hydrogen sulphide absorbed from the intestine. See also **enterogenous cyanosis.**

sulphanil'amide (*Chem.*). See **sulphonamides** (*Prontosil Album*) in Supplement.

sulphanil'ic acid (*Chem.*). $H_2N{\cdot}C_6H_4{\cdot}SO_3H$, *p*-aminobenzene-sulphonic acid; rhombic plates; crystallises with $2H_2O$ sparingly soluble in water.

sulphates (*Chem.*). Salts of sulphuric acid. Produced when the acid acts on certain metals, metallic oxides, hydroxides, and carbonates. The acid is dibasic, forming two salts—normal and acid sulphates.

sulphate of ammonia (*Chem.*). $(NH_4)_2SO_4$. Commercially the most important of the ammonium salts, particularly for use as fertiliser. Produced partly as a by-product of gas-works, coke-ovens, etc., but now largely by direct synthesis from hydrogen and atmospheric nitrogen.

sulphate of iron (*Min.*). See **melanterite.**

sulphate of lead (*Min.*). See **anglesite.**

sulphate of lime (*Min.*). See **gypsum.**

sulphate of strontium (*Min.*). See **celestine.**

sulphating roasting (*Met.*). Roasting carried out under conditions designed to retain a certain amount of sulphur as sulphate.

sulpha'tion (*Elec. Eng.*). The formation of the insoluble white sulphate of lead ($PbSO_4$) in the plates of a lead-acid-type secondary cell, a process which diminishes the efficiency and capacity of the cell.

sulphides (*Chem.*). Salts of hydrosulphuric acid. Many sulphides are formed by direct combination of sulphur with the metal.

sulphide dyestuffs (*Chem.*). Dyestuffs of unknown constitution, containing sulphur, e.g. vidal black, obtained by fusing *p*-aminophenol with sulphur, or fast black B by fusing 1,8-dinitronaphthalene with sulphur.

sulphide toning (*Photog.*). A process of toning photographic prints in which the silver is converted to silver sulphide via silver bromide.

sulphin'ic acids (*Chem.*). Acids containing the monovalent sulphinic acid group $-SO \cdot OH$.

sulphites (*Chem.*). Salts of sulphurous acid. The acid forms two series of salts, acid sulphites or bisulphites and normal sulphites.

sulphite wood pulp (*Paper*). Chipped and crushed wood which by boiling with bisulphite liquor has been reduced to its constituent fibres.

sulphocy'anides (*Chem.*). *Thiocyanates* (q.v.).

sul'phonal (*Chem.*). $(CH_3)_2 \cdot C \cdot (SO_2C_2H_5)_2$, diethylsulphonedimethylmethane; colourless prisms; m p. 126° C.; sparingly soluble in water. It is obtained by the condensation of ethyl mercaptan with acetone and subsequent oxidation with potassium permanganate. Used as a hypnotic.

sulphona'tion (*Chem.*). The process of forming sulphonic acids by the action of concentrated sulphuric acid on aliphatic or aromatic compounds.

sul'phones (*Chem.*). Compounds of the formula $RR':SO_2$. The sulphur is hexavalent.

sulphon'ic acids (*Chem.*). Acids containing the monovalent sulphonic acid group $-SO_2 \cdot OH$.

sul'phosol (*Chem.*). A colloidal solution in concentrated sulphuric acid.

sulphox'ides (*Chem.*). Compounds of the formula $RR':SO$. The sulphur is tetravalent.

sulphur (*Chem.*). A non-metallic element in the sixth group of the periodic system. At. no. 16, at. wt. 32·06, valencies 2, 4, 6, symbol S. Rhombic (α-) sulphur is a lemon-yellow powder; m.p. 112·8° C., sp. gr. 2·07. Monoclinic (β-) sulphur has a deeper colour than the rhombic form; m.p. 119·0° C., sp. gr. 1·96, b.p. 444·6° C. Chemically, sulphur resembles oxygen, and can replace the latter in many compounds, organic and inorganic. It is abundantly and widely distributed in nature, in the free state and combined as sulphides and sulphates. It is manufactured by purifying the native material or by heating pyrites. Sulphur is used in the manufacture of sulphuric acid and carbon disulphide; in the preparation of gunpowder, matches, fireworks, and dyes; as a fungicide, and in medicine; and for vulcanising rubber.

sulphur bacteria (*Bot.*). Bacteria which live in situations where oxygen is scarce or absent, and which act upon compounds containing sulphur, liberating the element.

sulphur cement (*Build.*). A cement made of sulphur and pitch mixed in equal parts; used to fix iron work.

sulphur dioxide (*Chem.*). SO_2. A colourless gas formed when sulphur burns in air. Dissolves in water to give sulphurous acid. See also **sulphur oxides.**

sulphur hydrides (*Chem.*). Four well-defined hydrides—H_2S, H_2S_2, H_2S_3, and H_2S_5.

sulphur oxides (*Chem.*). A series of oxides—SO, S_2O_3, SO_2, SO_3, S_2O_7, and SO_4.

sulphur trioxide (*Chem.*). See **sulphuric anhydride.**

sulphu'reous (*Bot.*). Pale clear yellow.

sul'phuretted hydrogen (*Chem.*). See **hydrogen sulphide.**

sulphu'ric acid (*Chem.*). A fairly strong dibasic acid, H_2SO_4. The concentrated acid is a colourless oily liquid; sp. gr. 1·85, b.p. 338° C.; it dissolves in water with the evolution of heat, and is very corrosive, largely owing to its dehydrating action. It is manufactured from sulphur dioxide, obtained by burning either pyrites or brimstone, by the *contact process* (q.v.) or the *chamber process* (q.v.). It is used extensively in the dyestuffs and explosives industries and as a drying agent in chemical processes.

sulphuric anhydride (*Chem.*). SO_3. Dissolves in water to give sulphuric acid.

sulphuric ether (*Chem.*). Diethyl ether.

sul'phuring (*Pot.*). A glaze defect, crystals or scum appearing on the surface.

sulphu'rous acid (*Chem.*). An aqueous solution of sulphur dioxide, which contains the hypothetical compound H_2SO_3. The corresponding salts, sulphites, are well known.

sumat'ra (*Meteor.*). A south-westerly summer squall, with thunder and lightning, blowing in the Straits of Malacca.

summation (*Physiol.*). The production of an effect by repetition of a causal factor which would be insufficient in a single application; as *summation of contractions*, the production of a state of tetanic contraction by a series of stimuli; *summation of stimuli*, the production of response in an excitable tissue by repetition of subminimal stimuli.

summation metering (*Elec. Eng.*). A system of metering electrical energy in which the consumption of several distinct load circuits is summated and indicated by one instrument.

summation of losses (*Elec. Eng.*). The process of adding together the individual losses, after allowing for any corrections, in order to obtain the guaranteed efficiency of an electrical machine.

summation panel (*Elec. Eng.*). A switchboard panel on which are mounted the instruments for measuring and recording the total output of a number of generators.

summation tone (*Acous.*). One of the combination tones produced when two or more pure tones are subjectively perceived by the ear, or partially rectified through amplitude distortion during reproduction.

summer or summer tree (*Carp.*). A large beam or lintel for the support of dead load only.

summer annual (*Bot.*). A plant which lives for a short period in summer, setting seed at the end of its growth and then dying.

summer egg (*Zool.*). In many fresh-water animals, a thin-shelled rapidly developing egg laid during the warm season. Cf. *winter egg.*

summer-load waterline (*Ship Constr.*). The waterline to which a ship may be loaded in summer. It is indicated in the freeboard markings.

summer masti'tis (*Vet.*). Mastitis of non-lactating cows due to infection by *Corynebacterium pyogenes*; probably transmitted by flies.

summer solstice (*Astron.*). See **solstices.**

summer wood (*Bot.*). Secondary wood formed in summer as secondary thickening comes to an end for the season; the elements of summer wood are often thick walled, and smaller than those of *spring wood* (q.v.). Sometimes, but less accurately, called AUTUMN WOOD.

summit canal (*Hyd. Eng.*). A canal crossing a summit; one, therefore, to which water must be supplied.

sump (*Civ. Eng.*). A small hole dug usually at the lowest part of an excavation to provide a place into which water can drain and from which it can be pumped at intervals to keep the working part of the excavation dry.

sump (*I C Engs.*). See **oil sump.**

sump (*Mining*). The prolongation of a shaft or pit, to provide for the collection of water in a mine.

Sumpner test (*Elec. Eng.*). A back-to-back load test, or regenerative test, on two similar transformers.

Sumpner wattmeter (*Elec. Eng.*). An iron-cored type of dynamometer wattmeter for use on a.c. circuits.

Sun (*Astron*). A star of spectral type G and absolute magnitude 5 0, the chief source of light and heat to the Earth and all the planets in the solar system; it consists of a massive sphere of incandescent gas, with a surface temperature of about 6000° C., and a mass of 2×10^{33} grams.

sun arc (*Cinema.*). An arc lamp of sufficient capacity to imitate the sun in studio or outdoor locations in motion-picture production.

sun pillar (*Meteor.*). A vertical column of light passing through the sun, seen at sunset or sunrise. It is caused by reflection of sunlight by horizontal ice crystals.

sun plant (*Bot.*). A plant tolerant of exposure to much bright light, or needing much light for strong growth.

sunshine recorder (*Meteor.*). The Campbell-Stokes recorder consists of a glass sphere arranged to focus the sun's image on to a bent strip of card, on which the hours are marked. The focused heat burns through the card, and the duration of sunshine is read off from the length of the burnt track.

sunspot (*Astron.*). A marking on the solar surface appearing as a relatively dark centre with less dark surrounding matter; spots occur generally in groups, are relatively short-lived, and with few exceptions are found only in regions of the solar disc between the parallels 30° N. and S. latitude; their frequency shows a marked period of 11 or 12 years; they are known to affect magnetic phenomena on the earth.

sun-spot (*Cinema.*). A large incandescent lamp, provided with a glass filter, to imitate the light from the sun in colour cinematography.

sunstone (*Min.*). See **aventurine feldspar.**

sunstroke (*Med.*). Heat hyperpyrexia. A condition produced by exposure to high atmospheric temperature and characterised by a rapid rise of bodily temperature, convulsions, and coma. See also **insolation.**

sun wheel (*Eng.*). A gear-wheel round which one or more planet wheels or planetary pinions rotate in mesh.

Sunbury Shale (*Geol.*). A marine shale of Lower Mississippian (Waverly) age, which acts as impermeable cover to the oil-bearing Berea Sandstone.

Sundance Series (*Geol.*). Marine Jurassic clays and sands exposed in the Front Range district of Colorado. Similar, though thicker, strata with some limestones occur also in the Big Horn Mts., where the series is 300 ft. thick.

sunk-coak (*Carp.*). The mortise-like recess in one of the mating surfaces of a scarfed joint, into which the *coak* (q.v.) fits.

sunk-face (*Masonry*). A term applied to a stone in whose face a panel is sunk by cutting into the solid material.

sunk fence (*Build.*). See **ha-ha.**

sunk key (*Eng.*). A key which is sunk into key ways in both shaft and hub. See **key.**

super- (Latin *super*, over). A prefix used in the construction of compound terms; e.g. *supersphenoidal*, above the sphenoid bone.

superacid'ity (*Chem.*). The excessive acidity which results from the dissolution of certain usually weak acids in certain non-aqueous solvents.

superaxil'lary (*Bot.*). Developing from above the axil.

supercal'endered paper (*Paper*). Paper which has been given an extra smooth surface by means of *calenders* (q.v.).

supercharger (*I.C. Engs.*). A compressor, commonly of the rotary vane or the centrifugal type, used to supply air or combustible mixture to an I.C. engine at a pressure greater than atmospheric; driven either directly by the engine or by an exhaust gas turbine.

supercharging (*Eng.*). (1) In aero engines, the maintenance of ground-level pressure in the inlet pipe up to the rated altitude by means of a centrifugal or other blower. Necessary for flying at heights at which the air-pressure is low and normal aspiration would be insufficient.—(2) In other I.C. engines, the term is used synonymously with boosting (see **boost**).

supercil'iary (*Zool.*). Pertaining to, or situated near, the eyebrows: above the orbit.

supercompression engine (*Eng.*). An unsupercharged engine of above normal compression ratio, to be run at full throttle only at high altitudes, when the normal power decreases owing to the fall in atmospheric pressure. Below these altitudes the throttle opening is limited by the use of a gate.

supercooled (*Chem.*). Cooled below the normal freezing-point without solidification.

supere'go (*Psycho-an.*). The strong unconscious inhibitory mechanism which criticises the ego and causes it pain and distress when it accepts unworthy impulses from the id. The superego is the main constituent of conscience, and the term was originally used by Freud to mean the development of a moral standard in the child as a result of the resolution of the Oedipus complex. Other authorities claim that the superego is formed at an even earlier stage, by the necessity of giving up the earliest love choices of the id, e.g. the breast. It is influenced in its formation by the parents' moral and ethical standards, much of which are taken over into the child's superego.

superelevation (*Surv.*). The amount by which the outer rail of a railway curve is elevated above the inner rail in order to counteract the effect of the centrifugal force of the moving train. Superelevation is also applied in the construction of highway curves. See also **cant.**

supereroga'tion (*Zool.*). A supplementary process, as the developmental processes associated with regeneration of a part, as opposed to the primary developmental processes involved during the first formation of the part.

superficial (*Zool.*). Pertaining to, or situated at, the surface; as *superficial anatomy*, i.e. surface anatomy.

superficial deposits (*Geol.*). See **drift.**

superfoeta'tion, superfeta'tion (*Med.*). Fertilisation of an ovum in a woman already pregnant, some time after fertilisation of the first ovum.

superheat (*Aero.*). The increase (positive) or decrease of the temperature of the gas in a gas-bag as compared with the temperature of the surrounding air. Similarly, *superpressure.*

superheated steam (*Eng.*). Steam heated at constant pressure out of contact with the water from which it was formed, i.e. at a higher temperature than that corresponding to saturation.

superheterodyne receiver (*Radio*). See **supersonic heterodyne receiver**

superimposed drainage (*Geol.*). A river system unrelated to the geological structure of the area, as it was established on a surface since removed. Cf. *consequent drainage.*

superior. Placed above something else; higher, upper (as the *superior* rectus muscle of the eyeball). —(*Bot.*) Posterior, as applied to the petal of a corolla.—Cf. *inferior.*

superior conjunction (*Astron.*). See **conjunction.**

superior figures (or **letters**) (*Typog.*). Small figures or letters printed above the general level of the line. They generally direct the reader to a footnote (cf. *marks of reference*); also used in mathematical work, etc.; thus: x^2.

superior ovary (*Bot.*). An ovary inserted on the receptacle above the other parts of the flower.

superior radicle (*Bot.*). A radicle which points towards the apex of a fruit.

superlin'gual (*Zool.*). In primitive Insects, a pair of small lobes associated with the hypopharynx.

Supermi'ser (*Eng.*). A combination of air preheater and economiser for boilers; the flue gases pass through annular spaces between the water tubes and the flue tubes surrounded by the air stream.

superna'tant liquid (*Chem.*). The clear liquid above a precipitate which has just settled out.

supernu'merary (*Zool.*). Additional; exceeding the usual number; as *supernumerary digit,* a sixth digit in forms which normally possess only five.

superoctave (*Acous.*). A stop on an organ which sounds two octaves higher than the nominal pitch of the key or pedal which actuates it.

super-panchromatic emulsion (*Photog.*). An emulsion similar to panchromatic emulsions but having a higher speed.

superpar'asite (*Bot., Zool.*). A parasite of the second or third degree; a hyperparasite.

superposed (*Bot.*). Said of a member placed vertically above another member.

superposed circuit (*Elec. Comm.*). An additional circuit added to a normal circuit or circuits, e.g. a phantom on telephone circuits, or direct-current telegraphy on a telephone circuit.

superposed ringing current (*Teleph.*). See under **ringing current.**

superposition (*Elec. Comm.*). The principle of *superposition* provides for the addition of independent currents and voltages at any point in an electrical system, provided that the associated electrical elements are linear with currents or voltages.

superposition image (*Zool.*). The type of image formed in a compound eye by overlapping of the separate images formed by the various facets. Cf. *mosaic image.*

superpressure (*Aero.*). See under **superheat.**

super-regeneration, super-reaction (*Radio*). Reaction in a receiver to a degree that would normally cause self-oscillation. This is prevented by the application of a quenching voltage to the reacting valve, which is thereby intermittently paralysed at the frequency of the quenching voltage, which is made high enough to be inaudible.

super-regeneration (*Zool.*). The formation of an organ a second time by regeneration, without removal: the formation of an organ in multiple form by regenerative processes.

super-regenerative receiver (*Radio*). A receiver employing the principle of super-regeneration.

super-royal (*Paper*). A standard size of printing paper, 20½ × 27½ in.

supersaturation (*Chem.*). A metastable state in which the concentration of a solution or a vapour is greater than that corresponding to saturation.

superson'ic amplification (*Radio*). Amplification at a supersonic frequency, such as that following the frequency changer in a supersonic heterodyne receiver.

supersonic frequency (*Radio*). Any frequency which is above the audible limit, but generally the frequency used for the post-frequency-changer amplification in a supersonic heterodyne receiver, viz. from 100 to 450 kilocycles per second.

supersonic heterodyne receiver (*Radio*). A receiver in which the received signal has the frequency of its carrier wave changed, by means of the heterodyne principle, to some predetermined frequency above the audible limit, after which it is amplified and finally rectified. Also called SUPERHETERODYNE RECEIVER, DOUBLE DETECTION RECEIVER.

superstructure (*Civ. Eng.*). The part of a structure carried upon any main supporting level.

supersynchronous (*Elec. Eng.*). Above synchronism.

supervisory control (*Elec. Eng.*). A method of remote control of electrical plant from a distant centre in which back-indication of the several control operations is given to the control centre.

supina'tion (*Zool.*). In some higher Vertebrates, movement of the hand and forearm by which the palm of the hand is turned upwards and the radius and ulna are brought parallel to one another; cf. *pronation.*—*adj.* **su'pinate.**

supina'tor (*Zool.*). A muscle which effects supination.

su'pine (*Med.*). Lying on one's back: the position of lying on the back.

supplemental (*Zool.*). Additional; extra; supernumerary; as (in some *Foraminifera*) *supplemental skeleton,* a deposit of calcium carbonate outside the primary shell.

supplementary (*Zool.*). Additional; extra; supernumerary.

supplementary lens (*Photog.*). A so-called magnifying lens for temporary attachment in front of a normal camera lens, in order to alter the focal-length. Used, particularly with fixed-focus lenses in box-cameras, to take photographs of near-by objects.

supply. A source of energy.

supply frequency (*Elec. Eng.*). The electrical frequency, in cycles per second, of an a.c. supply.

supply meter (*Elec. Eng.*). An instrument for measuring the total quantity of electrical energy supplied to a consumer during a certain period.

supply pipe (*Civ. Eng.*). See **service pipe.**

supply point (*Elec. Eng.*). A point on an electric power system from which electrical energy may be drawn.

supply-station (*Elec. Eng.*). See **generating station.**

supply terminals (*Elec. Eng.*). The terminals at which connexion may be made to a supply point.

supply voltage (*Elec. Eng.*). The voltage across a pair of supply terminals.

suppos'itory (*Med.*). A conical or cylindrical plug of a medicated mass for insertion into the rectum, vagina, or urethra.

suppressed-carrier system (*Radio*). A system of transmission in which the carrier wave is not radiated but is supplied by an oscillator at the receiving end. It is generally used in conjunction with single side-band working because of the phase distortion which arises when a carrier is inserted between two side-bands.

suppressed-zero instrument (*Elec. Eng.*). An indicating or graphic instrument in which the first scale reading is a considerable fraction of the maximum, instead of being zero.

Also called INFERRED-ZERO INSTRUMENT
SET-UP do.
SET-UP-SCALE do.
SET-UP-ZERO do.

suppression (*Bot.*). Failure to develop; said of a member normally present.

suppression (*Med.*, *Zool.*). Stoppage of discharge, as by obstruction of a duct: absence of some organ or structure normally present.—*adj.* **suppressed.**

suppressor, echo (*Acous.*). See **echo suppressor.**

suppressor grid (*Thermionics*). The grid nearest the anode in a pentode valve. It is maintained at a negative potential with respect to the anode, and prevents secondary electrons emitted therefrom from reaching other electrodes.

suppressor modulation (*Radio*). Modulation effected by varying the potential of the suppressor grid.

suppuration (*Med.*). The softening and liquefaction of inflamed tissue, with the production of pus. —*adj.* **sup'purative.**

su'pra-angular'e (*Zool.*). See **surangulare.**

supra-axil'lary (*Bot*). Arising above an axil.

supraclav'icle, supraclavic'ula (*Zool.*). See **supracleithrum.**

supracleith'rum (*Zool.*). A dorsal bone of the pectoral girdle in Fish.

suprador'sal (*Zool.*). On the back: above the dorsal surface: a dorsal intercalary element of the vertebral column.

supra-epimeron (*Zool.*). In Insects, the upper part of the epimeron when that sclerite is subdivided.

supra-episternum (*Zool.*). In Insects, the upper half of the episternum when that sclerite is subdivided.

supra-neuston (*Ecol.*). Aquatic animals associated with the upper side of the surface film, e.g. Water Skaters.

supraoccip'ital (*Zool.*). A median dorsal cartilage bone of the Vertebrate skull forming the roof of the brain-case posteriorly.

supraor'bital (*Zool.*). In some Vertebrates, a paired lateral membrane bone of the orbital region of the skull.

suprapharyn'geal (*Zool.*). A bone lying above the pharynx in some Fish, formed by the fusion of the pharyngobranchials: situated above the pharynx.

suprare'nal (*Zool.*). Situated above the kidneys.

suprarenal body (or **gland**) (*Zool.*). In higher Vertebrates, one of the endocrine glands lying close to the kidney and pouring into the blood secretions having important effects on the metabolism of the body.

suprarenalec'tomy (*Surg*). Surgical removal of the suprarenal gland.

suprascap'ula (*Zool.*). A dorsal element of the pectoral girdle representing the upper part of the scapula.

suprasegmen'tal structures (*Zool.*). The cerebellum, and, in higher forms, the cerebral cortex, as opposed to the *segmental apparatus* (q.v.).

suprasphe'noid (*Zool.*). In some Fish, a membrane bone dorsal to the sphenoid cartilage and within the cranial wall.

supratem'poral (*Zool.*). In the skull of some Vertebrates, a paired membrane bone occurring lateral to each parietal.

supreth'moid (*Zool.*). In the skull of *Pisces*, an unpaired membrane bone lying between the nasals.

su'ral (*Zool.*). Pertaining to the calf of the leg.

sura'nal (*Zool.*). Above the anus, as the *suranal plate* or pygidium of Insects.

surangular'e (*Zool.*). In some lower Vertebrates, a membrane bone on the outer posterior part of the lower jaw.

sur'base (*Join.*). See **dado rail.**

surbased arch (*Build.*). An arch with a rise that is less than one-half its span.

surcharge (*Civ. Eng.*). A term applied to the earth supported by a retaining wall at a level above the top of the wall.

sur'culose (*Bot.*). Bearing suckers.

sur'culus (*Bot.*). A sucker.

surface activity (*Chem.*). The influence of certain substances on the surface tension of liquids.

surface brightness (*Light.*). See **intrinsic brilliancy.**

surface concentration excess (*Chem.*). The excess concentration (which may be negative) of a solute per unit area in the surface layer of a solution.

surface condenser (*Eng.*). A steam condenser for maintaining a vacuum at the exhaust pipe of a steam-engine or turbine. It consists of a chamber in which cooling water is circulated through tubes, and which is evacuated by an air-pump. See **condenser, condenser tubes.**

surface-contact system (*Elec. Eng.*). A system of electric traction supply employing insulated fixed contacts or studs, placed at intervals between the running rails. The studs are normally 'dead,' but become 'alive' as soon as the electric tractor is over them, by connexion to a conductor running in a closed conduit underneath.

surface friction drag (*Aero.*). That part of the drag represented by the components of the pressures at points on the surface of an aerofoil, resolved tangential to the surface.

surface gauge (*Eng.*). See **scribing block.**

surface grinding machine (*Eng.*). A grinding machine for finishing flat surfaces. It consists of a high-speed abrasive wheel, mounted above a reciprocating or rotating work-table on which flat work is held, often by a *magnetic chuck* (q.v.).

surface-measure (*Timber*). A method of measuring timber in quantity, by the area of one face, irrespective of thickness. Cf. *board-measure.*

surface noise (*Acous.*). The characteristic noise accompanying the sound reproduced from records; it is caused by the granular nature of the material and the graphite which is brushed on the original wax, before electroplating, to make the surface conducting.

surface of operation (*Masonry*). A surface which is dressed to a plane as a reference from which the rest of the work can be set out and executed.

surface plate (*Eng.*). A rigid cast-iron plate whose surface is accurately scraped flat; used to test the flatness of other surfaces or to provide a truly plane datum surface in marking off work for machining.

surface tension (*Phys.*). A property possessed by liquid surfaces whereby they appear to be covered by a thin elastic membrane in a state of tension, the surface tension being measured by the force acting normally across unit length in the surface. The phenomenon is due to unbalanced molecular cohesive forces near the surface. See **capillarity, bubbles (pressure in).**

surface wiring (*Elec. Eng.*). A wiring installation in which the insulated conductors are attached to the surfaces of a building, either enclosed in conduit or secured by cleats.

surge (*Elec. Eng.*). A voltage transient manifested along a transmission line as a steep-fronted travelling wave. Caused by switching, insulation failure, or a lightning stroke.

surge absorber (*Elec. Eng.*). A circuit device which diverts, and may partly dissipate, the energy of a surge, thus preventing possible damage to apparatus or machines connected to a transmission line.

surge crest ammeter (*Elec. Eng.*). An instrument for recording a surge on a transmission line by measurement of the residual magnetism in a piece of magnetic material which has been magnetised by the surge current.

surge generator (*Elec. Eng.*). An apparatus for producing impulse voltages. It usually consists of an arrangement of condensers and resistances; the condensers are charged and then discharged through resistors. Also called IMPULSE GENERATOR.

surge impedance (*Elec. Comm.*). The ratio of voltage to current in an advancing wave along a transmission line. Substantially the same as *characteristic impedance* (q.v.).

surge point (*I.C. Engs.*). Of a centrifugal supercharger, the value of the mass air-flow at which, during throttling of the delivery, surging occurs. See **surging** (1).

surging (*I.C. Engs.*). (1) In centrifugal superchargers, an abrupt decrease or severe fluctuation of the delivery pressure as the weight of air delivered is reduced. See **surge point.**—(2) In valve springs, the coincidence of some harmonic of the cam lift curve with the spring's natural frequency of vibration, leading to irregular action and failure.

surmounted (*Build.*). A term applied to a vault springing from points below its centre and having the form of a circular arc above its centre.

surra (*Vet.*). A disease of horses, mules, and camels, due to infection by *Trypanosoma evansi.*

surro'sion (*Chem.*). An increase of weight produced by corrosion.

surround (*Acous.*). The flexible support of the large conical diaphragm in open-diaphragm electrodynamic loudspeakers. It can contribute, by resonance, to the radiation of sound-power of very low frequency.

surveying. The art of making such measurements of the relative positions of points on the surface of the earth as will enable natural and artificial features to be depicted in their true horizontal and vertical relationship by drawing them to scale on paper.

See **plane—** **geodetic—**

susceptance (*Elec. Eng.*). The ratio of the current flowing to the e.m.f. applied in the case of a purely inductive load in an a.c. circuit. The reciprocal of reactance.

susceptibility (*Bot.*). The whole of the properties of a plant which dispose it to suffer from the attacks of a parasite.

susceptibility (*Elec. Eng.*). The ratio of the intensity of magnetisation to the magnetic field strength in a magnetic circuit.

susceptibility curves (*Elec. Eng.*). Curves of susceptibility plotted to a base of magnetic field strength.

susceptor phase advancer (*Elec. Eng.*). A phase advancer which injects into the secondary circuit of an induction motor an e.m.f. which is a function of the open-circuit secondary e.m.f. Cf. *expedor phase advancer.*

suspended (*Bot.*). Said of an ovule which hangs from the top of the ovary.

suspended frame weir (*Civ. Eng.*). A form of frame weir in which the iron frames, in times of flood, are capable of being raised from the river and supported by an overhead bridge.

suspended scaffold (*Build.*). A form of scaffold used in the construction, repair, cleaning, etc., of buildings. It consists of working platforms, on light frameworks, slung from fixed higher points in the building.

suspended span (*Civ. Eng.*). The middle length of a bridge span connecting, and carried upon, the cantilever arms, in cases where these are not built out until they meet. See **cantilever bridge.**

suspension (*Chem.*). A system in which denser particles, which are at least microscopically visible, are distributed throughout a less dense liquid or gas, settling being hindered either by the viscosity of the fluid or the impacts of its molecules on the particles.

suspension bridge (*Civ. Eng.*). A bridge suspended from a flexible connexion between the two sides.

suspension cable anchor (*Civ. Eng.*). The anchorage, which may have various forms, of the cables supporting the bridge platform of a suspension bridge.

suspension insulator (*Elec. Eng.*). A freely hanging insulator made of units connected in series, by which an overhead line is suspended from the arm of a transmission-line tower; it cannot withstand any other force than a tension.

suspension push (*Illum.*). See **pendant push.**

suspension spring (*Horol.*). The thin ribbon of spring steel which supports a pendulum.

suspension switch (*Elec. Eng.*). See **pendant switch.**

suspen'soid (*Chem.*). See **lyophobic colloid.**

suspen'sor (*Bot.*). (1) A hypha which forms the stalk of a gametangium in the *Zygomycetes.*—(2) A small mass of cells which forces the developing embryo of a higher plant down into nutritive tissue.

suspenso'rium (*Zool.*). In Vertebrates, the apparatus by which the jaws are attached to the cranium.

suspensory (*Zool.*). Pertaining to the suspensorium: serving for support or suspension.

Sussex garden-wall bond (*Build.*). The form of *garden-wall bond* (q.v.) in which one header and three stretchers are laid in each course throughout.

sustentac'ular (*Zool.*). Supporting; as the *sustentacular cells* surrounding the gustatory cells in a taste-bud.

sus'tentator (*Zool.*). The cremaster of *Lepidoptera.*

Sutton Stone (*Geol.*). Massive white limestone, conglomeratic at the base, deposited round islands of Carboniferous Limestone which rose above the waters of the Liassic Sea in the South Wales district. See also **Southerndown Beds.**

su'tural bones (*Zool.*). Small supernumerary bones occurring in the sutures between the other bones of the skull in some *Primates.* Also called WORMIAN BONES.

su'ture (*Bot.*). (1) The line of union between two members of a whorl or the united edges of one member.—(2) A line of weakness along which dehiscence may occur.—(*Zool.*) A line of junction of two structures, as the line of junction of adjacent chambers of a Nautiloid shell: a synarthrosis or immovable articulation between bones, as between the bones of the cranium.—*adj.* **su'tural.**

swab (*Foundry*). See **bosh.**

swab (*Med.*). (1) Any small mass of cotton-wool or gauze used for mopping up blood or discharges, or for applying antiseptics to the body, or for cleansing surfaces (e.g. the lips, the mouth).—(2) A specimen of a morbid secretion taken on a swab (attached to a wire) for bacteriological examination.

swallow-tail (*Carp., Join.*). A *dovetail* (q.v.).

Swamm'erdam's glands (*Zool.*). See **calcigerous glands.**

swamp fever (*Vet.*). See **anaemia (infectious).**

swamping resistance (*Elec. Eng.*). A high resistance connected in series with the coil of a voltmeter; made from material having a negligible temperature coefficient, so as effectively to 'swamp' the variation with temperature of the resistance of the copper coil.

swan-neck (*Join.*). The bend formed in a hand-rail when a knee and a ramp are joined together without any intermediate straight length.

swan-neck insulator (*Elec. Eng.*). A pin-type insulator with a bent pin, arranged so as to bring the insulator into approximately the same horizontal plane as that of the support.

swansdown (*Textiles*). A cotton fabric of the fustian type, bleached and with a raised surface, or piece dyed; used for box linings, etc.

swansdown twill (*Weaving*). See **crow twill.**

swarf (*Acous.*). In gramophone-disc manufacture, the thin thread of waste wax which is removed from the surface of the wax blank when the original recording is made.

swarf (*Eng.*). Metal chips and turnings removed by cutting tools during machining operations.

swarm (*Zool.*). A large number of small animals in movement together; especially a number of Bees emigrating from one colony to establish another under the guidance of a queen: (of Bees) to emigrate in this fashion.

swarm cell, swarm spore (*Bot.*). See **zoospore.**

swarm sporangium (*Bot.*). See **zoosporangium.**

swarm spore (*Zool.*). A ciliated planula larva. See **zoospore.**

swash bank (*Hyd. Eng.*). The upper part of the slope of a sea embankment. See **footing, outburst bank.**

swash letters (*Typog.*). Ornamental italic letters with tails and flourishes, such as 𝒜, ℬ, etc. They should be used only at the beginning or end of a word.

swash plate (*Eng.*). A circular plate mounted obliquely on a shaft; sometimes used in conjunction with working cylinders mounted axially concentric with the shaft, as a substitute for an engine or pump crank mechanism.

sway rod (*Struct.*). A member inserted in a structural framework to resist wind forces.

S.W.D. (*Civ. Eng.*). Abbrev. for *stoneware drain.*

sweated joint (*Elec. Eng.*). A joint made by sweating.

sweating (*Build.*). A term applied to a surface showing traces of moisture due either to formation of condensate or to water having got through a porous material of which the surface is part.

sweating (*Eng.*). The operation of soldering pieces together by 'tinning' the surfaces and heating them while pressed into contact.

sweepback (*Aero.*). The angle at which the main planes of an aeroplane are set back relative to the longitudinal axis of the machine; it controls the longitudinal stability in flight.

sweep circuit (*Cathode Ray Tubes*). A circuit which supplies the deflecting voltage to one pair of plates or coils of a cathode ray oscillograph, the other pair being connected to the source of current or voltage under examination. A typical example is a linear time base.

sweep-saw (*Tools*). A thin-bladed saw which is held taut in a special frame and may be used for making curved cuts. Also called TURNING SAW.

sweet wort (*Brew.*). See **wort.**

swell (*Acous.*). One of the main sections of a pipe organ, in addition to the *great*, each having a separate manual. So called because the loudness of the stops on the swell manual can be varied by the foot depression of the *swell pedal* (q.v.), which operates, either directly or remotely, the shutters filling the opening of the chamber containing the swell pipes.

swell (*Weaving*). A spring-controlled device at the back of a shuttle box on a loom; it resists the entry of the shuttle and holds it in position when in the box.

swell pedal (*Acous.*). The foot-operated lever for regulating the loudness of stops drawn on the swell manual. In cinema organs, where the ranks are divided between two chambers and can be drawn on any manual or pedals, the shutters of each chamber are operated by a balanced swell pedal. See **grand swell.**

swelling (*Arch.*). The slight bulge given to the profile of a column near the middle of its length, to correct for the apparent concavity which it would have if it were a straight taper.

S.W.G. (*Eng.*). Abbrev. for *Standard Wire Gauge (British).*

swifts or **cylinders** (*Textiles*). (1) The large rollers in a set of woollen carding engines which, working in conjunction with the workers and strippers, help to scribble the wool.—(2) Light revolving frames of wood or metal which carry the hanks during unwinding.

swim-bladder (*Zool.*). See **air-bladder.**

swimmerets (*Zool.*). In some *Crustacea*, paired biramous abdominal appendages used in part for swimming.

swimming bell (*Zool.*). See **nectocalyx.**

swimming funnel (*Zool.*). In dibranchiate *Cephalopoda*, the funnel-shaped tube through which water is forcibly expelled from the mantle-cavity, producing a jerky backward movement of the animal.

swimming ovaries (*Zool.*). Clumps of ripe ova floating freely in the fluid of the body-cavity, as in *Acanthocephala.*

swimming plate (*Zool.*). See **ctene.**

Swinburne test (*Elec. Eng.*). An indirect test applied to shunt and compound d.c. motors, for determining the load losses.

swine erysipelas (*Vet.*). A septicaemia of swine due to *Erysipelothrix rhusiopathiae.*

swine fever (*Vet.*). A contagious disease of swine due to infection by a filterable virus.

swine paratyphoid (*Vet.*). See **paratyphoid (swine).**

swine plague (*Vet.*). A contagious haemorrhagic septicaemia of swine due to infection by *Pasteurella suiseptica.*

swine pox (*Vet.*). An epidemic eruptive disease of the skin and mucous membranes of swine due to infection by a filterable virus.

swing (*Elec. Comm.*). The extreme excursion from the positive peak to the negative peak in an alternating voltage or current wave-form.

swing (*Radio*). The angle, expressed as plus or minus half the excursion or spread, over which the dial of the goniometer or rotating aerial must be swung in order to estimate the setting for reading a bearing.

swing back (*Photog.*). The back of a camera which can tilt upwards or side-ways, or both, so that distortion of objects (such as the vertical lines of buildings) may be minimised, or objects at different distances may be brought into focus.

swing bridge (*Struct.*). A type of movable bridge which is capable of swinging through a quarter of a circle, about a vertical pivot, to allow of the passage of a vessel.

swing door (*Build.*). A door which swings freely about special hinges, so that it can be pushed (or pulled) open from both sides.

swing front (*Photog.*). The provision for tilting the front of a camera, with the lens, so that distortion of an object due to its receding along the axis can be minimised.

swinger (*Acous.*). A gramophone record which has its centre hole slightly eccentric with respect to the helical track, resulting in pitch variations during reproduction.

swinging post (*Build.*). See **hingeing post.**

Swiss lapiz (*Min.*). A fraudulent imitation of lapiz lazuli, obtained by staining pale-coloured jasper or ironstone with ferrocyanide. Also known as GERMAN LAPIZ.

Swiss (or **schiffle** or **shuttle**) **machine,** shif′le (*Textiles*). A type of embroidery machine in which the shuttles are placed diagonally.

Swiss (or **Thury**) **screw-thread,** tü-rē (*Eng.*). A metric thread having a profile angle of 47½°, the crest of the thread being formed by cutting off ⅕ of the thread height, and rounding.

switch (*Eng.*). A mechanical device for opening and closing an electric circuit: a mechanism for shifting a moving body in another direction: a device for moving a small section of a railway track so that rolling stock may pass from one line of track to another.

switch (*Teleph.*).
See **gravity—** **single switch call**
selector— **double switch call**
sequence— **uniselector.**

switchback (*Rail.*). An arrangement of track layout whereby a train making a steep ascent to the upper part of a valley runs into a siding, from which it passes out along another line at an acute angle to the first. Also called a BACK SHUNT.

switch-base (*Elec. Eng.*). The insulating base on which a switch is mounted.

switch blades (*Civ. Eng.*). *Points* (q.v.).

switchboard (*Elec. Eng., etc.*). An assembly of switch-panels.

switchboard (*Teleph.*). The general name for the whole of the positions in a telephone exchange where the operators make the temporary connexions between subscribers.
See **auto-manual—** **manual—**

switchboard instrument (*Elec. Eng.*). An electric measuring instrument arranged for mounting on a switchboard. See **sector-pattern instrument.**

switchboard panel (*Elec. Eng., etc.*). See **panel.**

switch-box (*Elec. Eng.*). An enclosure housing one or more switches operated by means of an external handle.

switch-desk (*Elec. Eng.*). A control desk on which a number of miniature switches are mounted, each of which serves to initiate some control operation.

switch-fuse (*Elec. Eng.*). A knife-switch carrying a fuse in each blade.

switchgear (*Elec. Eng.*). The generic name for that class of electrical apparatus whose sole function is to open and close electric circuits.

switchgear pillar (*Elec. Eng.*). See **pillar.**

switch hook (*Teleph.*). The device on which the telephone receiver is hung when not in use, and which at the same time opens the subscriber's loop from the exchange. Also called GRAVITY SWITCH.

switch-panel (*Elec. Eng.*). An insulating panel on which a switch is mounted.

switch plant (*Bot.*). A plant with small leaves, often reduced to non-functional scales, and long thin stems and branches with photosynthetic tissue in their cortical regions.

switch-plate (*Elec. Eng.*). A plate for covering one or more flush switches. Also called FLUSH-PLATE.

switch-starter (*Elec. Eng.*). A combination of knife-switch and starting regulator, in which the circuit is closed and the resistance progressively cut out in one continuous movement.

switching (*Elec. Eng., etc.*). The function exercised by a switch.—TELEPHONE SWITCHING, the interconnexion of telephone circuits and exchanges.

switching-off (*Elec. Eng., etc.*). The opening of an electric circuit: the disconnecting of an electrical machine from the supply.

switching-on (*Elec. Eng., etc.*). The closing of an electric circuit: the connecting of an electrical machine to the supply.

swivel-pin (*Automobiles*). See **king-pin.**

swivel weaving (*Weaving*). A method of weaving figures in a fabric by means of small shuttles, which are located above the reed and contain the extra material required.

sy′con grade (*Zool.*). The second type of canal system in *Porifera*; the flagellated chambers open in radial fashion from a central paragaster, which itself opens to the exterior by a single osculum.

syco′nium, syco′nus (*Bot.*). The fruit of the fig, consisting mainly of the much enlarged receptacle of the inflorescence.

syco′sis barbae (*Med.*). Inflammation of the hair follicles of the beard region, due to infection with the staphylococcus.

Sydenham's chorea (*Med.*). See **chorea.**

sy′enite (*Geol.*). A coarse-grained igneous rock of Intermediate composition, composed essentially of alkali-feldspar to the extent of at least two-thirds of the total, with a variable content of mafic minerals, of which common hornblende is characteristic.
See also **nepheline—** **potash—** **soda—**

syenite-porphyry (*Geol.*). An igneous rock of syenitic composition and medium grain-size, commonly occurring in minor intrusions; it consists of phenocrysts of feldspar and/or coloured silicates set in a microcrystalline groundmass. See also **microsyenite.**

sy′enodi′orite (*Geol.*). An alternative name for *monzonite* (q.v.), a rock type sharing the characters of syenite and diorite.

syeno-gabbro (*Geol.*). A term introduced independently by J. W. Evans and A. Johannsen for coarse-grained igneous rocks of Intermediate composition and intermediate between syenite and diorite in regard to feldspar content.

Sykes microphone (*Acous.*). A microphone in which a mass-controlled limp coil is allowed to move axially in the gap of a pot-magnet on the application of a sound-wave, thus generating an electromotive force depending on the excess-pressure wave-form.

syllable articulation (*Acous.*). See **articulation.**

sylphon bellows (*Eng.*). A thin-walled cylindrical metal bellows consisting of a number of elements arranged concertina-fashion, responding to external or internal fluid pressure; used in pressure-governing systems. See also **bellows*.**

Sylvania Sandstone (*Geol.*). An aeolian sandstone, used in the manufacture of glass, occurring in the Monroan of the eastern U.S.A.

syl′vanite (*Min.*). Telluride of gold and silver, which crystallises in the monoclinic system and is usually associated with igneous rocks and, in veins, with native gold. It is used as an ore of gold. See also **graphic tellurium.**

Syl′vedure (*Build.*). Trade-name for a timber-preserving agent.

sylves′tral (*Bot.*). Growing in woods and shady hedges.

sylves′trene (*Chem.*). △-1,8-*m*-Terpadiene, the chief constituent of Swedish and Russian turpentine. It is dextro-rotatory, b.p. 175° C.

Syl′vian aqueduct (*Zool.*). In Vertebrates, the cavity of the mesencephalon.

Sylvian fissure (*Zool.*). In Mammals, a deep lateral fissure of the cerebrum.

syl′vinite (*Min.*). A general name for mixtures of the two salts sylvite and halite, the latter predominating, occurring at Stassfurt and in Alsace.

syl′vite (*Min.*). Chloride of potassium, which crystallises in the cubic system. It occurs as a sublimation product near volcanoes, and is a source of potash compounds used as fertilisers.

sym-. See **syn-.**

symbio′sis (*Biol.*). An internal, mutually beneficial partnership between two organisms (*symbionts*), usually of a physiological nature.—*adj.* **symbiot′ic.**

symbleph'aron (*Med.*). Adhesion of the eyelid to the globe of the eye.

symbol (*Chem.*). See **chemical symbol.**

symbolic method (*Elec. Eng.*). A powerful method of a.c. circuit analysis utilising the vector operator $j=\sqrt{-1}$, a multiplier signifying rotation of a vector through a right-angle in the positive direction.

Symbran'chii (*Zool.*). A small order of eel-like *Neopterygii*, lacking scales and paired fins; found in rivers and swamps of tropical Asia, Australasia, and South America.

symmetrical (*Bot.*). See **actinomorphic.**

symmetrical components (*Elec. Eng.*). A term applied to a method of calculating short-circuit currents in a.c. systems, making use of symmetrical phase-sequence components of the currents and voltage.

symmetrical grading (*Teleph.*). Grading in which all groups of selectors are equally favoured in seeking outlets.

symmetrical short-circuit (*Elec. Eng.*). An a.c. short-circuit in which each phase carries the same current.

symmetrical winding (*Elec. Eng.*). A term applied to an armature winding which fulfils certain conditions of electrical symmetry.

symmetry (*Crystal.*). The quality possessed by crystalline substances by virtue of which they exhibit a repetitive arrangement of similar faces. This is a result of their peculiar internal atomic structure, and the feature is used as a basis of crystal classification.

symmetry (*Zool.*). (1) The method of arrangement of the constituent parts of the animal body; see **radial symmetry, bilateral symmetry, biradial symmetry, asymmetry.**—(2) In higher animals, the disposition of such organs as show bilateral or radial symmetry.

Symons's earth thermometer (*Meteor.*). See **earth thermometer.**

sympathec'tomy, sympatheticec'tomy (*Surg.*). Excision or cutting of a part of a sympathetic nerve.

sympathetic image (*Photog.*). An image formed by rendering insoluble gelatine which has penetrated into a support of unsized paper.

sympathetic nervous system (*Zool.*). In Invertebrates, part of the visceral nervous system supplying the alimentary canal: in Vertebrates, a system of motor nerve-fibres supplying the smooth muscles and glands of the body, and originating from the spinal cord in the cervical, thoracic, and lumbar regions. Cf. *parasympathetic system.*

sympathetic reaction (*Chem.*). See **induced reaction.**

Sympet'alae (*Bot.*). A large subdivision of Dicotyledons in which the corollas consist of united petals.

sympet'alous (*Bot.*). Said of a corolla composed of a number of united petals; gamopetalous.

Sym'phala (*Zool.*). An order of small *Myriapoda* having twenty-five trunk somites and twelve pairs of legs; the head bears a pair of uniflagellate antennae, a pair of two-jointed mandibles, two pairs of maxillae, and a labium; the genital opening is anterior; small active animals feeding on insects.

sym'phile (*Zool.*). In a community of social Insects, especially Ants or Termites, a true guest species which is fed and reared by the members of the community.

symphysiot'omy, symphyseot'omy (*Surg.*). The operation of cutting through the pubic joint to facilitate the birth of a child.

sym'physis (*Zool.*). Union of bones in the middle line of the body, by fusion, ligament, or cartilage, as the mandibular symphysis, the pubic symphysis: growing together or coalescence of parts, as acrodont teeth with the jaw: the point of junction of two structures: chiasma: commissure.—*adj.* **symphys'ial.**

sym'plast (*Cyt.*). A multinucleate cell formed by fragmentation of the nucleus within a single energid.

symplec'tic (*Zool.*). In some Fish, a bone supporting the quadrate, formed by the ossification of the lower part of the hyomandibular cartilage.

sym'podite (*Zool.*). See **protopodite.**

sympo'dium (*Bot.*). A branch system in which the main axis ceases to elongate after a time, and one or more lateral branches grow on; these cease to grow and give laterals which repeat the process.

symptom (*Med.*). Evidence of disease or disorder as experienced by the patient (e.g. pain, weakness, dizziness): any abnormal sensation or emotional expression or thought accompanying disease or disorder of the body or the mind: less accurately, any objective evidence of disease or bodily disorder.

symptomatol'ogy (*Med.*). The study of symptoms: a discourse or treatise on symptoms: the branch of medical science which treats of the symptoms of disease.

syn-, sym- (Greek *syn*, with). A prefix used in the construction of compound terms; e.g. *syndactyl*, having fused digits; *syngamy*, fusion of gametes.

syn-aldoximes (*Chem.*). The stereo-isomeric forms of aldoximes in which the H and OH groups are on the same side of the plane of the double bond.

synan'drium (*Bot.*). A mass of united anthers.

synan'drous (*Bot.*). Having several united stamens.

synan'gium (*Bot.*). A group of sporangia united side by side.

synangium (*Zool.*). An arterial trunk from which several arteries arise, as the terminal portion of the truncus arteriosus in lower Vertebrates.—*adj.* **synan'gial.**

synap'osemat'ic (*Zool.*). Said of a form of protective mimicry in which there is resemblance to a powerful or dangerous species.

synapse' (*Zool.*). The mode of connexion of one nerve-cell with another by the interlacing of the terminal arborisations of their processes, or by the embracing of the cell body by the processes of another cell.

synap'sid (*Zool.*). Said of skulls having a single fossa only. Cf. *diapsid.*

synap'sis (*Cyt.*). Syndesis.

synap'tene (*Cyt.*). See **zygotene.**

synap'tic (*Zool.*). Pertaining to, or situated at, a *synapse* (q.v.).

synaptic mates (*Cyt.*). The pairs of homologous chromosomes which form a close association in synapsis.

synaptic'ula (*Zool.*). Transverse rod-like connecting structures, as skeletal rods connecting gill-bars in *Amphioxus* or septa in Corals.—*sing.* **synapticulum.**

Synap'tida (*Zool.*). An order of *Holothuroidea*, having pinnate buccal tube-feet without ampullae but with retractor muscles; there are no tube-feet on the trunk; respiratory trees are lacking; the madreporite is internal; burrowing forms.

synarthro'sis (*Zool.*). An immovable articulation, especially an immovable junction between bones. Cf. *amphiarthrosis, diarthrosis.*

Syncar'ida (*Zool.*). A division of *Crustacea* in which there are six abdominal somites and the thoracic limbs have a two-jointed protopodite; a carapace is lacking, the first thoracic somite is fused with the head and the protopodite of the antenna is two-jointed.

syn'carp (*Bot.*). A multiple fleshy fruit.

syncar'pous (*Bot.*). Said of a gynaeceum consisting of two or more united carpels.

syncar'yon (*Biol.*). See **synkaryon.**

syncer'ebrum (*Zool.*). In *Arthropoda*, a cerebral ganglionic mass formed by the fusion of one or more of the ventral ganglia with the true primary cerebron consisting of supraoesophageal ganglia only.

synchondro'sis (*Zool.*). Connexion of two bones by cartilage, usually with little possibility of relative movement.

synchromesh gear (*Automobiles*). A gear in which the speeds of the driving and of the driven members which it is desired to couple are first automatically synchronised by small *cone clutches* (q.v.) before engagement of the dogs or splines, thus avoiding shock and noise in gear-changing.

synchronisation (*Cinema.*). Linear adjustment of sound-track and mute in cutting rush-prints; also of the negatives, when the separate prints are required to be reproduced together, the reproduced sound fitting exactly with the accompanying motion pictures.—Colloquially abbreviated to SYNC, SINK.—*v.* **synchronise.**

synchronisation (*Television*). Adjustment of the line and frame frequencies in a receiver so as to coincide with those at the transmitter, and the keeping of them so adjusted.

synchronisation of oscillators (*Radio*). A phenomenon which occurs when two oscillators, having nearly equal frequencies, are coupled together. When the degree of coupling reaches a certain point, the two suddenly pull into step.

synchronising (*Elec. Eng.*). The operation of bringing a machine into synchronism with an a.c. supply.

synchronising gear (*Aero.*). A gear to control the firing mechanism of a gun, synchronising it with the rotation of the airscrew, so that the bullets may pass through the disc of revolution without meeting the blades.

synchronising impulse (*Television*). An impulse transmitted at the beginning and/or end of each frame and scanning line, to assist in synchronisation.

synchronising modulation (*Television*). The range of modulation depth reserved for the synchronising impulses, as distinct from that for the picture signal.

synchronising power (*Elec. Eng.*). The power developed in a synchronous machine that keeps it in synchronism with the a.c. supply system to which it is connected.

synchronising torque (*Elec. Eng.*). The torque which, at the synchronous speed, develops the power that keeps a synchronous machine in synchronism with the a.c. supply system to which it is connected.

synchronising valve (*Television*). A valve used for injecting the synchronising impulses into a time-base circuit.

synchronising wheel (*Television*). A rotating wheel, having a large moment of inertia, used for maintaining synchronism over the individual cycles of the frame and line frequency oscillators.

synchronism (*Elec. Eng.*). Two a.c. machines are said to be *in synchronism* when their respective speeds of rotation are such as to make their electrical frequencies identical.

synchronous (*Elec. Eng.*). Exhibiting the characteristic of synchronism.

synchronous-asynchronous motor (*Elec. Eng.*). A slip-ring type induction-motor whose rotor is fed from a d.c. exciter coupled to it. The machine operates asynchronously during starting-up, and runs on load as a synchronous motor.

synchronous booster (*Elec. Eng.*). An a.c. generator coupled to a synchronous convertor and having its armature connected in series with that of the convertor.

synchronous camera (*Cinema.*). A motion-picture camera which is driven by a synchronous motor. In one sound-film system all such cameras, including sound-cameras, are switched on to the normal a.c. mains. In another sound-film system they are switched to special mains excited by a generator; as this generator is started from rest, it brings all cameras up to their synchronous speed, while keeping them interlocked.

synchronous capacitor (*Elec. Eng.*). A preferable name for *synchronous condenser.*

synchronous capacity (*Elec. Eng.*). The synchronising power of an interconnector linking two a.c. power systems. It is defined as the change of kilowatts transmitted over the interconnector per radian change of angular displacement of the voltages of the two systems.

synchronous carrier system (*Radio*). Simultaneous broadcasting by two or more transmitters having the same carrier frequency, the various drive circuits being interlocked so as to avoid heterodyne beats between them.

synchronous condenser (*Elec. Eng.*). A lightly loaded synchronous motor supplying a leading current for power-factor correction.

synchronous convertor (*Elec. Eng.*). A synchronous machine for converting polyphase alternating current to direct current. It comprises a double-purpose armature, rotating within a salient-pole direct-current field system. More generally known as a ROTARY CONVERTOR.

synchronous generator (*Elec. Eng.*). A type of a.c. generator, driven at a constant speed corresponding to the particular frequency of the electrical supply required from it.

synchronous impedance (*Elec. Eng.*). The ratio of the open-circuit e.m.f. to the short-circuit current of a synchronous machine, both values having reference to the same field excitation.

synchronous induction motor (*Elec. Eng.*). An induction motor in which a direct current is passed into the rotor winding after it has run up to speed, so that, after starting as an induction motor (with a high starting torque), it runs as a synchronous motor.

synchronous machine (*Elec. Eng.*). An a.c. machine whose electrical frequency is independent of the load.

synchronous motor (*Elec. Eng.*). A type of a.c. motor whose speed of rotation remains fixed, irrespective of its mechanical output.

synchronous phase-modifier (*Elec. Eng.*). A large synchronous machine used solely for varying the power factor at the receiving end of a transmission line, in order to maintain the voltage constant under all conditions of loading.

synchronous reactance (*Elec. Eng.*). The vector difference between the synchronous impedance and the effective armature resistance of a synchronous machine.

synchronous spark gap (*Radio*). A *rotary spark gap* (q.v.) driven by a synchronous motor running from the same supply as that for the transformer furnishing the high voltage. Used in some forms of spark systems.

synchronous watt (*Elec. Eng.*). A unit of torque sometimes used in connexion with a.c. machines. It is defined as the torque which, at the synchronous speed of the machine, would develop a power of one watt.

syn'chroscope (*Elec. Eng.*). An instrument indicating the difference in frequency between two a.c. supplies.

synchy'sis (*Med.*). Abnormal softening and fluidity of the vitreous body of the eye.

syn'cline (*Geol.*). A flexure found in sedimentary rocks, the form of which is concave downwards.

sync'litism (*Med.*). The compensatory difference in the rates of descent of the anterior and posterior portions of the presenting foetal part in the pelvis during labour.

syncope, sing'kō-pe (*Med.*). A fainting attack or sudden loss of consciousness due to sudden anaemia of the brain, as a result of an unstable nervous system or of heart failure.

syncot'ylous (*Bot.*). Said of a seedling having united cotyledons.

syncot'yly (*Bot.*). The union of cotyledons.

syncra'niate (*Zool.*). Having vertebral elements fused with the skull.

syncrante'rian (*Zool.*). Having the teeth in a continuous row, with no gap between anterior and posterior sets, as some Snakes. Cf. *diacranteric*.

syncryp'tic (*Zool.*). Showing superficial resemblance through protective mimicry of surrounding objects, without any more fundamental relationship.

syncy'tium (*Zool.*). A multinucleate cell: a tissue complex in which there are many nuclei but no distinguishable cell walls, arising from division or concrescence of cells.—*adj.* **syncy'tial.**

syndac'tyl (*Zool.*). Showing fusion of two or more digits, as some Birds.—*n.* **syndac'tylism.**

syn'desis (*Cyt.*). In meiotic nuclear division, fusion of homologous chromosomes.

syndesmo'sis (*Zool.*). Connexion of two bones by a ligament, usually with little possibility of relative movement.

syn-diazo compounds (*Chem.*). The stereoisomeric forms of diazo compounds in which the groups attached to the nitrogen atoms are on the same side of the plane of the double bond.

syn'drome (*Med.*). A concurrence of several symptoms or signs in a disease which are characteristic of it: a set of concurrent symptoms or signs.

syne'chia (*Med.*). A morbid adhesion of the iris of the eye to the cornea or to the lens.

synech'thran (*Zool.*). In a community of social Insects (especially Ants or Termites), a scavenging or predatory species living within the community and arousing marked hostility.

syn'ecology (*Bot.*). The study of plant communities.

syn'ema (*Bot.*). A group of united filaments when the stamens in a flower are monadelphous.

Synentog'nathi (*Zool.*). An order of *Neopterygii* having a distinct lateral line, median fins far back, lower pharyngeals united into a single bone; some forms have the jaws elongated into a beak; mainly marine forms. Skippers, Gar-fishes, Needle-fishes, Half-beaks, Flying Fishes.

syner'esis (*Chem.*). The spontaneous expulsion of liquid from a gel.

syner'gic, synerget'ic (*Zool.*). Working together; said of muscles which co-operate to produce a particular kind of movement.

synergi'dae, syn'ergids (*Bot.*). Two naked cells which lie in the embryo sac at the end toward the micropyle, and appear to play some part in guiding the tip of the pollen tube towards the egg-nucleus.

syngam'eon (*Zool.*). A category of individuals based on the type of reproduction.

syngami'asis (*Vet.*). Infection of the trachea, bronchi, and lungs of birds by the nematode worm *Syngamus trachea*.

syn'gamy, *or* **—gam'i** (*Bot., Zool.*). Fusion of gametes.

syngene'sious (*Bot.*). Said of anthers which are united laterally so that they form a hollow tube around the style.

syngen'esis (*Zool.*). Sexual reproduction; reproduction distinguished by the fusion of male and female elements.—*adj.* **syngenet'ic.**

syngenet'ic (*Min.*). A category of ore bodies comprising all those which were formed contemporaneously with the enclosing rock. Cf. *epigenetic*, i.e. formed at some subsequent time.

syng'nathous (*Zool.*). (Of certain Fish) having the jaws fused to form a tubular structure.

syngy'nous (*Bot.*). Epigynous.

synize'sis (*Cyt.*). In meiotic prophase, contraction of the chromatin towards one side of the nucleus, obscuring the individual loops.

synkar'yon, syncar'yon (*Bot.*). A pair of nuclei in close association in a hyphal segment, and dividing at the same time to give daughter nuclei which associate in similar manner.—(*Zool.*) A zygote nucleus resulting from the fusion of two pronuclei.

syn'nema (*Bot.*). An erect bunch of hyphae.

synodic month (*Astron.*). The interval (amounting to 29.53059 days) between two successive passages of the moon through conjunction or opposition respectively; therefore, the period of the phases.

synodic period (*Astron.*). An interval of time between two similar positions of the moon or a planet, relative to the line joining the earth and sun; hence the time from one conjunction, opposition, or quadrature to another, and the period of the phases of the moon or a planet.

synoekete, sin-ē'kēt (*Zool.*). In a community of social Insects (especially Ants or Termites), an indifferently tolerated guest species living in the community without attracting notice.

synoi'cous (*Bot.*). Having antheridia and archegonia together in the same group, surrounded by an involucre.

synonym (*Bot., Zool.*). A systematic or proper name which has been superseded, or is, by the rules of nomenclature, not tenable.—*n.* **synon'ymy.**

synoptic chart (*Meteor.*). See **weather map.**

synosteo'sis (*Zool.*). Ankylosis.

synosto'sis (*Zool.*). A union between two bones which is so perfect that no trace of original separableness remains.

synotic tectum (*Zool.*). That part of the chondrocranium which forms a roof over the hind-brain between the otic capsules, and later ossifies in higher forms to form the supra- and exoccipitals.

syno'via (*Zool.*). In Vertebrates, a glairy lubricating fluid, occurring typically within tendon sheaths and the capsular ligaments surrounding movable joints.

synovial membrane (*Zool.*). The delicate connective tissue layer which lines a tendon sheath or a capsular ligament, and is responsible for the secretion of the *synovia* (q.v.).

synovip'arous (*Zool.*). Secreting synovia.

synovi'tis (*Med.*). Inflammation of the synovial membrane of a joint.

synsa'crum (*Zool.*) In Birds, part of the pelvic girdle formed by the fusion of some of the dorsal and caudal vertebrae with the sacral vertebrae.

syntech'nic (*Zool*.). Said of unrelated forms showing resemblance due to environmental factors; convergent.

synteno'sis (*Zool.*). Union of bones by means of tendons, as in the phalanges of the digits.

syn'thesis (*Photog.*). The realisation of the positive coloured image from three negatives registering the three component colours in the object.

synthetic music (*Acous.*). Freely composed music for silent-film accompaniment, recorded on gramophone discs so devised that terminations are not obvious.

synthetic resins (*Chem.*). Resinous compounds obtained by the condensation and polymerisation of certain substances, e.g. phenol and formaldehyde, phenol and furfural, formaldehyde and urea, glycerine and phthalic anhydride, etc. See **plastics.**

synthetic rubber (*Chem.*). A rubber-like compound obtained by the polymerisation of isoprene or its derivatives. See **Buna, Neoprene*.**

synthetic ruby, synthetic sapphire (*Min.*). In chemical composition and in all their physical characters, including optical properties, these stones are true crystalline ruby or sapphire; but they are produced in quantity in the laboratory by fusing pure precipitated alumina with the predetermined amount of pigmentary material. They can be distinguished from natural stones only by the most careful expert examination.

synthetic spinel (*Min.*). See **spinel (synthetic).**

synthetic stop (*Acous.*). In an organ, the production of low-pitched notes by sounding two low notes together with a musical interval of a fifth, the impression of the desired difference-tone being subjective.

synthetic tone (*Acous.*). Musical tone built up from its partials, as contrasted with a tone produced *ad hoc* from a musical instrument.

syntonic jars (*Radio*). Two similar Leyden jars each fitted with a spark-gap and equal lengths of conductor for connecting thereto. When one of the jars is charged and then discharged across the gap, a spark appears at the gap connected to the other jar. Used by Lodge to demonstrate the principle of tuning or syntony.

syn'tonins (*Chem.*). Acid *infraproteins* (q.v.).

syn'tony (*Radio*). An obsolescent term expressing the possession of a common resonance frequency by two or more circuits.

synu'sia (*Bot.*). An ecological unit based on the life-forms of the plants growing in company.

syph'ilide, syph'ilid (*Med.*). Any skin affection caused by syphilis. Also SYPHILODERM, SYPHILODERMA.

syph'ilis (*Med.*). A contagious venereal disease due to infection with the micro-organism *Spirochaeta pallida* (*Treponema pallidum*); contracted in sexual intercourse, by accidental contact, or (by the foetus) from an infected mother.

syphilit'ic (*Med.*). Pertaining to, caused by, or affected with syphilis: a syphilitic person.

syph'iloderm, syphiloder'ma (*Med.*). See **syphilide.**

syphilo'ma (*Med.*). A syphilitic tumour. See **gumma.**

Syracuse Salt Series (*Geol.*). The chief salt-bearing members of the Salinian of southern Michigan and the adjacent areas.

Syrian garnet (*Min.*). A trade name for almandine garnet, of gemstone quality.

syringi'tis (*Med.*). Inflammation of the Eustachian tube.

syrin'gium (*Zool.*). In some Insects, a tubular structure for the ejection of repellent liquid.—*adj.* **syrin'gial.**

syringobul'bia (*Med.*). A disease characterised by increase of neuroglia and the presence of cavities in the medulla oblongata, giving rise to such nervous phenomena as paralysis of the palate, pharynx, and larynx. See also **syringomyelia.**

syringomye'lia (*Med.*). A chronic, progressive disease of the spinal cord in which increase of neuroglia and the formation of irregular cavities cause paralysis and wasting of muscles and loss of skin sensibility to pain and to temperature.—See also **syringobulbia** (i.e. syringomyelia affecting the medulla oblongata).

syringomy'elocele (*Med.*). A form of spina bifida in which the part protruding through the defective spinal column consists of the greatly distended central canal of the spinal cord.

syr'inx (*Med.*). A fistula, or a fistulous opening.—(*Zool.*) (1) The vocal organs in Birds, situated at the posterior end of the trachea.—(2) A portion of the internal skeleton of certain Brachiopods.—*pl.* **syrin'ges.**—*adj.* **syrin'geal.**

systal'tic (*Zool.*). Alternately contracting and dilating; pulsatory; as the movements of the heart; cf. *peristaltic*.—*n.* **systal'sis.**

system (*Biol.*). (1) An assemblage of structures or parts composed of similar tissues, e.g. the *osseous system*.—(2) A collection or set of organs which concur in some particular function, e.g. the *digestive system*.—(3) In *Urochorda*, a colony of individuals possessing a common cloaca, e.g. *Botryllidae*.—(4) A method or scheme of classification, e.g. the *Linnaean system*.—(5) A systematic treatise on the animal or plant kingdom, or any part of either.—*adj.* **systematic.**

system (*Chem.*). Any portion of matter which is either in fact or in imagination isolated from other matter.

system (*Elec. Eng.*). A general term covering the entire complex of apparatus involved in the transmission and distribution of electric power.

system (*Geol.*). (1) The name given to the succession of rocks which were formed during a certain period of geological time, e.g. *Jurassic System*.—(2) A term applied to the sum of the phases which can be formed from one or more components of minerals under different conditions of temperature, pressure, and composition.

systems of crystals (*Crystal.*). The seven large divisions into which all crystallising substances can be placed, viz. cubic, tetragonal, hexagonal, trigonal, orthorhombic, monoclinic, triclinic. This classification is based on the degree of *symmetry* (q.v.) displayed by the crystals

systematic errors. Errors which are always in the same direction, i.e. errors which are always positive or always negative. Sometimes known as CUMULATIVE ERRORS.

systematics (*Biol.*). The branch of Biology which deals with classification and nomenclature.

system'ic (*Zool.*). Pertaining to the body as a whole, not localised; as the *systemic circulation*.

systemic arch (*Zool.*). In Vertebrates, the main vessel or vessels carrying blood from the heart to the body as a whole.

systemic heart (*Zool.*). In Birds and Mammals, the auricle and ventricle of the left side of the heart, which supply blood to the body generally. Cf. *respiratory heart*.

systemic infection (*Bot.*). The condition when a parasitic fungus perennates in the perennial parts of its host, and passes from them into the new shoots developed during each season of growth.

systole, sis'tō-le (*Bot.*, *Zool.*). Rhythmical contraction (as of the heart, or of a contractile vacuole).—(*Cyt.*) Collapse of the nucleus and outflow of nuclear material into the cytoplasm during mitosis, due to dissolution of the nuclear membrane. Cf. *diastole*.

systrophe, sis'trŏf-e (*Bot.*). Clumping of chloroplasts when exposed to very bright light.

sys'tyle (*Build.*). A colonnade in which the space between the columns is equal to twice the lower diameter of the columns.

syzygy, siz'i-jē (*Astron.*). A word (derived from the Greek *syzygia*, close union) applied to the moon when in conjunction or opposition.—(*Zool.*) An association of gregarine individuals adhering in strings: in *Crinoidea*, a close suture of two adjacent brachials.—*adj.* **syzyg'ial.**

Szer'elmey's Stone Liquid (*Build.*). Trade-name for a preserving agent for building-stones.

***t*- (*Chem.*).** An abbrev. for (1) *trans*-, i.e. containing the two radicals on opposite sides of the plane of a double bond or alicyclic ring; (2) *tertiary*, i.e. substituted on a carbon atom which is linked to three other carbon atoms.

τ (*Chem.*). A symbol for a time interval, especially half, or mean, life.

T (*Chem.*). With subscript, a symbol for *transport number*.

***T*- (*Chem.*).** A symbol indicating the presence of a triple bond which begins on the corresponding carbon atom.

T-antenna (*Radio*). An antenna comprising a top conductor with a vertical downlead attached at the centre.

T-beam (*Civ. Eng.*). A beam forming part of the construction of a reinforced concrete floor; regarded as being composed of the beam part projecting below the floor slab, and portions of the floor slab on both sides, which are counted in with the compressional flange area, the whole having the form of a letter T.

T-bolts (*Eng.*). Bolts having a head in the form of a short cross-piece; used to hold work on a machine table in conjunction with corresponding T-slots into which the heads are dropped and secured by turning through 90°. Also TEE-BOLTS.

T-iron (*Civ. Eng.*) A structural member of wrought-iron or rolled steel having a T-shaped cross-section.

T-network (*Elec. Comm.*). See **Y-network.**

T-rest (*Eng.*). A T-shaped rest clamped to the bed of a wood-turning lathe for supporting the tool. Also TEE-REST. See **L-rest.**

T-section (*Elec. Comm.*). An electrical network consisting of a series arm, a shunt arm, and another series arm equal to the first series arm.

T-wire (*Teleph.*). The tip-wire connected to the tips of the plugs which terminate the cords of an operator's cord-circuit, and which eventually connect with the A-wire of the subscriber's line.

Ta (*Chem.*). The symbol for *tantalum*.

tab (*Aero.*). The rear portion of a control surface when it is pivoted on a hinge, its position being either automatically controlled or separately controlled, if necessary with a servo device.

tabs (*Cinema.*). Light-weight curtains on a cinema stage, between the screen and the main curtains; operated with the latter or independently.

tabashir, tabasheer, tab'a-shēr (*Bot.*). A mass of silica found in the stems of bamboos.

tabby weave (*Textiles*). See **plain weave.**

ta'bes dorsa'lis (*Med.*). Locomotor ataxia (**ataxy**). A disease of the nervous system marked by attacks of pain in the legs, anaesthesia of certain areas of the skin, ataxia, loss of the pupil reflex to light, and other nervous affections; due to degenerative changes in the nerves, especially of the sensory roots of the spinal cord, as a late result of syphilis.

tabes mesenter'ica (*Med.*). Tuberculous infection of the lymphatic glands in the abdomen, causing enlargement of the abdomen, diarrhoea, anaemia, wasting of the body, and weakness.

tabes'cent (*Bot.*). Shrivelling.

tabet'ic (*Med.*). Pertaining to, affected by, or caused by tabes dorsalis: a person affected by tabes dorsalis.

table (*Carp.*). See **coak.**

table (*Jewel.*). The flat top of a table-cut stone. The table is surrounded by bevelled edges or step-cut facets.

tablet (*Acous.*). A tilting key for operating stops on the console of an organ, with or without illuminated indication of position.

tablet (*Plastics*). A piece of moulding composition of the correct weight and density, and of suitable diameter and thickness to fit the mould; it is not preformed to the approximate shape of the moulding.

tabling (*Carp.*). The operation of shaping a *coak* (q.v.).

tabopare'sis, taboparal'ysis (*Med.*). General paralysis of the insane and tabes dorsalis affecting the same person.

tab'ula (*Zool.*). In *Hydrocorallinae* and certain Corals, a horizontal calcareous partition completely shutting off the lower part of the polyp cup. Cf. *dissepiment*.

tabular (*Bot., Geol., Min.*). Horizontally flattened.

tabular spar (*Min.*). See **wollastonite.**

tabular'e (*Zool.*). A paired membrane bone of the skull in some Vertebrates, lying above the otic capsule and sometimes erroneously termed the *epiotic*.

tach-, tachy- (Greek *tachys*, swift). A prefix used in the construction of compound terms; e.g. *tachycardia* (q.v.).

tacheom'eter, tachym'eter (*Surv.*). An instrument which measures distance from any given point by telescopic observation of a staff held at the point, the length of the staff seen between two fixed reference hairs in the telescope being multiplied by a factor to give distance. See **additive constant, multiplying constant.**

tacheom'etry (*Surv.*). The process of surveying and levelling by means of angular measurements from a known station, combined with determination of distances from the station by the use of hairs or lines in the instrument, reading on a known base held at the point whose distance is required.

tachom'eter (*Eng.*). An instrument for indicating the revolutions per minute of a revolving shaft; it has a hand moving over a graduated scale, operated either by a spring-controlled ring pendulum or by magnetic means.

tachomet'ric electrometer (*Elec. Eng.*) An electrometer for measuring very small currents; it is kept at a fixed reading by compensating for its loss of charge by supplying it with charges from a condenser, these being controlled by a variable-speed motor, the speed of which is observed.

tachycardia (*Med.*). Frequent action of the heart, beyond the normal rate.

tachygen'esis (*Zool.*). Accelerated development with elimination of certain embryonic stages, as in some Caecilians, in which the free-living tadpole stage is suppressed.—*adj.* **tachygenet'ic.**

tach'ylite, tach'ylyte (*Geol.*). A black glassy igneous rock of basaltic composition, which occurs as a chilled margin of dykes and sills. In Hawaii it forms the bulk of certain lava-flows.

tachymeter (*Surv.*). See **tacheometer.**

tachypnoea, tachypnea, tak-ip-nē'a (*Med.*). Excessive frequency of respiration.

tachyspo'rous (*Bot.*). Said of a plant which liberates its seeds quickly.

tack (*Build.*). A small clout nail.

tacky (*Paint.*). Said of paint or varnish which has not quite dried and is in a sticky condition.

Tacon'ic revolution (*Geol.*). A period of intense folding which affected the eastern parts of N.

America at the end of the Ordovician period. The effects are best seen in the Taconic Mts. on the borders of New York State and Massachusetts.

tactile (*Zool.*). Pertaining to the sense of touch.

tactile bristle (*Bot.*). A stiff hair which transmits a contact stimulus.

tactile perception (*Acous.*). The perception of vibration by the sense of touch; developed particularly in deaf persons, who can be trained to detect and interpret vibrations in another person's larynx, or to interpret vibrations applied selectively to their fingers by vibrators operated through filters by a microphone.

tactile pit (*Bot.*). A sharply defined area of thin cell wall in an epidermal cell of a tendril, which appears to be concerned in the perception of pressure.

tae'nia (*Zool.*). A ribbon-shaped structure; as the *taenia pontis*, a bundle of nerve fibres in the hind-brain of Mammals.

taeni'asis (*Med.*). The state of infestation of the human body with tape-worms (*Taenia*), which as adults may inhabit the intestine and as larvae the muscles and other parts of the body.

taenid'ia (*Zool.*). Thickenings of the *endotrachea* (q.v.) which keep the trachea distended and generally take the form of a spiral thread.—*sing.* **taenidium.**

taenio'les (*Zool.*). The ribbon-shaped longitudinal gastric ridges of a scyphula.

taenite (*Min.*). A solid solution of iron in nickel occurring in iron meteorites; it appears as bright white areas on a polished surface.

taf'feta (*Textiles*). A light-weight fabric of plain weave, usually produced from silk or rayon yarns; also made in cotton and worsted. Usually it has a stripe or check pattern. Used for blouses and shirts.

taffrail log (*Ships*). See **log (nautical).**

taft joint (*Plumb.*). A joint between the ends of two lengths of lead pipe, one of which is rasped to a smaller size so as to fit into the opened-out end of the other, the whole being soldered with a blowlamp.

tag block (*Elec. Comm.*). The terminal block, holding varying numbers of double-ended soldering tags, which is fitted to every panel of apparatus and supported on standard apparatus racks. The external wiring to the unit can then be connected without interference with the internal wiring, which is completed during manufacture. The external connexions to bays of apparatus are also made to tag blocks mounted at the top of the racks.

tag'atose (*Chem.*). A ketohexose.

tagma (*Zool.*). A distinct region of the body of a metameric animal, formed by the [illegible] or fusion of somites; as the thorax of an Insect.—*pl.* **tag'mata.**

tagmo'sis (*Zool.*). In a metameric animal, the grouping or fusion of somites to form definite regions; as the head, thorax, and abdomen of an Insect.

tail (*Aero.*). The hindmost horizontal unit of an aeroplane. Also EMPENNAGE.

tail (*Bind.*). The bottom or foot margin (e.g. of a page or volume).

tail (*Masonry*). That end of a stone step which is built into a wall.

tail, tails (*Mining*). American terms for *tailings* (q.v.).

tail (*Zool.*). See **cauda.**

tail-bay (*Build.*). The space under a floor, between the end binder and the wall.

tail-bay (*Hyd. Eng.*). The part of a canal lock immediately below the tail gates.

tail beam (*Carp.*). A floor joist which at one end is framed into a trimmer.

tail fin (*Aero.*). See **fin.**

tail-gates (*Hyd. Eng.*). The gates at the low-level end of a lock.

tail heaviness (*Aero.*). The state in which the combination of forces acting upon an aircraft in flight is such that it tends to pitch downwards by the tail.

tail joist (*Carp.*). A *tail beam* (q.v.).

tail plane (*Aero.*). See **plane.**

tail race (*Hyd. Eng.*). A channel conveying water away from a hydraulically operated machine.—(*Mining*) The launder or trough for the discharge of water-borne tailings.

tail skid (*Aero.*). That part of the alighting gear taking the weight of the rear end of the aeroplane when on the ground. It carries a wheel, shoe, or claw, depending upon the take-off and landing characteristics of the machine.

tail-stock (*Eng.*). A casting mounted slidably on a lathe bed. It carries a spindle in true alignment with the centre of the head-stock, longitudinally adjustable by a handwheel, and coned internally to receive a hardened dead centre. See **lathe.**

tail trimmer (*Carp.*). A trimmer close to a wall, used in cases where it is not desired to build the joists into the wall.

tailed (*Bot.*). Bearing a long slender point.

tailing, — in, — down (*Build.*). The operation of building in and fixing the end of a member which projects from a wall.

tailing iron (*Build.*). A steel section built into a wall, across the top of the encastered end of a projecting member.

tailings (*Mining*). (1) The rejected portion of an ore; waste.—(2) The portion washed away in water concentration.

take (*Cinema., Television*). The unit of registration technique in shooting sound-film or transmitting television images. A number of *takes* are separate samples of the same shot, the best *take* being selected for the final sequence in sound-film production. Each *take* therefore corresponds to a continuous sequence in the rushes.

take-off sprocket wheel (*Cinema.*). The sprocket which accepts the film after it has come off the constant-speed drive sprocket, or impedance wheel. This is driven synchronously, and protects the constant-speed drive from the pull on the film exerted by the take-up reel.

take-up, take-up reel (*Cinema.*). The drive and the reel which is necessary to accept the cinematograph film after exposure in the gate of a camera or projector. It is driven through a friction drive, so that adequate tension is maintained in pulling the film from the take-off sprocket wheel.

taking-off (*Build., Civ. Eng.*). The first process involved in drawing up a bill of quantities. It consists of measuring the various dimensions of each item on the drawing, and entering them in a systematic manner on sheets specially ruled for the purpose.

Talbot process (*San. Eng.*). An anti-corrosion process applied to cast-iron pipes; they are coated internally with a mixture of bitumen and a hard siliceous material, which is distributed over the surface by centrifugal action.

talc (*Min.*). An acid metasilicate of magnesium, $H_2Mg_3SiO_{12}$, which crystallises in either the orthorhombic or monoclinic system. It is usually massive and foliated and is a common mineral of secondary origin associated with serpentine and schistose rocks. See **steatite.**

tali-, talo- (Latin *talus*, ankle-bone, astragalus). A prefix used in the construction of compound terms; e.g. *talocalcaneal*, pertaining to the astragalus and the calcaneum.

talipes, tal'i-pēz (*Med.*). Club-foot. A general term for a number of deformities of the foot:

TALIPES CALCANEUS, in which the toes are drawn up from the ground and the patient walks on the heel; TALIPES EQUINUS, in which the heel is drawn up and the toes point downwards; TALIPES EQUINOVARUS, in which the foot is inverted and turned inwards, with the toes pointing down; TALIPES VALGUS, in which the foot is abducted and everted, so that the patient walks on the inner side of the foot.

talk-back (*Cinema.*). The same as *speak-back*.

tall-boy (*Build.*). A fitting added to the top of a chimney to prevent down-draught.

tallboy (*Furn.*). A tall, narrow chest-of-drawers, usually in two sections.

tally (*Surv.*) A brass tag attached to a chain at every tenth link, and so marked or shaped as to enable the position of the tally along the chain to be immediately read. Also called a TELLER.

talon (*Arch.*). An ogee moulding.

talon (*Zool.*). A sharp-hooked claw, as that of a bird of prey.

tal'ose (*Chem.*). An aldohexose.

ta'lus (*Civ. Eng.*). An earthwork or batter wall slope.

talus (*Geol.*). See **scree.**

talus (*Zool.*). A synonym for *astragalus.*—*pl* **tali.**

talus wall (*Masonry*). A wall the face of which is built to have a batter.

Tamasopo Limestone (*Geol.*). The chief member of the oil-bearing strata in the Mexican oil-fields; of Lower to Middle Cretaceous (Washita to Cenomanian) age; includes the Escamela Limestone above and the Maltrata Limestone below.

tambour (*Furn.*). A panel of slat-work or pleated textile material.

tambour lace (*Textiles*). An embroidery on net or muslin; a variety of Limerick lace.

tamp (*Civ. Eng., Mining*). (1) To fill a charged shot-hole with clay or other stemming material to confine the force of the explosion. See **stemming.**—(2) To ram or pound down ballast on a railway track, or road-metal. See also **punning.**

tampin (*Plumb.*). A conical plug of boxwood used in opening out the end of a lead pipe.

tampon (*Surg.*). A plug or packing made of gauze, cotton-wool, and the like, for insertion into orifices or cavities (especially the vagina and uterus) for the control of haemorrhage, the removal of secretions, or the dilating of passages.

tamponade' (*Surg.*). The surgical use of the tampon.

tan liquor (*Leather*). A solution of tanning materials, prepared for the tanyard by grinding the materials and macerating them with water. The liquor may be strengthened as desired by the addition of tanning extracts. See **leaching, tannins.**

Tanaida'cea (*Zool.*). An order of *Peracarida* in which the carapace is coalesced dorsally with the first two thoracic somites, the eyes, when present, are on short immovable stalks, and the uropods are slender; small marine forms most of which burrow in mud.

tandem connexion (*Elec. Eng.*). An obsolescent term for *cascade connexion.*

tandem engine (*Eng.*). An engine in which the cylinders are arranged axially, or end to end, with a common piston-rod.

tandem knife switch (*Elec. Eng.*). A switch in which two or more blades are mechanically coupled in order to operate simultaneously as a multiple-pole switch.

tandem selection (*Auto. Teleph.*). Selection of outlets by two uniselectors in series, so that the maximum possible availability of outlets is obtained.

tandem selector (*Auto. Teleph.*). A selector for routing calls over junctions.

tandem working (*Teleph.*). The using of an intermediate exchange during the transition period when a manual system is being converted to automatic working. Working is effected by trains of impulses which are set up on key senders on instructions from A-operators in originating exchanges. See also **automatic tandem working.**

tang (*Carp., Join., etc.*). The end of a tool which is driven into or about its haft. See **socket chisel.**

tangent distance (*Surv.*). The distance between the intersection point and one of the tangent points of a railway or highway curve.

tangent galvanometer (*Elec. Eng.*). A galvanometer in which a small magnetic needle is pivoted at the centre of a large circular coil, and in which the current varies as the tangent of the angle of deflection.

tangent point (*Surv.*). The point of commencement, or of termination, of a railway or highway curve.

tangent scale (*Elec. Eng.*). The scale of an electrical instrument in which the measured quantity varies as the tangent of the angle of deflection.

tangent screw (*Surv.*). A screw by which a fine adjustment may be made to the setting of an instrument about its axis, either in order to bring the line of sight into coincidence with a signal, or to adjust the vernier reading to a given value.

tangential keys (*Eng.*). A pair of keys fitted in such a way that one side is entirely sunk in the shaft and the other in the hub, the two keys facing in opposite directions; used for heavy drives. See **key.**

tangential longitudinal section (*Bot.*). A section taken along the length of a plant member, parallel to a tangent to its surface.

tank (*Cinema.*). Colloquialism for a portable camera booth used in motion-picture production.

tank (*Mil.*). An armoured motor vehicle propelled by tractors and mounted with guns.

tank (*Photog.*). The receptacle for solutions in the development of films, particularly when these are held in a rack or frame.

tank circuit (*Radio*). The oscillatory circuit (inductance and condenser) in a thermionic oscillator or amplifier in a radio transmitter.

tank development (*Photog.*). The process of cinematograph development which uses tanks into which the film, wound on racks, is immersed.

tank furnace (*Glass*). Essentially a large 'box' of refractory material holding from 6 to 200 tons of glass, through the sides of which are cut 'ports' fed with a combustible mixture (producer gas and air, coke-oven gas and air, or oil spray and air), so that flame sweeps over the glass surface. With the furnace is associated a regenerative or recuperative system for the purpose of recovering part of the heat from the waste gases.

tanker (*Ship Constr.*). A term covering all types of ships carrying liquid in bulk, from light acids and oils to molasses and latex.

tannic acid (*Chem.*). See **tannin.**

tannin (*Chem.*). A mixture of derivatives of polyhydroxy-benzoic acids. When pure it forms a colourless amorphous mass, easily soluble in water, of bitter taste and astringent properties. Occurs in many trees. The best source for the production of pure tannic acid is the gall formed on certain oak trees. Tannin is used for tanning leather because it has the property of precipitating gelatin and forming an insoluble compound. For fancy leathers, sumach is extensively used. Also called TANNIC ACID or GALLO-TANNIN.

tannin sac (*Bot.*). A cell containing much tannin.

tanning (*Leather*). Any of the processes by which skins and hides are converted into leather, viz. (1) the use of vegetable tanning materials; (2)

impregnation with various mineral salts; (3) treatment with oils and fats. See **tawing, leather, soaking, liming, leaching, tannin, scudding, shaving, handlers, layers.**

tanning (*Photog.*). Development which causes differential hardening or insolubility in emulsions, according to the extent of the reduction of silver consequent on exposure.

tan'talite (*Min.*). Tantalate of iron and manganese, crystallising in the orthorhombic system. It usually has an admixture of the niobate of iron and manganese and the mineral passes from the pure tantalate (tantalite) to the pure niobate (columbite). In some varieties (manganotantalite) the iron is replaced by manganese. It commonly occurs in pegmatite veins, and is used for the filaments of electric lamps and as a source of tantalum.

tan'talum (*Met.*, *Min.*). A metallic element in the fifth group of the periodic system. Chem. symbol, Ta; at. wt. 181·4, at. no. 73, sp. gr. at 20° C., 16·6, m.p. 2910° C. Specific electrical resistivity, 15·5 microhms per cm. cub., Brinell hardness, 46. Occurs in crystals and grains (usually containing, in addition, small amounts of niobium) in the Ural and Altai Mts., and is used as a substitute for platinum for corrosion-resisting laboratory apparatus, as acid-resisting metal in chemical industry, and in the form of carbide in cemented carbides.

tap (*Eng.*). A screwed plug of accurate thread, form, and size, on which cutting edges are formed by longitudinal grooves; screwed into a hole by hand or power, to cut an internal thread.

See **plug— second— taper—**

tap-field control (*Elec. Eng.*). A method of controlling the speed of a series motor; the field excitation is varied by means of tappings on the field windings.

tap-field motor (*Elec. Eng.*). A series motor whose field windings are arranged for tap-field control.

taproot (*Bot.*). A strongly developed main root which grows vertically downwards and normally bears lateral roots much smaller than itself.

tape (*Build.*, *Surv.*). A long flexible measuring scale of thin strip steel, linen, or linen in which wire is interwoven to increase its strength, coiled up in a circular leather case fitted with a handle for winding purposes.

tapes (*Bind.*). See **bands.**

tape condenser (*Spinning*). A mechanism used to convert the web of fibres from the doffer of a carding engine into a number of slivers. Leather tapes and rubbing rollers perform the action.

tape machine (*Elec. Comm.*). A telegraph printing-machine producing a tape on which news or stock prices are printed by signals sent over a line from a central news agency.

taper key (*Eng.*). A rectangular key having parallel sides, but slightly tapered in thickness along its depth. See **key.**

taper-loaded cable (*Teleg.*). Submarine cable in which the continuous loading is effectively reduced towards the ends of the cable but is uniform for the centre length.

taper pipe (*Plumb.*, *San. Eng.*, *etc.*). A pipe of diminishing diameter, serving to connect pipes of different diameters.

taper roller bearing (*Eng.*). A roller bearing rendered capable of sustaining end thrust by the use of tapered rollers, in conjunction with internally and externally coned races.

taper slots (*Elec. Eng.*). Slots in an armature core in which the intervening teeth have parallel sides.

taper tap (*Eng.*). The first tap used in threading a hole. The first few threads are ground down to the core diameter to provide a guide, gradually increasing to the full thread size. See **tap, plug tap, second tap.**

tapering (*Bot.*). Said of a leaf base which becomes gradually narrowed towards the petiole.

tapering gutter (*Build.*). A parapet gutter having an increasing width in the direction of flow, so as to secure the necessary fall.

tapestry (*Textiles*). Formerly, a hand-woven fabric in which a design was produced by stitches across the warp; now the term is also applied to machine-made imitations of the hand-made fabrics.

tapestry brick (*Build.*). A rustic brick. See **rustics.**

tape'tal (*Bot.*). Relating to the tapetum.

tapetal plasmodium (*Bot.*). A multinucleate mass formed by the breakdown of the cell walls between the cells of a tapetum.

tape'tum (*Bot.*). A layer of cells surrounding a mass of spore mother cells, which finally breaks down and contributes material which is used in the nutrition of the developing spores.

tapetum (*Zool.*). In the eyes of certain night-flying Insects, a reflecting structure: in some Vertebrates, a reflecting layer of the retinal side of the choroid: in the Vertebrate brain, a tract of fibres in the corpus callosum.

tap'iolite (*Min.*). Niobate and tantalate of iron and manganese. This really forms a variable series of minerals that may be considered as dimorphous with the columbite-tantalite series. The various molecules have been named *tapiolite* (tantalate of iron), *mossite* (niobate of iron), and *ixiolite* (tantalate of manganese). The minerals crystallise in the tetragonal system.

tapper (*Radio*). An electro-mechanically operated *decoherer* (q.v.) in the form of a light hammer, which taps the coherer tube after the arrival of a signal.

tappet (*Eng.*). A sliding member working in a guide; interposed between a cam and the push rod or valve system which it operates, to eliminate side thrust on the latter.

tappet (*Weaving*). See **wiper.**

tapping (*Elec. Eng.*). A connexion taken to an intermediate joint on a winding.

tapping (*Eng.*). The operation of forming a screw-thread in a hole by means of taps, the tapping size of the hole corresponding to the core diameter of the thread.

tapping (*Met.*). The operation of running molten metal from a furnace into a ladle.

tapping (*Surg.*). See **paracentesis.**

tar (*Chem.*). See **coal-tar.**

tarmacadam (*Civ. Eng.*). A road surfacing formed of broken stone which has been covered with tar; spread in a layer of uniform thickness and well rolled. Two layers are usually applied, the upper one being of stone of smaller size.

Tarannon Shales (*Geol.*). A succession of shales, found in Wales, and belonging to the Upper Llandovery Series. They constitute part of the lower rocks in the Silurian System.

tar'buttite (*Min.*). The basic phosphate of zinc, which crystallises in the triclinic system. The crystals are often found in sheaf-like aggregates. It occurs at Broken Hill and in North-West Rhodesia.

Tardigra'da (*Zool.*). A class of minute cryptozoic *Arthropoda* with a reduced head and no specialised respiratory system; the mouth-parts are suctorial, and the only appendages are four pairs of uniramous clawed legs; common forms, of wide distribution, found among moss and debris in ditches and gutters and on tree trunks, etc.

target (*Thermionics*). Any electrode or surface upon which electrons impinge at high velocity, e.g. the fluorescent screen of a cathode ray tube, or any of the intermediate electrodes in an electron multiplier.

target diagram (*Elec. Eng.*). A diagram for estimating the uniformity of a batch of electric lamps; obtained by plotting candle-power against watts for each lamp. The more uniform the lamps under test the more closely together will the plotted points lie in the diagram.

target rod (*Surv.*). A type of levelling staff provided with a sliding target, which can be moved by the staffman, under direction from the leveller, to a position in which it is in line with the line of sight of the level, the staff reading being recorded by the staffman.

tarnish (*Chem.*). The discoloration produced on the surface of an exposed metal, generally as the result of the formation of an oxide or a sulphide film.

tars-, tarso- (Greek *tarsos*, the sole of the foot). A prefix used in the construction of compound terms in connexion with the tarsus or tarsals; e.g. *tarsophalangeal*, pertaining to the tarsals and the phalanges.

tarsal (*Zool.*) One of the bones composing the *tarsus* (q.v.) in Vertebrates. Also TARSA'LE (*pl.* TARSA'LIA).

tarsal glands (*Zool.*). See **Meibomian glands.**

tarsal'gia (*Med.*) Pain in the instep of the foot.

tarsia (*Dec.*) Wood inlay, of geometric or architectural patterns, in which comparatively large pieces of naturally coloured or dyed wood are used.

tarsometatar'sus (*Zool.*). In Birds, a bone formed by the fusion of the distal row of tarsals with the metatarsals.

tarsus (*Zool.*). (1) In *Vertebrata*, an elongate plate of dense connective tissue which supports the eyelid.—(2) In *Insecta*, *Myriapoda*, and some *Arachnida* (as Mites), the terminal part of the leg, consisting typically of five joints: in land *Vertebrata*, the basal podial region of the hind limb; the ankle.—*adj.* **tarsal.**

tartar emetic (*Chem.*). Potassium antimonyl tartrate, $2[\text{K SbO C}_4\text{H}_4\text{O}_6]\cdot\text{H}_2\text{O}$. In addition to its use as an emetic, it is an important mordant in dyeing, and is used, intravenously, as a remedy in bilharziasis.

tartar'eous (*Bot.*). Said of the surface of a lichen when it is rough and crumbly.

tartar'ic acid (*Chem*). HOOC·CH(OH) CH(OH) COOH, dihydroxy-succinic acid. It exists in four modifications, viz. *d*-tartaric acid, m.p. 170° C.; *l*-tartaric acid, m.p. 170° C.; *racemic* or *dl*-tartaric acid, m.p. 206° C.; *meso*tartaric acid, m.p. 143° C. The *d*-tartaric acid is found in nature, free and as salts of potassium, calcium, and magnesium. It occurs in a large number of plants and fruits, the acid potassium salt is deposited from wine.

tar'trates (*Chem.*). The salts of tartaric acid. They are extensively used in medicine, the potassium salts and Rochelle salt as saline purges.

tarus (*Build.*). A cylindrical projection along the intersection between the two sloping roof surfaces on one side of the ridge of a mansard roof.

tarviated (*Civ. Eng.*). A term applied to macadam road surfacings in which the stone is bound together with tar.

T.A.S. (*Aero.*). Abbrev. for *true air speed* or *air speed* (q.v.).

tas'manite (*Geol.*). A type of practically pure spore coal; a variety of cannel coal.

tassement polaire, tas-mahn^g pō-lär' (*Bot.*). The formation of a dense mass by the chromosomes at the poles of the spindle, as telophase comes on.

taste-bud (*Zool.*). In Vertebrates, an aggregation of superficial sensory cells subserving the sense of taste; in higher forms, usually on the tongue.

taur'ine (*Chem.*). $\text{H}_2\text{N}\cdot\text{CH}_2\cdot\text{CH}_2\cdot\text{SO}_3\text{H}$, aminoethylsulphonic acid; m.p. 240° C., with decomposition. Found in the animal body, in ox-gall, etc.

Taurus (*Astron.*). Bull. Second sign of the *Zodiac* (q v).

tautom'erism (*Chem*). The existence of a substance as an equilibrium mixture of two interconvertible forms, usually because of the mobility of a hydrogen atom. Thus tautomeric compounds can give rise to two series of derivatives.

taut'onym (*Bot., Zool*). A name in which the specific epithet is a repetition of the generic name.

Tawara's node (*Zool.*). A plexiform mass of very small muscle fibres on the septal wall of the right auricle in Mammals.

tawing (*Leather*). The process by which lamb, kid, and deer skins are tanned. After soaking, liming, and bating, the skins are drummed with a paste consisting of alum, flour, salt, and egg yolk (or olive oil). Tawed leathers are white and are used for gloves, etc.; they are brush-dyed on the grain side, if necessary.

tawny (*Bot*). Dark-brownish yellow.

taxeop'odous (*Zool.*). Having the proximal and distal tarsal bones in straight lines parallel with the axis of the limb, as some *Ungulata.*

taxi (*Aero*). (Of an aircraft) to travel under its own power, while in contact with the earth.

tax'ine (*Chem*). $\text{C}_{37}\text{H}_{51}\text{O}_{10}\text{N}$, an alkaloid of unknown constitution, obtained from the yew tree (*Taxus baccata*); fine, glistening particles; m.p. 105°-110° C.

taxis (*Bot., Zool.*). A movement of a whole organism towards or away from a stimulus; it is confined to motile plants of microscopic dimensions, and to motile reproductive bodies.

taxonom'ic series (*Biol.*). The range of extant living organisms, ranging from the simplest to the most complex forms Cf. *phylogenetic series.*

taxon'omy (*Biol.*). The science of classification as applied to living organisms.—*adj.* **taxonom'ic.**

Tay-Sachs' disease (*Med.*). Amaurotic family idiocy. A disease of infants (usually of the Hebrew race), characterised by idiocy, progressive paralysis of the body, blindness, and death before the age of two years, as a result of the progressive degeneration of the nerve cells of the brain and spinal cord.

Tb (*Chem.*). The symbol for *terbium.*

Te (*Chem*). The symbol for *tellurium.*

Tea-green Marl (*Geol.*). The highest portion of the Keuper Series, characterised by a green colour, and lying immediately beneath the Rhaetic System.

Tealby Clay (*Geol.*). A thin bed of clay found in Lincolnshire; believed to be of Neocomian age. It forms part of the Lower Cretaceous rocks.

Tealby Limestone (*Geol.*). A limestone found beneath the Red Chalk of Lincolnshire; believed to be of the same age as the Lower Greensand of Southern England. It forms part of the Cretaceous system of rocks.

teaming (*Civ. Eng*). The removing of excavated material from cutting to bank.

tear fault (*Geol.*). A horizontal displacement of a series of rocks along a more or less vertical plane, as a result of differential stresses acting upon the bed. Cf. *normal fault, thrust plane.*

tear gases (*Chem.*). Volatile compounds which even in low concentration make vision impossible by their irritant action on the eyes. They are halogenated organic compounds, e.g. *xylyl bromide*, $\text{CH}_3\cdot\text{C}_6\text{H}_4\cdot\text{CH}_2\text{Br}$, and *ethyl iodoacetate* $\text{CH}_2\text{I}\cdot\text{COOC}_2\text{H}_5$.

tear gland (*Zool.*). See **lacrimal gland.**

teaser (*Cinema.*). Colloquialism for a *trailer* which is intended to advertise films for future exhibition in a cinema.

teasing (*Paint.*). The operation of working out a surface defect in varnish work.

Technicolor (*Cinema., Photog.*). Trade-name for a perfected colour cinematograph process, using three-colour analysis with beam-splitter cameras and imbibition printing.

technology. The practice, description, and terminology of any or all of the applied sciences which have commercial value.

tecton'ic (*Geol.*). Said of rock structures which are directly attributable to earth movements involved in folding and faulting.

tecto'rial (*Zool.*). Covering; as the *tectorial membrane* (membrana tectoria) of Corti's organ.

tectospon'dylous (*Zool.*). Having cartilaginous vertebrae calcified in several concentric rings; cyclospondylous.

tectrices, tek'tri-sēz (*Zool.*). In Birds, small feathers covering the bases of the remiges and filling up the gaps between them.

tectum (*Zool.*). A covering or roofing structure; as the *tectum synoticum*, part of the roof of the cartilaginous skull which connects the two auditory capsules.

tee (*Plumb.*). A short pipe fitting used to connect two pipe lengths, of which one is to be fixed as a branch off the other.

tee bolts (*Eng.*). See **T-bolts.**

tee hinge (*Join.*). A large strap hinge shaped like the letter T, the long arm, corresponding to the upright part of the T, being secured to the door, while the crosspiece is secured to the hinging post.

tee joint (*Elec. Eng.*). A joint in a cable formed by tapping off a branch circuit, without cutting the main cable.

tee-slots (*Eng.*). See **T-bolts.**

teeming (*Met.*). The operation of filling ingot moulds from a ladle of molten metal.

teeth (*Zool.*). See **tooth.**

teg'men (*Bot.*). The inner leaves of a testa.—(*Zool.*) In some *Crinoidea*, the leathery membrane covering the top of the calyx: in *Icthyopsida*, the roof of the chondrocranium: in *Orthoptera*, the hardened leathery fore-wing.—*pl.* **tegmina.**

tegmen'tum (*Zool.*). (1) The upper layer of a shell plate in *Amphineura*.—(2) A reticular mass of fibres with much grey matter in the mesencephalon of higher Vertebrates; also known as RED NUCLEUS.

teg'mina. See **tegmen.**

teg'ula (*Build.*). A roofing tile.

tegula (*Zool.*). One of the articular sclerites of the wing in Insects, a small tile-shaped structure.—*pl.* **tegulae.**—*adj.* **tegular.**

teg'ulico'lous (*Bot.*). Living on tiles.

tegumentary system (*Bot.*). The layer or layers of cells which cover the surface of a plant.

tegumen'tum (*Zool.*). See **tegmentum, integument.**

teg'umere (*Zool.*). In metameric animals, the portion of the integument contained within one somite.

teichop'sia (*Med.*). Temporary loss of sight in part of the visual field, and the appearance before the eye of a spot of light which enlarges and becomes zigzag in shape and many-coloured; a symptom of *migraine* (q.v.).

teir (*Textiles*). See **tier.**

Tejon formation, tā-hhōn' (*Geol.*). See **Martinez formation.**

tek'tites (*Min.*). A group term suggested by Suess in 1900 to cover moldavites, billitonites, australites, and to replace the term obsidianite of Walcott (1898). They consist of balls and other spheroidal dumb-bell forms of green and black glass, approximating to obsidian in composition and probably of cosmic origin.

tela (*Zool.*). A web-like tissue.

telangiec'tasis (*Med.*). Morbid dilatation of capillaries and arteries.—*adj.* **telangiectat'ic.**

telautog'raphy (*Teleg.*). The transmission of half-tone images by scanning electrically a gum print on metal foil, reception being either by photographic scanning with a modulated light beam, or by electrolysis in prepared paper.

tele- (Greek *tēle*, afar, at a distance). A prefix used in the construction of compound terms; e.g. *telephone*, i.e. a voice from afar.

te'leaform (*Zool.*). Resembling *teleas*; said of a larval type of certain *Hymenoptera* having a hooked anterior end, a long caudal process, and one or more bands of setae encircling the trunk.

telearch'ics. The study of, and the means for effecting, the control of mechanical devices remotely, either by radio (as ships and aircraft; see **queen bee**), by sound-waves, or by beams of light.

tel'eblem (*Bot.*). A membrane of closely interwoven hyphae covering the entire fructifications of some agarics.

telecommunication (*Elec. Comm.*). Any communication of information in verbal, written, coded, or pictorial form by electrical means, whether by wire or by radio.

Telefunk'en system (*Radio*). A system of quenched spark radio-telegraphy which employed a spark gap comprising a series of metal discs slightly separated from each other.

teleg'ony (*Zool.*). The supposed influence of a male with which a female has previously been mated, as evinced in offspring subsequently borne by that female to another male.

telegraph (*Elec. Comm.*). A combination of apparatus for conveying messages over a distance by means of electrical impulses sent along special overhead wires or underground cables. For *telegraph cable, telegraph circuit*, etc., see **cable, circuit,** etc.

telegraph distortion set (*Teleg.*). An instrument which generates selected telegraph signals, in morse or five-unit code, for transmission through circuits or apparatus to be tested, and which also indicates the resulting distortion of the signal, either on a dial or a cathode-ray oscillograph.

telegraphy. The electrical communication system whereby messages are transmitted in coded signals by trained operators, the received messages being recorded either manually or automatically before delivery to the recipient. See **facsimile telegraphy, carrier telegraphy, printing telegraph, code, start-stop.**

Telehor (*Television*). Trade-name for a television system involving mechanical scanning by means of vibrating mirrors.

teleme'ter (*Elec. Eng.*). An instrument for the remote indication of electrical quantities, such as voltage, current, power, etc.

telemeter (*Photog.*). A small range-finder for photographic purposes.

telemeter (*Surv.*). The general name for an instrument which acts as a distance measurer, without the use of a chain or other direct-measuring apparatus.

teleme'tering (*Elec. Eng., etc.*). The process by which remote indication is given of electrical quantities.

telenceph'alon (*Zool.*). The cerebral hemispheres of the brain in Vertebrates.

teleol'ogy (*Biol.*). The interpretation of animal or plant structures in terms of purpose and utility. —*adj.* **teleological.**

tel'eophore (*Zool.*). See **gonotheca.**

teleoptiles, —op'tī-lēz (*Zool.*). The types of feathers characteristic of an adult Bird, as filoplumes, plumulae, and pennae. Cf. *neossoptiles.*

Telepan'toscope (*Television.*). A device similar to an Iconoscope, except that the scanning motion of the cathode ray beam is in one direction only (i.e. the line-scanning direction), the frame-scanning being accomplished by mechanical means.

telephone (*Elec. Comm.*). A combination of apparatus for conveying speech over a distance by means of audio-frequency variations in the current sent along special overhead wires or underground cable. See also **automatic telephone**; and for *telephone cable, telephone circuit,* etc., see **cable, circuit,** etc.

telephone condenser (*Radio*). A fixed condenser, having a capacitance of the order of 0 001 mfd., connected in parallel with the telephones in a crystal receiver in order to by-pass the radio-frequency currents.

telephone interference (or **influence) factor** (*Teleph.*). The weighting-factor required for determining the total interference of induced electromotive forces arising from harmonic induction in telephone-lines from adjacent power-lines. The factor takes into account the average relative sensitivity of the ear for varying frequency, and also the average response curves of telephone receivers. Abbrev. **T.I.F.**

telephone-telegram circuit (*Elec. Comm.*). A circuit for transmitting telegrams verbally between telegraph offices.

teleph'ony. The transmission of speech-currents over wires, by means of which two persons can effectively converse at a distance. The complexity of modern telephone plant arises not so much from the difficulty of providing a duplex channel for speech, but in arranging for the speedy and economical connexion of any pair of telephone subscribers on demand.

tel'ephoto lens (*Photog.*). A lens of long focal-length and narrow angle, for obtaining images of very distant objects

telephotog'raphy (*Photog.*). A branch of photography which involves the use of a camera with a lens analogous to a telescope, so that very distant views can be registered, either on plates or by cinematography.

telephotography (*Teleg.*). Photo-telegraphy. See **facsimile telegraphy.**

tel'eprinter (*Elec. Comm.*). A form of telegraph transmitter, having a typewriter keyboard and a type-printing telegraph receiver; widely used in the larger commercial offices and for public and news services. Similar in function to the *teletype* (q.v.).

teleradiog'raphy (*Med.*). Radiography with the X-ray tube at a distance from the body so as to minimise distortion of the part radiographed.

telescope (*Astron.*). An optical instrument for making distant objects appear nearer; it consists of arrangements of lenses or mirrors by which the light is brought to a focus, the image there formed being magnified.

See **astronomical—** **refracting—**
reflecting— **terrestrial—***

telescopic stars (*Astron.*). Those stars whose apparent magnitudes are less than the 6th and which are too faint to be seen with the naked eye. The largest telescopes can photograph stars as faint as apparent magnitude 21.

teleth'moid (*Zool.*). See **prenasal.**

teletor'ium, telestu'dio (*Radio, Television*). The enclosure, sound-proofed and treated acoustically, which is used for originating television or broadcasting programmes.

tel'etron (*Television*). A cathode ray tube specially designed for synthesising television images, either for direct viewing or for projection.

tel'etype (*Teleg.*). The direct-keyboard sending and type-printing of telegraph messages, using the start-stop system with the 5-unit code.

teleutoso'rus (*Bot.*). A group of teleutospores, together with their supporting hyphae, forming a pustule on the surface of the host.

teleu'tospore, teleu'togonid'ium (*Bot.*). A thick-walled spore, consisting of two or more cells, formed by rust fungi towards the end of the season; capable of remaining quiescent for some time, and then germinating to give one or more promycelia, on which the basidiospores are developed.

teleu'tostage (*Bot.*). The stage in the life-history of a rust fungus when teleutospores are formed.

television. The electrical transmission of visual scenes and images by wire or radio, in such rapid succession as to produce, in the observer at the receiving end, the illusion of being able to witness events as they occur at the transmitting end.

television amplifier (*Television*). A thermionic amplifier operating uniformly in gain and phase-delay, between zero and several million cycles per second.

television cable (*Cables*). Cable capable of transmitting frequencies sufficiently high to accommodate television signals without undue attenuation.

tel'evisor (*Television*). A television receiver.

tel'ewriter (*Teleg.*). An obsolete system of transmitting messages whereby the excursions of a pen were transmitted by direct currents over a line; these operated a similar mechanism, which wrote out the message.

Telex (*Teleg*). A service whereby the public may hire from the Post Office teleprinters using an interrupted audio-frequency for transmission. The service provides subscribers with printed telegraph communication through the ordinary telephone exchanges and the national telegraph system.

Telfener rack (*Civ. Eng.*). A form of rack railway in which the rack is centrally located, is formed of two angles (placed back-to-back, with teeth cut in them), and is sometimes strengthened with flat bars between the angles.

te'lial stage (*Bot.*). An American term for *teleutostage.*

te'liospore (*Bot.*). An American term for *teleutospore.*

te'lium (*Bot.*). An American term for *teleutosorus.*

tell-tale clock (*Horol.*). A portable clock which gives, on a chart, a record of the time a watchman visits certain fixed points in his round of inspection.

teller (*Surv.*). See **tally.**

tellies (*Cinema.*). Colloquialism for cinematograph films with sound; also for television.

tellu'ric bismuth (*Min.*). Bismuth which occurs in the trigonal system and contains a trace of tellurium. See also **tetradymite.**

tellu'rium (*Met.*). A metallic element, tin-white in colour, in the sixth group of the periodic system. Chem. symbol, Te. At. wt. 127·61; at. no. 52; sp. gr. at 20° C. 6·24; m.p. 450° C.; valencies 2, 4, 6; specific electrical resistivity 33×10^3 microhms per cm. cub. Used in the electrolytic refining of zinc to eliminate cobalt; alloyed with lead to increase the strength of pipes and cable sheaths. The chief sources are the slimes from copper and lead refineries, and the fine dusts from telluride gold ores.

telo- (Greek *telos,* end). A prefix used (especially in Zoology) in the construction of compound terms; e.g. *telophase* (q.v.).

tel'oblast (*Zool.*). A large cell from which many smaller cells are produced by budding, as one of the primary mesoderm cells in developing *Polychaeta.*

tel'ocoel, —sēl (*Zool.*). The cavity of the *telencephalon* (q.v.).

teloden'dra (*Zool.*). The terminal twigs into which an efferent axon breaks up at a synapse; cf. *dendrite—sing.* **telodendron.**

telokine'sis (*Cyt.*). See **telophase.**

telolecithal, —les'i-thal (*Zool.*). Said of ova in which the yolk is aggregated in one hemisphere.

telolem'ma (*Zool.*). The connective tissue sheath of a muscle-spindle.

telomit'ic (*Cyt.*). (In cell-division) having the chromosomes attached to the fibres of the spindle by their ends.

tel'ophase (*Cyt.*). The period of reconstruction of nuclei which follows the separation of the daughter chromosomes in mitosis.

Telosporid'ia (*Zool.*). A subclass of *Sporozoa* in which the trophozoite is uninucleate and ceases to exist when spores are formed; the spore cases are simple and usually contain several sporozoites.

telosynap'sis, telosyn'desis (*Cyt.*). End-to-end union of the elements of a pair of chromosomes; cf. *parasynapsis*, and see also **synapsis.**

telotax'is (*Zool.*). The movements of an animal when they are directed to the attainment of a definite end.

Telotre'mata (*Zool.*). An order of *Testicardines* in which the shell is usually biconvex and the animal is attached by its peduncle.

tel'otroch (*Zool.*). The abapical tuft of cilia in a trochophore.

telotro'cha (*Zool.*). See **trochophore.**

telpher line (*Civ. Eng.*). A form of monorail in which an electrically driven truck runs along a single rail, the load being suspended below the truck and rail.

telson (*Zool.*). The post-segmental region of the abdomen in *Crustacea* and *Arachnida.*

te'lum (*Zool.*). In Insects, the last abdominal somite.

Temeside Shales (*Geol.*). A succession of greenish nodular shales found in the Old Red Sandstone facies of the Devonian System in South Wales and the Welsh borderlands. Named from the River Teme in Shropshire.

Temnocephaloi'dea (*Zool.*). A class and order of *Platyhelminthes,* comprising a few small epizoic forms having a tough cuticle and a muscular non-protrusible pharynx; in some cases part of the epidermis is ciliated; anteriorly there are from four to twelve tentacles, posteriorly a large sucker.

temnospon'dyly (*Zool.*). The condition of having the vertebrae in articulated parts, cf. *stereospondyly.—adj.* **temnospondylous.**

témoin, tā-mwan^{g} (*Civ. Eng.*). An undisturbed column of earth left on an excavated site, as an indication of the depth of the excavation.

temper brittleness (*Met.*). A type of brittleness that is shown by the notched bar test, but not by the tensile test, in certain types of steel after tempering; influenced to a marked extent by the composition of the steel, the tempering temperature, and the subsequent rate of cooling.

temper-hardening (*Met.*). A term applied to alloys that increase in hardness when heated after rapid cooling; also to the operation of producing this. Also called ARTIFICIAL AGEING; distinguished from *ageing* (q.v.) or age-hardening, which occurs at atmospheric temperature. Both processes are covered by the term *precipitation hardening* (q.v.).

temper colour (*Eng.*). In tempering hardened steel cutting tools, etc., the colour of the oxide layer which forms on reheating and which indicates approximately the correct quenching temperature for a particular purpose. See **tempering.**

tempera (*Dec.*). Pigments ground up in size, liquid glue, white or yolk of egg, or other unctuous medium.

temperament (*Psychol.*). The quantity and quality of the general affective nature of an individual as formed by his inherited traits and physiological constitution. **Nervous temperament,** according to Hadfield, arises from a high excitability of the nerves, physiological in origin.

temperamental (*Psychol.*). Displaying alternation of moods and intensity of responsive reactions.

temperature (*Phys.*). The degree of hotness or coldness measured with respect to an arbitrary zero (as in the Centigrade and Fahrenheit scales) or the *absolute zero* (q.v.). See **degree, fixed points, fundamental interval,** the articles at **thermometer,**

also **absolute—** **critical—**

temperature (*Med., Vet.*). Human body temperature in health is normally taken to be 98·4 F. (mouth). Normal values for animals: equines, 100·5 F.; sheep, goats, 104 F.; dogs, 101 F.; cats, 100·5 F.

temperature adjustment (*Horol.*). The regulating of a watch or chronometer for different temperatures.

temperature coefficient (*Bot.*). The ratio of the rate of progress of any reaction or process in a plant, at a given temperature, to the rate at a temperature 10° C. lower.

temperature coefficient (*Eng., Phys.*). The fractional change in any particular physical quantity per degree rise of temperature. The *temperature coefficient of resistance* is defined as the change in resistance per degree C. rise of temperature divided by the resistance at 0° C.

temperature, colour (*Photog.*). See **colour temperature.**

temperature correction (*Surv.*). A correction applied to the observed length of a base line to correct for any difference between the temperature of the tape during the measurement and that at which it was calibrated.

temperature rise (*Elec. Eng.*). The difference in temperature between an electrical machine, after it has been on load for some time, and the surrounding air. It is a measure of the machine's capacity for dissipating the heat generated by the electrical power losses in the machine, and thus forms part of the electrical specification.

tempered scale (*Acous.*). Also called EQUI-TEMPERED SCALE, EQUAL-TEMPERED SCALE. The musical scale of keyboard instruments, and, by implication, any other instruments or voices which are concerted with them, in which all semi-tones have frequencies of the same ratio, so that 12 semi-tones amount to one octave. See **natural scale.**

tempering (*Met.*). The reheating of hardened steel at any temperature below the critical range, in order to decrease the hardness. Also called DRAWING. Sometimes applied to reheating after rapid cooling, even when this results in increased hardness; e.g. in the case of steels that exhibit secondary hardening.

tempering (*Pot.*). Thorough mixing of clays with water, etc. to form a plastic paste for moulding.

template (*Build.*). A long flat stone supporting the end of a beam, in order to spread the load over several joints in the brickwork.

template or **templet** (*Eng., etc.*). A thin plate, cut to the shape or profile required on a finished surface, by which the surface is marked off or gauged during machining or other operation.

temple (*Weaving*). A device (spiked or fluted rollers, etc.) on a loom for keeping cloth as it is woven at the same width as the spread of the warp threads in the reed.

tempola'bile (*Chem.*). Tending to change with time.

tempor-, temporo- (Latin *tempora,* temples). A prefix used (especially in Zoology) in the construction of compound terms; e.g. *temporo-maxillary,* pertaining to the temporal and maxillary regions.

temporal (*Zool.*). A cartilage bone of the Mammalian skull formed by the fusion of the petrosal with the squamosal.

tempora'lis (*Zool.*). In Vertebrates, one of the adductor muscles which by their contraction raise the lower jaw.

temporary adjustment (*Surv.*). An adjustment to a surveying instrument which it is necessary to make each time the instrument is used; e.g. setting up, levelling, and focusing.

temporary collenchyma (*Bot.*). Collenchyma present in a young organ and disappearing as secondary thickening progresses.

temporary hardness (*Chem.*) A form of hardness of water caused by the presence of the bicarbonates of calcium and magnesium and therefore removable by boiling.

temporary starch (*Bot.*) Starch which is stored for a time in the chloroplasts, when the plant is forming carbohydrates more rapidly than they are being used or removed from the leaf.

temporary stars (*Astron.*). See **nova.**

temporary support (*Photog.*). The support which is used during the double-transfer carbon process.

temporary way (*Civ. Eng.*). The ballast, sleepers, and rails laid temporarily by a contractor for his use on constructional works in transporting material.

temse, temz (*Build., etc.*). A *sieve* (q.v.).

tenacity (*Met.*). See **ultimate tensile stress.**

tenac'ulum (*Zool.*). In *Neopterygii*, a fibrous band extending from the eyeball to the skull.

tender (*Build., Civ. Eng., etc.*). A quotation from a contractor, offering to supply materials or execute work for a given sum.

tendinous (*Zool.*). See **tendon.**

tendo calca'neus (*Zool.*). See **Achillis tendo.**

tendon (*Zool.*). A cord, band, or sheet of fibrous tissue by which a muscle is attached to a skeletal structure, or to another muscle.—*adj.* **ten'dinous.**

tendril (*Bot.*). A slender, simple, or branched, elongated organ used in climbing, at first soft and flexible, later becoming stiff and hard. It may be a modified stem, leaf, leaflet, or inflorescence.

ten'ent (*Zool.*). Used for clinging or attachment.

tenes'mus (*Med.*). Painful and ineffectual straining at stool.

tenia, teniasis, etc. See **taenia,** etc.

ten'nantite (*Min.*). The sulphide of copper and arsenic, which crystallises in the cubic system. This mineral is isomorphous with *tetrahedrite* (q.v.). The crystals are frequently dodecahedral and contain antimony, and hence grade into tetrahedrite.

ten'on (*Carp.*). A tongue formed on the end of a member by cutting away from both sides one-third of the thickness of the member. The projecting part fits into a mortise in a second member in order to make a joint between them.

tenon-and-slot mortise (*Join.*). A joint, such as that made between the posts and heads of solid door frames, in which a tenon cut on the end of the head fits into a *slot mortise* (q.v.) on the end of the post.

tenon saw (*Join.*). A saw with a very thin parallel blade, having fine teeth (10 to 14 to the inch) and a stiffened back along its upper edge. Also called a MITRE SAW.

ten'orite (*Min.*). Oxide of copper, crystallising in the triclinic system. It occurs in minute black scales as a sublimation product in volcanic regions or associated with copper veins.

tenosynovi'tis, tenovagini'tis (*Med.*). Inflammation of the sheath of a tendon.

tenot'omy (*Surg.*). The cutting of a tendon for the correction of deformity.

tenovaginitis (*Med.*). See **tenosinovitis.**

tensile strength (or **stress**) (*Met.*). See **ultimate tensile stress.**

tensile test (*Met.*). A test in which specimens are subjected to an increasing tensile pull until they fracture. A stress-strain curve may be plotted, and the limit of proportionality, proof stress, yield point, ultimate tensile stress, elongation and reduction in area determined.

tensile testing machine (*Eng.*). A machine for applying a tensile or compressive load to a test piece, by means of hand- or power-driven screws, or by hydraulic ram. The load is usually measured by a poise weight and calibrated lever.

tensim'eter (*Chem.*). An apparatus for the determination of transition points by observation of the temperature at which the vapour pressures of the two modifications become equal.

tension (*Elec. Eng.*). A term sometimes used in place of *voltage* or *electromotive force.*

tension flange (*Bot.*). Mechanical tissue developed on the concave side of a coiled tendril.

tension insulator (*Elec. Eng.*). A suspension insulator for overhead transmission lines, which is designed to withstand the pull of the conductors; it is used, therefore, at terminal, anchor, or angle towers.

tension rod (*Struct.*). A structural member subject to tensile stress only.

tension sleeve (*Struct.*). A *screw shackle* (q.v.).

tensor (*Elec. Eng.*). See **amplitude.**

tensor (*Zool.*). A muscle which stretches or tightens a part of the body without changing the relative position or direction of the axis of the part. Cf. *laxator.*

tent (*Surg.*). A roll or plug of soft absorbent material, or of expansible material, for keeping open a wound or dilating an orifice. See also **laminaria tent.**

tentacle (*Bot.*). One of the hairs on the leaf of sundew, which helps in capturing small insects and produces enzymes which digest the prey.

tentacle, tentac'ulum (*Zool.*). An elongate, slender, flexible organ, usually anterior, fulfilling a variety of functions in different forms, as exploring, feeling, grasping, holding, and sometimes locomotion. In *Protozoa,* a pseudopod: in *Coelenterata,* a prehensile appendage bearing stinging cells; in *Polychaeta,* a tactile process of the prostomium or peristomium: in *Arthropoda* generally, an antenna (popular): in *Cirripedia,* a thoracic appendage or cirrus: in Insect larvae, any slender fleshy process of the body: in *Gastropoda,* a sensory cephalic process or horn: in some *Pelecypoda,* a sensory process of the mantle-edge: in *Cephalopoda,* an arm: in *Crinoidea,* an arm or ray: in some *Hemichorda,* a process of the collar: in *Cephalochorda,* a tactile process of the velum or the buccal hood: in Fish, a barbel.—*adjs.* **tentac'ular, tentac'ulif'erous, tentac'uliform.**

Tentacula'ta (*Zool.*). A subclass of *Ctenophora* distinguished by the possession of tentacles.

tentac'ulocyst (*Zool.*). In some coelenterate medusoids, a sense organ situated at the margin of the umbrella and consisting of a modified vesicular tentacle, frequently containing lithites.

tenter (*Textiles*). See **stenter.**

Tentest (*Build.*). Trade-name of a building-board made of fibre.

tentil'la (*Zool.*). Branches of a tentacle.

tento'rium (*Zool.*). In the Mammalian brain, a strong transverse fold of the dura mater, lying between the cerebrum and the cerebellum.

tep'al (*Bot.*). One of the members of a perianth which is not clearly differentiated into a calyx and a corolla.

tepee buttes (*Geol.*). Conical hills of Cretaceous shale, with steep, smooth slopes of talus and a core of shell-limestone, formed *in situ* by the growth of successive generations of lamellibranchs (*Lucina*). See also **St. Pierre Shales.**

teph'rite (*Geol.*). A fine-grained igneous rock resembling basalt and normally occurring in lava flows; characterised by the presence of a feldspathoid mineral in addition to, or in place of, feldspar. According to the particular feldspathoid mineral present, *leucite-tephrite, nepheline-tephrite,* and *analcite-tephrite* may be distinguished.

teph'roite, —rō-it (*Min.*). An orthosilicate of manganese, which crystallises in the orthorhombic system. It forms a member of the isomorphous olivine group, and occurs with zinc and manganese minerals in New Jersey and Sweden.

teratol'ogy (*Biol.*). The study of monstrosities (Greek *teras,* gen. *teratos,* a wonder).

terato'ma (*Med.*). A tumour-like mass in the body consisting of tissues derived from the three germ layers (ectoderm, mesoderm, and entoderm) as a result of some abnormality in development

ter'bium (*Chem.*). Symbol, Tb. A metallic element, a member of the rare earth group; at. no. 65, at. wt. 159 2. It occurs in the same minerals as dysprosium, europium, and gadolinium.

Terebellifor'mia (*Zool.*). An order of *Phanerocephala,* comprising burrowing and tubicolous forms with small parapodia from which cirri are usually absent, although dorsal respiratory cirri occur in some cases; the buccal region is not eversible and the pharynx is unarmed; palps are always, and tentacles sometimes, lacking; the peristomium may bear cirri or tentacular filaments

ter'ebene, ter'ebine, tereban'thenes (*Paint*) Volatile solvents and thinners derived from heavy petroleum oils, mixtures of petroleum and rosin oils, or petroleum and rosin oils mixed with turpentine.

ter'ebra (*Zool.*). The actual sting or modified ovipositor of female *Hymenoptera*

ter'ebrate (*Bot.*) Having scattered perforations

terebrate (*Zool.*). Possessing a boring organ possessing a sting.

ter'ebrator (*Bot*). The trichogyne of a lichen.

terephthal'ic acid (*Chem.*). $C_6H_4(COOH)_2$, benzene-1, 4-dicarboxylic acid, a powder, hardly soluble in water or alcohol, which sublimes unchanged. It is prepared by the oxidation of *p*-toluic acid.

terete' (*Bot.*). Elongated cylindrical-conical, tapering to a point.

ter'gite (*Zool.*). The tergum in Arthropods when it forms a chitinous plate.

tergum (*Zool.*). The dorsal part of a somite in *Arthropoda*: one of the plates of the carapace in *Cirripedia.*—*adj.* **tergal.**

terminal (*Bot.*). (1) Situated at the tip of anything —(2) Said of secondary wood parenchyma when this develops only at the end of the growing season, and therefore at the limit between one annual ring and the next.

terminal (*Build.*). The pointed upper end of a lightning conductor.

terminal (*Elec. Eng*). A point of connexion in an electric circuit: a point where the supply to an electrical machine is taken.

terminals (*Bot.*). The fine end-branches of the veins of a leaf.

terminal assembly (*Auto. Teleph.*). A terminal frame for connecting to a bank multiple.

terminal-bar (*Elec. Eng.*). A bar to which a group of plates of an accumulator is attached. Also called CONNECTOR-BAR, TERMINAL-YOKE.

terminal curvature (*Geol.*). A sudden local change in the dip of stratified rocks in the near neighbourhood of a fault, caused by the drag of the downward displaced block against the fault plane.

terminal curve (*Horol.*). The curve which connects the inner end of a balance spring to the collet or the outer end to the stud.

terminal equipment (*Teleph.*). The special apparatus required for connecting the normal telephone exchange pairs to special transmission systems (such as radio-telephone links, carrier systems) or to trunk-lines. See **trunk terminal.**

terminal insulator (*Elec. Eng.*). An insulator carrying a terminal to which part of an electric circuit is connected.

terminal-lug (*Elec. Eng.*). A projection on a group of accumulator plates for connexion to an external circuit.

terminal nose dive (*Aero.*). See **dive (terminal nose).**

terminal pillar (*Elec. Eng.*). See **post-head.**

terminal pole (*Elec. Eng*). A pole at the end of a power-transmission or telephone line so designed as to withstand the longitudinal load of the conductors as well as the vertical load.

terminal screw (*Elec. Eng.*). See **clamping screw.**

terminal tower (*Elec. Eng*). The transmission line tower at the end of an overhead transmission line; arrangements must be made for taking the pull of the conductors, and for connecting them to the substation or other apparatus at the end of the line.

terminal velocity. The constant velocity acquired by a particle falling in air or water when the frictional resistance is equal to the gravitational pull.

terminal voltage (*Elec. Eng.*). The voltage at the supply terminals of an electrical machine.

terminal-yoke (*Elec. Eng*). See **terminal-bar.**

termination (terminal or **terminating) impedance** (*Elec. Comm.*). The end or load impedance of a network or line, generally required to match the image impedance of the line or network, i.e. to obviate reflection of power.

terminator (*Astron.*). That projected great circle of the moon's surface which appears as a curve on which the sun is rising or setting; hence the eastern curved edge of the waxing moon and the western edge of the waning moon.

termita'rium (*Zool*). A mound of earth built and inhabited by termites and containing an elaborate system of passages and chambers.

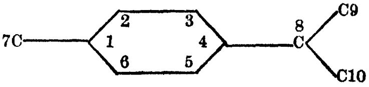
termolec'ular (*Chem.*). Pertaining to three molecules.

ternary (*Chem.*). Consisting of three components, etc.

ternary system, ternary diagram (*Met.*). The alloys formed by three metals constitute a ternary alloy system, which is represented by the ternary constitutional diagram for the system.

ter'nate (*Bot.*) (1) Said of a compound leaf with three leaflets.—(2) Arranged in threes, as branches arising at about the same point from a stem.

terpadi'enes (*Chem.*). $C_{10}H_{16}$, isocyclic compounds, containing two double bonds. Numerous compounds in the terpene series are terpadienes. The carbon atoms are numbered as follows:



ter'penes (*Chem.*). $C_{10}H_{16}$, a group of essential oils found in many plants. They may be regarded as hydro-derivatives of cymene. The simplest members of this series are monocyclic terpenes containing two double bonds; the more complicated polycyclic terpenes contain one double bond only.

terpin'eol (*Chem.*). $C_{10}H_{17}OH$, colourless crystals; m.p. 37° C., b.p. 218° C.; it can be obtained from limonene hydrochloride by the action of caustic potash. Terpineol is used extensively as the basis of certain perfumes and in soap perfumery.

terra-cotta (*Pot.*). A hard body, composed of fine clay, fine sand, crushed pottery waste, etc.; of a yellow to brownish-red colour, generally unglazed; used for statuettes, vases, and as building material in the form of shaped blocks.

terrace (*Build.*). A raised level space having at least one upright or sloping side.

terrace house (*Build.*). A house which forms part of a block of houses built in a row, and which has another house attached to it on each side.

terrain clearance indicator (*Radio*). See **radio altimeter.**

terrazzo, ter-at′sō (*Build.*). A rendering of cement and marble or granite chippings, used as a covering for concrete floors, on which it is floated and finally polished with carborundum blocks and fine grit stones. Also called VENETIAN MOSAIC.

terrestrial. Pertaining to the earth.—(*Bot., Zool.*) Growing or living on land, in contrast to growing submerged in water.

terrestrial equator (*Astron.*). An imaginary circle on the surface of the earth, the latter being regarded as cut by the plane through the centre of the earth perpendicular to the polar axis; it divides the earth into the northern and southern hemispheres, and is the primary circle from which terrestrial altitudes are measured.

terrestrial magnetism (*Elec. Eng., etc.*). The magnetic properties exhibited within, on, and outside the earth's surface. There is a nominal South pole in Canada and a nominal North pole approximately opposite, the positions varying cyclically with time. The direction indicated by a compass needle at any point is that of the intensity of the component of the field at the point. Having the characteristics of flux from a permanent magnet, the earth's magnetic field probably depends on currents within the earth and also on those arising from ionisation in the upper atmosphere, interaction being exhibited by the Aurora Borealis. See **declination, dip, inclination.**

terrestrial poles. The two diametrically opposite points in which the earth's axis cuts the earth's surface.

terrestrial radiation (*Meteor.*). At night the earth loses heat by radiation to the sky, the maximum cooling occurring when the sky is cloudless and the air dry. Dew and hoar-frost are the result of such cooling.

terrico′lous (*Bot.*). Living in the soil.

terrigenous sediments, —ig′en-us (*Geol.*). Those sediments that are deposited on the shallower parts of the sea-floors and consist of detritus derived from the land areas. Cf. *deep-sea deposits.*

terro-metallic clinkers (*Build.*). Bricks similar to *Dutch clinkers* (q.v.) but made from a clay which burns to a nearly black colour.

terry (*Textiles*). See under **pile.**

ter′tial (*Zool.*). In Birds, a flight feather of the third row, attached to the upper arm. Cf. *primary, secondary.*

ter′tian (*Med.*). A type of malaria in which the febrile paroxysm occurs every third day (i.e. at an interval of forty-eight hours between each paroxysm); the benign form is due to infection with *Plasmodium vivax,* and the maligant form to infection with *Plasmodium falciparum.*

Tertiary (*Geol.*). The era of geological time during which the strata ranging from the Eocene to the Pliocene were deposited.

tertiary alcohols (*Chem.*). Alcohols containing the group $\rightarrow C{\cdot}OH$. When oxidised, the carbon chain is broken up, resulting in the formation of two or more oxidation products containing a smaller number of carbon atoms in the molecule than the original compound.

tertiary amines (*Chem.*). Amines containing the nitrogen atom attached to three alkyl groups. Tertiary aliphatic-aromatic amines yield *p*-nitroso compounds with nitrous acid.

tertiary cell wall, tertiary layer, tertiary thickening (*Bot.*). A deposit of wall-thickening on the inner surface of the secondary wall of a cell, tracheide or vessel, usually in the form of rings or of a loose spiral band.

tertiary colours (*Paint.*). Colours produced by mixing two or more secondary colours.

Tertiary igneous rocks (*Geol.*). The various types of igneous rocks which were intruded or extruded during early Tertiary times, especially over a region stretching from Britain to Iceland; e.g. in the Inner Hebrides and north-east Ireland (the Thulean Province).

tertiary layer (*Bot.*). See **tertiary cell wall.**

tertiary nitro compounds (*Chem.*). Nitro compounds containing the group $\rightarrow C\ NO_2$. They contain no hydrogen atom attached to the carbon atom next to the nitro group, and they have no acidic properties.

tertiary thickening (*Bot.*). See **tertiary cell wall.**

tertiary winding (*Elec. Comm.*). (1) An extra winding on an audio-frequency transformer for monitoring purposes.—(2) The third winding on a hybrid coil, the other two being exactly equal and inserted in series with the two legs of the circuit.

terva′lent (*Chem.*). See **trivalent.**

tesch′enite (*Geol.*). A coarse-grained basic (gabbroic) igneous rock consisting essentially of plagioclase, near labradorite in composition, titanaugite, ilmenite, and olivine (or its decomposition products); primary analcite occurs in wedges between the plagioclase crystals, which it also veins.

tessel′la (*Arch.*). See **tessera.**

tes′sellate (*Bot.*). Said of a surface marked out in little squarish areas, like a tiled pavement.

tes′sellated pavement (*Build.*). A pavement formed of small pieces of stone, marble, etc. in the manner of a mosaic. Also called ROMAN MOSAIC.

tes′sera, tessel′la (*Arch.*). One of the small pieces of stone, marble, etc. used in the mosaic of a tessellated pavement.—*pls.* **tesserae, tessellae.**

tesseral system (*Crystal.*). See **cubic system.**

tesseralkies (*Min.*). See **skutterudite.**

test (*Bot., Zool.*). See **testa.**

test. Any routine or special procedure for ascertaining that apparatus is functioning correctly as specified.

test bed (*Elec. Eng.*). A cast-iron framework foundation on which machines are fixed for the purpose of carrying out load tests.

test board (*Elec. Eng.*). A switchboard carrying instruments and switches for connecting up to apparatus to be tested.

test-desk (*Teleph.*). The special position, away from the operators, at which are situated test-clerks who can apply special tests to faulty lines to ascertain the nature of such faults, and who issue instructions for remedying them.

test film (*Cinema.*). A special film, either of speech, music, or a continuously varying frequency of constant amplitude, which is passed through a projector to ascertain that the sound reproduction is up to a specified standard.

test final selector (*Auto. Teleph.*). The selector following the test selector, which enables operators at the test-desk to get on to a subscriber's line.

test jack (*Elec. Comm.*). A jack with contacts in series with a circuit, so that an instrument, or other testing device, can be immediately introduced into a circuit for locating faults.

test paper (*Photog.*). Strip paper which has been impregnated with litmus (or some other indicator) for testing the acidity or alkalinity of solutions.

test piece (*Eng.*). A piece of material accurately turned or shaped, often to specified standard dimensions, for subjecting to a tensile test, shock test, etc., in a testing machine.

test record (*Acous.*). A gramophone record specially made for the testing of reproducing equipment, having on its surface constant-frequency or gliding tones, or selected recordings of speech or music, to emphasise particular faults in the subsequent reproduction.

test selector (*Auto. Teleph.*). A selector operated by a test-clerk in an automatic exchange; by means of it, through a test final selector, he is able to get on to any line in the exchange.

test strip (*Cinema*). The specially exposed unmodulated sound-track which is made to ascertain the current in the exciter lamp of a recording machine which gives the requisite density on the negative, after normal development. See **slit test.**

test terminals (*Elec. Eng.*). Circuit terminals to which a connexion is made for purposes of testing.

testa, test (*Bot.*). The seed coat, several layers of cells in thickness, derived from the integuments of the ovule.—(*Zool.*) A hard external covering, usually calcareous, siliceous, chitinous, fibrous or membranous. an exoskeleton: a shell; a lorica: in *Urochorda*, the gelatinous 'house': in *Echinoidea*, the hard calcareous shell.—*adjs.* **testa'ceous, testa'cean.**

testa'ceous (*Bot.*). Of the colour of old red bricks.

Testicardines, —kar'di-nēz (*Zool.*). A class of *Brachiopoda* in which there is an internal skeleton supporting the lophophore, the shell is hinged, and the intestine ends blindly.

tes'ticle (*Zool*). See **testis.**

testing machine (*Eng.*). A machine for applying accurately measured loads to a test piece, to determine the suitability of the latter for a particular purpose.

See **Haigh fatigue—** **Izod test.**
tensile—

testing position (*Teleph.*). The position in an exchange where the operating staff make simple tests to determine whether a line is faulty, before reporting to the test-desk.

testing set (*Elec Eng.*). A self-contained set of apparatus, including switches, instruments, etc., for carrying out certain special tests.

testing transformer (*Elec. Eng.*). A specially designed transformer providing a high-voltage supply for testing purposes.

testis, testicle (*Zool.*). A male gonad or reproductive gland responsible for the production of male germ-cells or sperms.—*adj.* **testic'ular.**

tetan'ic contraction (*Zool.*). See **tetanus.**

tet'anus (*Med.*). Lockjaw. A disease due to infection with the tetanus bacillus, *Clostridium tetani*, the toxins secreted by which cause the symptoms and signs of the disease, viz. painful tonic spasms of the muscles, which usually begin in the jaw and then spread to other parts.

tetanus (*Zool.*). The state of prolonged contraction which can be induced in a voluntary muscle by a rapid succession of stimuli.

tet'any (*Med.*). A condition characterised by heightened excitability of the motor nerves and intermittent painful muscular cramps, occurring in many abnormal states, especially those associated with hypocalcaemia.

tetany, grass (*Vet.*). See **grass disease.**

tetartohe'dral (*Crystal.*). Containing a quarter of the number of faces required for the full symmetry of the crystal system.

tetra- (Greek *tetra-*, a prefix indicating four). A prefix used in the construction of compound terms; e.g. *tetradactyl*, having four digits.

tetrabo'ric acid (*Chem.*). See **boric acid.**

Tetrabran'chia (*Zool.*). A subclass of *Cephalopoda* in which the whole visceral mass is protected by an external, multilocular, siphunculated shell, the last chamber of which is occupied by the animal; there are two pairs of ctenidia and the eyes lack a crystalline lens.

tetrabran'chiate (*Zool.*). Having four gills or ctenidia.

tetracerous, tet-ras'— (*Zool.*). Having four horns.

Tetractinel'lida (*Zool.*). An order of *Demospongiae* in which the skeleton is composed of tetraxial and monaxial spicules.

tetracy'clic (*Bot.*). Said of a flower which has four whorls or members.

tet'racyte (*Bot*). One of the four cells formed after a meiotic division.

tetrad (*Bot*). A group of four spores remaining together until they are nearly or quite mature.

tetrad (*Cyt*). A bivalent chromosome, formed during the latter part of meiotic prophase, which shows signs of division into four longitudinal threads.

tetrad division (*Bot.*). The nuclear and cell divisions occurring when a spore mother cell divides to give four spores.

tetradac'tyl (*Zool.*). Having four digits.

tetradid'ymous (*Bot.*). Four-fold.

tetrad'ymite (*Min.*). A mineral consisting of bismuth and tellurium. It sometimes contains sulphur and a trace of selenium; crystallises in the trigonal system. Bismuth tellurides are commonly found in gold-quartz veins or in metamorphic rocks.

tetrady'namous (*Bot.*). Said of a flower which has six stamens, four of them longer than the remaining two.

tetrag'onal system (*Crystal.*). The crystallographic system in which all the forms are referred to three axes at right-angles; two are equal and are taken as the horizontal axes, whilst the vertical axis is either longer or shorter than these. It includes such minerals as zircon and cassiterite.

tetragonous (*Bot.*). Having four angles and four convex faces.

tetrahe'dral (*Bot*). Having four triangular faces.

tetrahe'drite (*Min.*). A sulphide of copper and antimony, $4Cu_2S\,Sb_2S_3$, which crystallises in the tetrahedrite class of the cubic system, and frequently contains other metals such as bismuth, mercury, silver (as in the old silver-mines of Devon and Cornwall), zinc, and iron. It is used as an ore of copper and, in some case, of these other metals. Also called FAHLERZ, FAHL-ORE, GREY COPPER ORE.

tetrakon'tan (*Bot.*). Having four flagella.

tetram'erous (*Bot., Zool*). Having four parts: arranged in fours: arranged in multiples of four.

tetramor'phous (*Chem.*). Existing in four different crystalline forms.

tet'raploid (*Bot., Zool*). Possessing twice the normal number of chromosomes. Cf. *haploid, diploid.*

tetrapneumonous, —pnū'mon-us (*Zool.*). Possessing four lung-books.

tet'rapod (*Zool.*). Having four feet.

tetrap'terous (*Zool.*). Having four wings.

tetrarch (*Bot.*). Having four strands of xylem.

tetraso'mic (*Cyt.*). A tetraploid nucleus (or organism) having one chromosome four times over, the others in duplicate.

tetrasporan'gium (*Bot.*). A unilocular sporangium containing tetraspores.

tet'raspore (*Bot.*). One of the asexual spores of the red algae; these spores are formed in groups of four.

tetraspo'rous (*Bot.*). Having or containing four spores.

tetras'ter (*Cyt.*). A complex mitotic figure formed in an ovum after polyspermy.

tetrastich'ous (*Bot.*). Arranged in four rows.

tetrathog'nathous (*Zool.*). Having the jaws borne on the fourth somite of the head.

tetrava'lent (*Chem.*). Capable of combining with four atoms of hydrogen or their equivalent.

tetrax'on (*Zool.*). (Of sponge spicules) having four axes.

tetraz'o dyes (*Chem.*). See **disazo dyes.**

tet'razole (*Chem.*). A five-membered heterocyclic compound containing four nitrogen atoms and one carbon atom in the ring.

tetrazo'oid (*Zool.*). In some *Urochorda*, one of four zooids developed from the stolon.

tet'rode (*Thermionics*). See **screened-grid valve.**

tet'roses (*Chem.*). Monosaccharoses containing four oxygen atoms in the molecule, e.g. $HO\cdot CH_2\cdot(CHOH)_2 CHO$.

Texas fever (*Vet.*) A disease of tropical cattle due to infection of the blood by piroplasms (*Babesia bigemina*), and transmitted by ticks (*Boophilus annulatus*).

text (*Typog.*). The body of matter in a printed page or book, exclusive of notes, comments, and illustrations: words set to music, as distinguished from the accompanying music.

textile. A woven fabric, or a material suitable for weaving.

textile fibres (*Weaving, etc.*). Filaments of vegetable, animal, or mineral origin used for making yarns and fabrics. Cotton, ramie, and linen are vegetable fibres; wool, mohair, and silk are of animal origin; asbestos is a mineral. Rayon is a synthetic material made from cellulose, wood pulp forming the bulk of the raw material for its manufacture.

texture. The mode of union or disposition, in regard to each other, of the elementary constituent parts in the structure of any body or material.—(*Geol.*) That quality of a rock which is determined by the relative sizes, disposition, and arrangement of the component minerals. The nomenclature and classification of rocks are governed by mineral composition and texture. See, for example, **graphic texture, ophitic texture, poikilitic texture.**—(*Photog.*) The quality of the surface of a photograph.

texture brick (*Build.*). A rustic brick. See **rustics.**

Th (*Chem.*). The symbol for *thorium*.

thalamenceph'alon (*Zool.*). See **diencephalon.**

thalamiflo'ral (*Bot.*). Said of a flower which has all its members inserted separately on the receptacle, with the gynaeceum superior.

thala'mium (*Bot.*), The hymenium of an apothecium.

thal'amus (*Bot.*). The receptacle of a flower.

thalamus (*Zool.*). In the Vertebrate brain, the larger, more ventral part of the dorsal zone of the thalamencephalon.

thalass'in (*Zool.*). A poisonous substance produced by some sea-anemones. (Greek *thalassa*, sea.)

thalass'oid (*Ecol.*). See **pseudo-marine.**

thalass'ophyte (*Bot.*) A seaweed.

Thalia'cea (*Zool.*). A class of *Urochorda* in which the adult is pelagic and tailless, with a degenerate nervous system and a posterior atriopore; the gill-clefts are not divided by external longitudinal bars.

thal'liform (*Bot.*). Like a thallus.

thal'line exciple (*Bot.*). An exciple which contains algal cells.

thalline margin (*Bot.*). The margin of an apothecium in a lichen when it is of the same structure as the thallus, and usually coloured like the thallus.

thallium (*Chem.*). Symbol, Tl. A metallic element in the third group of the periodic system. At. no. 81, at. wt. 204·39. The metal is silvery white, but turns to a grey colour in air; m.p. 303°, b.p. 1525° C., sp. gr. at ordinary temperatures 11·9. It can act as a monovalent element and as a trivalent element.

thallo'dic (*Bot.*). Belonging to a thallus.

Thallophy'ta (*Bot.*). A major division of the plant kingdom, including fungi, algae, bacteria, and a number of smaller groups. The plant body is a thallus, but varies a good deal in complexity, and the plants do not produce flowers or seeds.

thallous carbonate (*Chem.*). Tl_2CO_3. Possesses marked fungicidal potency against mildew growth in textile fabrics.

thallus (*Bot.*). A plant body which is not differentiated into root and shoot; it may be a single cell, a filament of cells, or a complicated branching multicellular structure, in which case it has no true root.

Thal'ofide cell (*Photo-electric Cells*). A photoconducting cell employing thallium oxy-sulphide as the light-sensitive agent.

thalweg, tahl'väg (*Geol.*). (German 'valley way.') The name frequently used for the longitudinal profile of a river, i.e. from source to mouth.

than'atoid (*Zool.*). Poisonous, deadly, lethal; as some venomous animals.

Thanet Sands (*Geol.*). A succession of marine glauconitic sands which form the lowest division of the Landenian stage of the Eocene beds in the London district.

thatchboard (*Build.*) A form of building-board made of straw, faced sometimes with cement or plaster.

thatching (*Build.*). A form of roof-covering composed of courses of reeds, straw, or heather laced together.

theatre film (*Cinema*). The fictional type of film which forms the major part of cinema programmes.

theatre main (*Elec. Eng.*). A special service main providing an alternative electric supply to a theatre in the event of failure of the normal supply.

theatre organ. A musical instrument based on organ technique, but employing more novel effects, for entertainment purposes in theatres, mainly cinemas. Characterised by the full use of the extension principle, the predominance of tibia tone, and the possibility of drawing nearly all the stops on any manual; contrasted with the straight organ for concert or ecclesiastical purposes, in which each manual is a complete organ in itself, extension is sparingly used, and the predominant tone is diapason. Also termed UNIT ORCHESTRA.

the'baine (*Chem.*). $C_{19}H_{21}NO_3$; glistening plates; m.p. 193° C.; contained in opium; it is a morphine in which both hydroxyls are methylated.

Thebe'sian valve (*Zool.*). An auricular valve of the Mammalian heart.

the'ca (*Bot.*). (1) An ascus.—(2) The capsule of a moss.—(3) A pollen sac.—(4) An anther.

theca (*Zool.*). A case or sheath covering or enclosing an organ, as the *theca vertebralis* or dura mater enclosing the spinal cord: a tendon sheath: the wall of a coral cup.—*adjs.* **the'cal, the'cate.**

the'caspore (*Bot.*). An ascospore.

thecif'erous (*Bot.*). Containing asci.

the'cium (*Bot.*). The hymenium of the apothecium of a lichen.

the'codont (*Zool.*). Having the teeth implanted in sockets in the bone which bears them.

the'ine (*Chem.*). See **caffeine.**

thelykaryot'ic (*Zool.*). Possessing a female pronucleus only.

thel'ytoky (*Zool.*). Parthenogenesis resulting in the production of females only.

ThEm (*Chem.*). The symbol for *thorium emanation*, or *thoron* (q.v.).

the'nal (*Zool.*). Pertaining to the palm of the hand.

Thénard's blue, tā-nar (*Chem.*). A blue pigment made by calcining a mixture of cobalt oxide and alumina. It can be used in oil or water.

theobro'mine (*Chem.*). 3,7-Dimethyl-2,6-dihydroxypurine. Occurs in cacao beans. A crystalline powder with a bitter taste. It is used as a diuretic and in certain forms of dropsy.

theod'olite (*Surv.*). An instrument for measuring horizontal and vertical angles.

theophyll'ine (*Chem*). 1, 3 - Dimethyl - 2, 6 - dihydroxypurine. Occurs in tea and is a strong diuretic. Colourless crystals; m.p. 264° C.

theorem of the equipartition of energy (*Chem.*). See **principle of the equipartition of energy.**

theory. A *scientific theory* is a co-ordinated set of hypotheses which are found to be consistent with one another and with specially observed phenomena.

theory of indicators (*Chem.*). See **Ostwald's theory of indicators.**

ther'alite (*Geol*). A coarse-grained, holocrystalline igneous rock composed essentially of the minerals labradorite, nepheline, purple titanaugite, and often with soda-amphiboles, biotite, analcite, or olivine.

therapeu'tic (*Med.*). Of, or pertaining to, the medical treatment of disease: remedial: curative. —Hence THERAPEUTICS, that part of medical science which deals with the treatment of disease; the art of healing.

ther'apy (*Med.*). The curative and preventive medical treatment of disease.

therm-, thermo- (Greek *thermē*, heat). A prefix used in the construction of compound terms; e.g. *thermodynamics*, *thermometer* (qq.v).

therm (*Phys*). A unit of heat used as a basis for the sale of town gas; equal to 100,000 B.Th.U.

thermal (*Aero.*). See **air pocket*.**

thermal agitation noise (*Elec. Comm.*). See **Johnson noise.**

thermal ammeter (*Elec. Eng.*). One in which the deflection of the pointer depends on the sag of a fine wire carrying the current to be measured, due to thermal expansion.

thermal analysis (*Met.*). The use of cooling or heating curves in the study of changes in metals and alloys. The freezing-points and the temperatures of any polymorphic changes occurring in pure metals may be determined. The freezing ranges and temperatures of changes in solid alloys may also be studied. The data obtained are used in constructing constitutional diagrams.

thermal capacity (*Heat*). See **water equivalent.**

thermal circuit-breaker (*Elec. Eng.*). A miniature-type circuit-breaker whose overload device operates by virtue of thermal expansion.

thermal conductivity (*Heat*). See **conductivity (thermal).**

thermal cut-out (*Elec. Eng.*). A thermal circuit-breaker designed to screw into a standard barrel-type fuse-holder.

thermal death-point (*Bot.*). The temperature at which an organism is killed or a plant virus inactivated.

thermal detector (*Radio*). Any detector of high-frequency currents which operates by virtue of their heating effect when passed through a resistance.

thermal dissociation (*Chem.*). The dissociation of certain molecules under the influence of heat.

thermal efficiency (*Eng.*). Of a heat engine, the ratio of the work done by the engine to the mechanical equivalent of the heat supplied in the steam or fuel.

See **brake—** **indicated—**

thermal emissivity (*Bot.*). The loss of heat from a leaf by radiation, conduction, and convection.

thermal flasher (*Illum.*). A flasher the operation of which depends upon the heating effect of the current which it is controlling. The movement of a wire or bimetallic strip, when heated by the current, causes it to interrupt the circuit, which is not remade until it has cooled.

thermal instability (*Cables, Diel*). The condition when, the power factor rising so rapidly with temperature that the losses increase more rapidly than the dissipation, the dielectric becomes progressively hotter and burns out.

thermal instrument (*Elec. Eng.*). An instrument the operation of which depends upon the heating effect of a current. See **hot-wire, thermocouple instrument.**

thermal limit (*Elec. Eng.*). The maximum permissible output of an electrical machine as governed by considerations of safe temperature rise.

thermal metamorphism (*Geol.*). The process by which the atoms forming the constituent parts of rocks are regrouped as a result of induced temperature changes, due to contact with, or proximity to, molten magma. Cf. *regional metamorphism.*

thermal microphone (*Acous.*). A microphone which depends for its operation on the variation of resistance of a fine wire or foil on the passage of a sound-wave, the velocity of the particles in the sound-wave cooling the heated wire.

thermal noise (*Elec. Comm.*). See **Johnson noise.**

thermal ohm (*Elec. Eng*). See **thermal resistance.**

thermal receiver (*Acous.*). The same as *thermophone.*

thermal relay (*Elec. Eng*). A relay the operation of which depends upon the heating effect of an electric current.

thermal resistance (*Elec. Eng.*). Resistance to the flow of heat. The unit of resistance is the *thermal ohm*, which requires a temperature difference of 1° C. to drive heat at the rate of 1 watt If the temperature difference is θ° C., the resistance S thermal ohms, and the rate of driving heat W watts, we have $\theta = SW$.

thermal resistivity (*Cables*). The resistance to the flow of heat across a cm. cube of dielectric. The unit is ° C. × cm./watt.

thermal station (*Elec. Eng.*). An electric generating station in which the prime movers are steam-turbines or internal-combustion engines.

thermal trip (*Elec. Eng.*). A tripping relay for a large circuit-breaker, which operates by thermal expansion.

thermal unit (*Heat*). See **British Thermal Unit, calorie.**

therman'aesthe'sia (*Med.*). Loss of skin sensibility to heat and cold.

ther'mion (*Thermionics*). An electron emitted from a heated cathode. (Rare.)

thermion'ics. Strictly, the science dealing with the emission of electrons from hot bodies. Applied, generally, to the broader subject of the subsequent behaviour and control of such electrons, especially in vacuo.

thermionic amplifier. Any device employing thermionic vacuum tubes and used for the amplification of electric currents and/or voltages. Also called THERMIONIC MAGNIFIER.

thermionic current (*Thermionics*). The current represented by the electrons leaving a heated cathode and flowing to other electrodes, as distinguished from the current which flows through the cathode for the purpose of heating it. Also called SPACE CURRENT.

thermionic detector (*Radio*). A thermionic vacuum tube used for the detection of radio-frequency alternating currents.

thermionic emission (*Thermionics*). The emission of electrons from the surface of a conductor through the agency of heat.

thermionic generator (*Radio*). A generator of high-frequency alternating currents which employs thermionic vacuum tubes as a means of conversion from d.c. to a.c.; for example, an oscillator.

thermionic magnifier (*Thermionics*). See **thermionic amplifier.**

thermionic oscillator. An oscillator employing a thermionic vacuum tube (or tubes).

thermionic rectifier (*Radio*). A thermionic vacuum tube used for the rectification or detection of alternating currents.

thermionic relay (*Thermionics*). A three- (or more) electrode thermionic vacuum tube in which the potential applied to one of the electrodes controls the current flowing to another, usually without the expenditure of energy at the control electrode.

thermionic tube, thermionic vacuum tube (*Thermionics*). See **thermionic valve.**

thermionic valve (*Thermionics*). A vacuum tube containing a heated cathode from which electrons are emitted, an anode for collecting some or all of these electrons, and generally additional electrodes for controlling their flow to the anode. Also called THERMIONIC TUBE, THERMIONIC VACUUM TUBE.

thermionic voltmeter (*Thermionics*). A combination of thermionic vacuum tube (or tubes) with d.c. indicating instruments; used for the measurement of alternating or direct voltages, and generally characterised by the absence of current drawn from the source of voltage measured. A number of forms are available, for the measurement of peak, r.m.s., and average voltage over a wide range of values.

ther'mite process (*Chem.*). See **aluminothermic process** and **Thermit*.**

thermo-. Prefix. See **therm-.**

thermochem'istry (*Chem.*) The study of the heat changes accompanying chemical reactions.

thermo-couple (*Elec. Eng.*). A combination of two dissimilar metals having a junction which can be maintained at the temperature which it is desired to measure in terms of the thermo-electric current produced.

thermo-couple instrument (*Elec. Eng.*). An instrument the operation of which depends upon the heating of a thermo-junction by an electric current.

thermodynam'ics (*Phys.*). The mathematical treatment of the relation of heat to mechanical and other forms of energy. Its chief applications are with respect to heat engines (steam-engines and I.C. engines; see **Carnot cycle**) and to chemical reactions (see **thermochemistry**).—LAWS OF THERMODYNAMICS. 1*st law*: During a transformation of heat into any other form of energy there is a constant relation between the amount of heat lost and the amount of energy gained. The same is true of the reverse process.—2*nd law*: Heat can never pass spontaneously from a colder to a hotter body; a temperature difference can never appear spontaneously in a body originally at uniform temperature (Clausius).

thermodynamic concentration (*Chem.*). See **activity** (2).

thermodynamic potential (*Chem.*). The differential coefficient of the energy taken with respect to the variable expressing the quantity of the substance.

thermo-electric element (*Elec. Eng.*). One of the two dissimilar metallic conductors constituting a thermo-couple.

thermo-electric pyrometer (*Elec. Eng.*). The combination of apparatus forming a temperature-indicating instrument whose action derives from a thermo-electric current.

thermo-electricity (*Elec. Eng.*). The current flowing in a circuit due to an e.m.f. generated by the difference in temperature between the junction of two dissimilar metal conductors and another part of the circuit.

thermo-e.m.f. (*Elec. Eng.*). The e.m.f. produced at the junction of two dissimilar metals when heated; if the circuit is electrically completed a current flows, the necessary energy being obtained from the heat supplied to the junction, which is therefore cooled.

thermo-galvanometer (*Elec. Eng.*). A galvanometer in which the current to be measured passes through a fine wire coil, in which it produces a heating effect. Above the coil is suspended a thermo-couple, the e.m.f. from which is observed by means of a moving-coil galvanometer.

thermogen'esis (*Zool.*). Production of heat within the body.

therm'ograph (*Meteor.*). A continuously recording thermometer. In the commonest forms the record is made by the movement of a bimetallic spiral, or by means of the out-of-balance current in a Wheatstone bridge containing a resistance thermometer in one of its arms.

thermola'bile (*Chem.*). Tending to decompose on being heated.

thermol'ysis (*Chem.*). The dissociation or decomposition of a molecule by heat.—(*Zool.*) Loss of body heat.

thermometer (*Heat*). An instrument for measuring temperature. The commonest form consists of a glass bulb communicating with a straight uniform capillary tube, mercury filling the bulb and part of the stem. As temperature rises and falls, the mercury expands and contracts, the position of the end of the mercury thread indicating the temperature on a scale engraved on or attached to the stem. A *clinical thermometer* is one specially adapted for recording bodily temperature. See **fixed points,** also **platinum (resistance) thermometer, Six's thermometer.**

thermometer screen (*Meteor.*). See **Stevenson screen.**

thermomet'ric scales (*Heat*). See **Fahrenheit scale, Centigrade scale, fixed points.**

thermom'etry (*Heat*). The measurement of temperature.

ther'monas'ty (*Bot.*). A nastic movement in a plant in relation to heat.

ther'mophile, thermophi'lous, thermophi'lic (*Bot.*). Said of a plant which requires a high temperature for growth, or which can tolerate exposure to high temperatures.

thermophi'lic bacteria (*Bot.*). Bacteria which need a temperature of from 45° C. to 65° C. for their development.

ther'mophone (*Acous.*). A device which generates alternating acoustic pressures, either within the aural cavity when used as a telephone receiver or for measuring the sensitivity of the ear, or in the cavity of a condenser-transmitter during calibration; the pressure variations arise from heat disposal from a fine wire or foil, which carries the corresponding electric currents.

ther'mophyte (*Bot.*). A plant growing in warm situations.

ther'mopile (*Elec. Eng.*). An apparatus for the direct conversion of heat into electrical energy, consisting of a number of thermo-electric elements connected in series or in parallel or both.

thermoplas'tic (*Chem.*). Becoming plastic on being heated. Specifically (*Plastics*), any resin which can be melted by heat and then cooled, the process being able to be repeated any number of times without appreciable change in properties; e.g. cellulose acetate, vinyl resins, polystyrenes, acrylic resins.

thermoplastic putty (*Build.*). Glazier's putty which is rendered pliable by the addition of tallow and is so able to give and take with the expansion and contraction of large sheets of glass.

thermoreg'ulator (*Chem.*). A device which keeps a bath at a constant temperature by regulating the supply of heat thereto. Thermoregulators generally contain a liquid with a high coefficient of expansion, e.g. toluene or mercury.

Thermosbaena'cea (*Zool.*). An order of small and inconspicuous *Peracarida* closely related to the *Cumacea* and *Tanaidacea*; it comprises only a single species, which occurs in the waters of hot mineral springs.

thermoscop'ic (*Zool.*). Perceptive of change of temperature.

thermosetting compositions (*Plastics*). Compositions in which a chemical reaction takes place while they are being moulded under heat and pressure; the appearance and chemical and physical properties are entirely changed, and the product is resistant to further applications of heat; e.g. phenolics, urea resins.

thermosta'ble (*Bot., etc*). Not decomposed by moderate heating.

thermo-stage (*Bot.*). A stage in the life-history of a flowering plant, when, at the outset of development from the embryo in the seed, low temperatures are needed to ensure further normal development.

ther'mostat (*Chem.*). A bath which is kept at a constant temperature.—(*Heat*) A device for maintaining an enclosure at a constant temperature. This may be achieved by arranging that some expansible element automatically cuts off the heat supply (gas or electric) when the temperature exceeds the required value.

thermostat'ic control (*Elec. Eng.*). The automatic adjustment or maintenance of temperature by means of a thermostat.

thermotax'is (*Biol.*). Response or reaction of an organism to the stimulus of heat —*adj.* **thermotac'tic.**

thermotol'erant (*Bot.*). Able to endure high temperatures, but not growing well under such conditions.

thermotro'pism (*Biol.*). See **thermotaxis.**

therophyll'ous (*Bot.*) Having leaves only in the warmer part of the year; deciduous.

ther'ophyte (*Bot.*). An annual plant, passing the winter or dry season in the form of seeds.

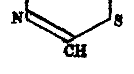
Thévénin's theorem, tā-vā-nan^g (*Elec. Comm.*). The current produced in a load, when connected to a source, is that produced by an electromotive force equal to the open-circuit voltage of the source divided by the load-impedance plus the apparent internal impedance of the source, i.e. the conjugate impedance to that which extracts maximum power from the source. See **Norton's theorem.**

thi-, thio- (*Chem.*). A prefix denoting a compound in which a sulphur atom occupies a position normally filled by an oxygen atom.

thi'amides (*Chem.*). A group of compounds derived from amides by the exchange of oxygen for sulphur, e.g. $CH_3 \cdot CS \cdot NH_2$.

thi'azines (*Chem.*). Six-membered heterocyclic compounds, containing in the ring four carbon, one sulphur, and one nitrogen atoms.

thi'azole (*Chem.*). A colourless, very volatile liquid which closely resembles pyridine; b.p. 117° C. It forms salts, but is hardly affected by concentrated sulphuric acid. Its formula is



thiazole dyestuffs (*Chem.*). Thiazole derivarives, e.g. primulines, which are obtained by heating a mixture of *p*-toluidine with sulphur at about 200° C. Other dyestuffs of this group are the thioflavines.

thick lens (*Light*). Any lens, or system of lenses, in which the distance between the outer faces is not small compared with the focal length.

thickener (*Met.*). Apparatus in which water is removed from ore pulp by allowing solids to settle. To obtain continuous working the solids are worked towards a central hole in the bottom by means of revolving rakes.

thickening fibre (*Bot.*). One of the spiral bands of thickening on the wall of a cell, tracheide, or vessel.

thickness moulding (*Build.*). A moulding serving to fill up the bare space beneath a projecting cornice.

thig'mocyte (*Zool*). See **thrombocyte.**

thigmotax'is (*Biol*). Response or reaction of an organism to the stimulus of touch or contact.—*adj.* **thigmotac'tic.**

thigmotro'pism (*Biol*). Thigmotaxis.

thill (*Mining*). The floor in a coal-mine.

thimble (*Plumb*). See **sleeve piece.**

thimbles (*Pot*). Supports used in seggars for flat-ware

thimble-tube boiler (*Eng*). A heat-recovery boiler, consisting of an annular water-drum from which short thimble-like tubes or pockets project into the central flue, through which the hot exhaust products are passed.

thin (*Photog.*). A general term referring to a developed emulsion which has density lower than normal, either because of lack of exposure or insufficient development.

thin feel (*Textiles*). The term applied to a fabric which is thin or appears so when handled.

thin films, colours of (*Light*). See **colours of thin films.**

thinner (*Paint.*). A substance, such as turpentine or petroleum spirits, which is added to a mixed paint in order to thin it to a consistency at which it will work freely.

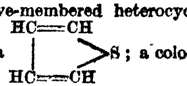
thio-acids (*Chem*). Acids in which the hydroxyl of the carboxyl group has been replaced by SH, thus forming the group $-CO \cdot SH$.

thio-alcohols (*Chem.*). *Mercaptans* (q.v.).

thiocar'bamide (*Chem.*). *Thiourea* (q.v.).

thiocy'anates (*Chem.*). Compounds formed when alkaline cyanides are fused with sulphur. Also called SULPHOCYANIDES.

thio-ethers (*Chem.*). Compounds in which the ether oxygen has been replaced by sulphur; general formula R.S.R'. They form additive crystalline compounds with metallic salts; they are capable of combining with halogen or oxygen, which becomes attached to the sulphur atom, thereby converting the latter from the bivalent to the tetravalent state; and they form additive crystalline compounds with alkyl halides, e.g. $(CH_3)_3SI$.

thi'ophen (*Chem.*). A five-membered heterocyclic compound of the formula  ; a colourless liquid, b.p. 84° C., which closely resembles benzene and occurs in coal-tar.

thiosulphu'ric acid (*Chem.*). See **hyposulphurous acid.**

thiourea, thī'ō-ū-rē'a (*Chem.*). Thiocarbamide, $NH_2 \cdot CS \cdot NH_2$, colourless prisms, m.p. 180° C.; it is slightly soluble in water, alcohol, and ether. It is used in organic synthesis and as a reagent for bismuth.

thiourea resins (*Plastics*). Resins made from thiourea and an aldehyde. They are more water-resistant and more stable than the urea resins, but they cure more slowly, and the sulphur in them causes trouble with the steel moulds and the dyestuffs used to colour them.

third pinion (*Horol.*). The pinion on the same axis as the third wheel which engages with the centre wheel.

third-rail insulator (*Elec. Eng.*). See **conductor-rail insulator.**

third-rail system (*Elec. Eng.*). The system of electric traction supply by which current is fed to the electric tractor from an insulated conductor rail running parallel with the track.

third tap (*Eng.*). See **plug tap** (1).

third ventricle (*Zool.*). In Vertebrates, the cavity of the 'twixt brain or thalamencephalon.

third wheel (*Horol.*). The wheel between the centre and the fourth wheel of a watch train.

thirds (*Paper*). A standard size of cut card, 1½ × 3 in.

thirl (*Mining*). To cut through from one working into another. To cut out the lost coal between two workings or headings.

Thistle board (*Build.*). A form of building-board made from gypsum faced with sheets of brown paper on both sides.

thistle funnel (*Chem.*). A glass funnel with a thistle-shaped head to which is attached a long narrow tube.

thix'otrope (*Chem.*). A colloid whose properties are affected by mechanical treatment.

thixot'ropy (*Chem.*). The property, shown by certain gels, of liquefying on being shaken and of re-forming on standing.

tholeiite, tō'lē-it (*Geol.*). A fine-grained basic igneous rock essentially basaltic in composition, intersertal in texture, with wedges of mesostasis or glass occurring between laths of plagioclase. Quartz-dolerite is the medium-grained equivalent of tholeiite.

Thomas's splint (*Surg.*). A skeleton splint consisting of two parallel metal rods and a padded leather ring, used for maintaining the hip and the knee-joint in fixed extension.

Thomsen's disease (*Med.*). See **myotonia congenita.**

Thomson compass (*Elec. Eng.*). See **Kelvin compass.**

Thomson effect (*Elec. Eng.*). The phenomenon of thermo-electricity. Also called KELVIN EFFECT.

Thompson Limestone (*Geol.*). A marine limestone occurring in the Jurassic succession of the Cordilleran geosyncline in California; equivalent, with the overlying Mormon Sandstone, to the Bajocian of the European succession.

thoracente'sis, thoracocente'sis (*Surg.*). The operation of drawing off a morbid collection of fluid in the pleural cavity through a hollow needle stuck through the wall of the chest.

Thorac'ica (*Zool.*). An order of *Cirripedia*, the members of which possess a mantle and six pairs of cirriform trunk appendages; the members of the order, although frequently found attached to other animals, are rarely parasitic.

thorac'icolum'bar outflow (*Zool.*). See **sympathetic nervous system.**

thoracop'agus (*Med.*). A foetal monstrosity in which twins are joined together at the thorax.

tho'racoplasty (*Surg.*). The operation for collapsing a diseased lung by removal of portions of the ribs.

thora'coscope (*Surg.*). An instrument for viewing the pleura covering the lung and the chest wall. It is inserted through the chest wall into a pleural cavity previously filled with air.

thoracot'omy (*Surg.*). Incision of the wall of the chest, for draining pus from the pleural cavity or from the lung.

tho'rax (*Zool.*). In *Crustacea* and *Arachnida*, a region of the body lying between the head and the abdomen and usually fused with the former, distinguished by the nature of its appendages: in *Insecta*, one of the three primary regions of the body, lying between the head and the abdomen, and bearing in the adult three pairs of legs and the wings (if present): in some tubicolous *Polychaeta*, a region of the body behind the head, distinguished by the form of its segments and the nature of its appendages: in land *Vertebrata*, the region of the trunk between the head or neck and the abdomen which contains the heart and lungs and bears the fore limbs, especially in the higher forms, in which it is enclosed by ribs and separated from the abdomen by the diaphragm.—*adj.* **thorac'ic.**

thor'iated filament (*Thermionics*). A tungsten filament containing a small proportion of thorium, to reduce the temperature at which copious electronic emission takes place.

thor'ium (*Chem.*). Symbol, Th. A radio-active dark grey metallic element in the fourth group of the periodic system. At. no. 90, at. wt. 232·12, half-life 1·8 × 10^{10} years, m.p. above 1700° C., sp. gr. 11-12, specific electrical resistivity 18 microhms per cm. cub., chief source monazite. The oxide, ThO_2, is used in gas-mantles.

thorn (*Bot.*). A leaf, part of a leaf, or a shoot which contains vascular tissue and ends in a hard, sharp point.

thor'on (*Chem.*). A radio-active isotope of radon, produced by the disintegration of thorium; its half-life is 54·5 seconds.

thor'oughpin (*Vet.*). A distension of the synovial sheath of the flexor perforans tendons of the horse at the knee-joint.

thorter-ill (*Vet.*). See **louping ill.**

thousand (*Build.*). A trade term for 1200 slates.

thread (*Eng.*) See **screw thread.**

thread grinding (*Eng.*). The accurate finishing of screw threads by a form grinding wheel, profiled to the thread section and automatically traversed along the revolving work.

threading or **threading-up** (*Cinema.*). The operation of inserting the start of the film into the mechanism of camera, or projector, as it leaves the feed-reel, and attaching it to the take-up reel.

three-ammeter method (*Elec. Eng.*). A method of measuring the power carried by a single-phase circuit making use of three ammeters.

three-centred arch (*Build.*). An arch having the form of a false ellipse struck from three centres.

three-coat work (*Plast.*). Plastering in three successive coats. See **pricking-up, roughing-in, floating, setting.**

three-colour process (*Photog.*). Any system of colour photography which analyses the colours by three colour filters each giving a black-and-white record. These records are used in the synthesis of the final positive coloured image, either by the additive process, in which lights approximating to the filters are added together, or by the subtractive process, in which the colours approximating to filters are subtracted from white light, or from a white reflecting surface, by the use of colours complementary to those of the filters.—(*Print.*) The subtractive process applied to printing. The yellow is, as a rule, printed first, followed by red, then blue. A fourth printing, in black or grey, may be added in high-class work.

three-core cable (*Elec. Eng.*). A cable having three conducting cores arranged symmetrically about the axis of the cable and insulated.

three-electrode valve (*Thermionics*). See **triode valve.**

three-high mill (*Met.*). A rolling mill with three rolls, which are rotated in such a way that the metal is passed in one direction through the bottom pair of rolls and in the opposite direction through the top pair.

three-hinged arch (*Civ. Eng.*). An otherwise continuous arch which is hinged at the crown and the abutments.

three-impedance star network (*Elec. Comm.*). See **Y-network.**

three-light window (*Join.*). A window having two mullions dividing the window space into three compartments.

three-phase (*Elec. Eng.*). A term applied to an a.c. system in which the currents flowing in three independent circuits are mutually displaced in phase by 120 electrical degrees.

three-phase four-wire system (*Elec. Eng.*). A system of three-phase a.c. distribution making use of three outgoing conductors (lines) and a common return conductor (neutral), the voltage between lines being $\sqrt{3}$ times the voltage between any line and the neutral.

three-phase induction regulator (*Elec. Eng.*). An induction regulator for use on three-phase circuits, in which the e.m.f. induced in the secondary winding is constant in magnitude but variable in phase, so that the total e.m.f. on the secondary side bears a small phase displacement to the primary voltage.

three-phase six-wire system (*Elec. Eng.*). A system of three-phase a.c. distribution in which each phase has separate outgoing and return conductors.

three-pin plug (*Elec. Eng.*). A plug with three contact pins, two for the main circuit and one for the earth connexion.

three-pinned arch (*Civ. Eng.*). See **three-hinged arch.**

three-point landing (*Aero.*). The landing of an aeroplane on the two wheels and tail skid (or wheel) simultaneously; the normal 'perfect landing.'

three-point problem (*Surv.*). A field problem, arising in plane table and hydrographical surveying, in which it is required to locate on the plan the position of the instrument station, given that only three points represented on the plan are in fact visible from the station.

three-point switch (*Elec. Eng.*). See **three-way switch.**

three-quarter bat (*Build.*). A bat of length equal to three-quarters the full length of a brick.

three-quarter plate watch (*Horol.*). A watch with the upper plate cut away so that the balance may be in the same plane as the plate.

three-start thread (*Eng.*). See **multiple-threaded screw.**

three-voltmeter method (*Elec. Eng.*). A method of measuring the power in a single-phase circuit by means of three voltmeters and a non-reactive resistance. Cf. *three-ammeter method.*

three-wattmeter method (*Elec. Eng.*). A method of measuring the power carried by a three-phase four-wire circuit, making use of three wattmeters whose current coils are connected in the lines and whose voltage coils are connected between the lines and the neutral.

three-way switch (*Elec. Eng.*). A rotary-type single-pole switch having three independent contact positions.

three-wire meter (*Elec. Eng.*). An electricity supply meter performing the simultaneous integration of the energy supplied by the two sides of a three-wire system.

three-wire mooring (*Aero.*). See **mooring (three-wire).**

three-wire system (*Elec. Eng.*). A system of d.c. transmission and distribution making use of two main conductors, the so-called positive and negative 'outers,' and a third conductor, the so-called 'mid-wire' or neutral, whose potential is intermediate between that of the other two. A consumer is fed by a neutral and one outer wire. By suitably alternating the outer wire for neighbouring consumers, the current in the neutral is kept small compared with the currents in the outers. The neutral wire is usually made half the weight of the outers.

threshold (*Build.*). See **sill.**

threshold (*Photog.*). The minimum intensity of stimulus which causes a perceptible sensation in the eye.

threshold effect (*Cathode Ray Tubes*). *Origin distortion* (q.v.)—(*Radio*) The marked increase in background noise which occurs in a valve circuit when on the verge of oscillation.

threshold of hearing (*Acous.*). The curve that gives the relation between frequency and the relative intensity of sound (usually expressed in bels or decibels) which can just be heard in very quiet surroundings. Marked deviations from the average indicates that the ear is deaf. The deviations are useful in diagnosing the cause of deafness and adjusting a suitable correcting deaf-aid. See **audiogram.**

thrill (*Med.*). A tremor or vibration palpable at the surface of the body, especially in valvular disease of the heart.

throat (*Bot.*). The aperture of a gamopetalous corolla or of a gamosepalous calyx.

throat (*Build., Civ. Eng.*). See **drip.**

throat plate (*Eng.*). In a locomotive boiler, the front plate of the firebox casing, flanged to receive the boiler shell and *wrapper plate* (q.v.).

thromb-, thrombo- (Greek *thrombos*, lump, clot). A prefix used in compound terms; e.g. *thrombosis.*

thrombec'tomy (*Surg.*). The operation of removing a venous thrombus.

thrombin (*Chem.*). A protein-like substance formed in shed blood from *prothrombin** (q.v.). It reacts with the soluble protein fibrinogen, converting it to insoluble fibrin, and so causes the blood to clot.

thrombo-angii'tis oblit'erans (*Med.*). A disease occurring in Hebrews, characterised by inflammation and thrombosis of the larger arteries and veins (especially those of the leg); it gives rise to muscular cramps on walking and, later, to ulceration and gangrene of the foot.

throm'bocyte (*Zool.*). A minute greyish circular or oval body found in the blood of higher Vertebrates in numbers varying from 20,000 to 300,000 per cubic millimetre; it plays an important rôle in coagulation; a blood-platelet.

thrombocytope'nia (*Med.*). Abnormal decrease in the number of platelets (thrombocytes) in the blood. See **purpura haemorrhagica.**

thromboki'nase (*Chem.*). A *kinase* (q.v.) which converts prothrombin into active thrombin in the presence of soluble calcium salts.

thrombope'nia (*Med.*). See **thrombocytopenia.**

thrombophil'ia (*Med.*). A tendency to the formation of thrombi in the blood-vessels.

thrombophlebi'tis (*Med.*). Combined inflammation and thrombosis of a vein.

thrombo'sis (*Med.*). The formation of a clot in a blood-vessel during life.—(*Zool.*) Coagulation; clotting.

throm'bus (*Med.*). A clot formed in a blood-vessel during life and composed of thrombocytes (platelets), fibrin, and blood cells.

throttle valve (*Eng.*). (1) In steam engines and turbines, a governor-controlled steam valve, usually of the *double-beat* (q.v.) type.—(2) In gas engines, the *regulator valve* (q.v.).—(3) In petrol engines, the *butterfly valve* (q.v.).—(4) In refrigerators, the regulating valve controlling the pressure and temperature range of the working agent.

throttling (*Eng.*). The process of reducing the pressure of a fluid by causing it to pass through minute or tortuous passages so that no kinetic energy is developed and the total heat remains constant. See **refrigerators, throttling calorimeter.**

throttling calorimeter (*Eng.*). A device for measuring the *dryness fraction* (q.v.) of wet steam by throttling to a measured lower pressure and measuring the resulting degree of superheat.

through bridge (*Civ. Eng.*). A bridge in which the track is carried by the lower stringer. Cf. *deck bridge.*

through road (*Civ. Eng.*). A road which serves as a connexion between other roads.

through-stone (*Masonry*). A bondstone whose length is equal to the full thickness of the wall in which it is laid as a header. Also called PERPEND.

throw (*Cinema.*). The distance between the projector and the screen.

throw (*Elec. Eng.*). See **span** (2).

throw (*Geol.*). The amount of vertical displacement (*upthrow* or *downthrow*) of a particular rock, vein, or stratum, due to faulting; usually expressed in fathoms, yards, or feet. See **fault,** and cf. *lateral shift.*

throw (*Horol.*). A hand-driven, dead-centre lathe, used by clock-makers.

throw (*Mining*). (1) See **throw** (*Geol.*).—(2) The amplitude of shake of a concentrating table.

throwback (*Acous.*). In a public-address system, when the microphone is near the reproducers, the *throwback* is the sound-intensity which is applied to the microphone by the reproducers. If this is excessive, the system becomes paralysed with self-sustained oscillations.

throw-off trip (*Print.*). An attachment on a printing machine which allows the impression to be suspended without stopping the machine.

throw-over switches (*Elec. Eng.*). See **double-throw switches.**

throwing (*Pot.*). The operation of shaping clay on a potter's wheel, on a flat disc supported on a shaft and rotated by a treadle, or by power.

throwing (*Textiles*). In silk manufacture, the processes of reeling, doubling, twisting, scouring, etc., to bring the raw silk filaments into the form of a silk thread.

throwing power (*Chem.*). The property of a solution in virtue of which a relatively uniform layer of metal may be electrodeposited on a relatively irregular surface.

thrum-eyed (*Bot.*). Having the throat of the corolla more or less closed by the anthers; said of the primrose and its relatives.

thrush (*Med.*). Infection of the mouth with the fungus *Oidium albicans*, characterised by the appearance of white patches on the mucous membrane and the tongue.

thrush, avian (*Vet.*). See **oidiomycosis.**

thrush, equine (*Vet.*). Inflammation of the frog of the horse's foot, attended with a fetid discharge.

thrust (*Struct.*). The equal horizontal forces acting upon the abutments of an arch, due to the loading carried by it.

thrust bearing or **thrust block** (*Eng.*). A shaft bearing designed to take an axial load. It consists either of a plain bearing pad, a *Michell bearing* (q.v.), or a ball-bearing provided with lateral races.

thrust plane (*Geol.*). The plane over which a block of rocks is pushed as a result of stresses which develop in the earth's crust. This usually occurs when the elastic limit of the folded beds has been reached.

thu'lite (*Min.*). An obsolete name for *zoisite.*

thu'lium (*Chem.*). Chem. symbol, Tm or Tu. A metallic element, a member of the rare earth group. At. no. 69, at. wt. 169·4. One of the rarest elements, occurring in small quantities in euxenite, gadolinite, xenotime, etc.

thumb latch (*Join.*). A latch operated by the pressure of the thumb. See **Norfolk latch.**

thumbat (*Build.*). A *wall-hook* (q.v.) intended for attaching sheet-lead to a wall surface.

thunder (*Meteor.*). The crackling, booming, or rumbling noise which accompanies a flash of lightning. The noise has its origin in the violent thermal changes accompanying the discharge, which cause non-periodic wave disturbances in the air. Its reverberatory characteristic arises mainly from the continuous arrival of the brief noise from sections of the discharge at increasingly remote locations, since the spark may be several miles long. A *clap* of thunder occurs when the spark is, roughly, normal to the line of observation. The time-interval between lightning and the corresponding thunder (seconds divided by five) gives the distance of the storm centre (in miles).

thunder-cloud (*Meteor.*). See **cumulo-nimbus.**

thunder-storm (*Meteor.*). In the powerful upward air currents, which are a characteristic feature of a thunder-cloud, large raindrops become broken up and acquire positive electric charges, which accumulate until the potential becomes sufficient to cause a lightning discharge to occur, either to earth or to another cloud. See **lightning, cumulo-nimbus.**

Thurso Flagstone Group (*Geol.*). A group of flagstones, some 5000 ft. in thickness, constituting the higher division of the Caithness Flagstone Series of Northern Scotland.

Thury regulator, tu-rē (*Elec. Eng.*). An automatic voltage regulator in which the rheostat arm is moved by a pawl-and-ratchet mechanism actuated by solenoids.

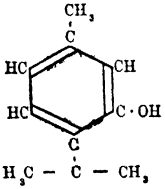
Thury screw-thread (*Eng.*). See **Swiss screw-thread.**

Thury system (*Elec. Eng.*) See **series system.**

thymec'tomy (*Surg.*) Surgical removal of the thymus.

thymi'tis (*Med.*). Inflammation of the thymus.

thy'mol (*Chem.*). $C_{10}H_{14}O$, 1-methyl-4-*iso*propyl-3-hydroxy-benzene, of the formula



Large crystals; m.p. 44° C., b.p. 230° C.; it occurs in thyme oil, and can be synthesised from *iso*propyl alcohol and *m*-cresol. It is used as a disinfectant.

thymo'ma (*Med.*). A tumour arising in the thymus, usually highly malignant.

thy'mus (*Zool.*). A ductless gland of Vertebrates, developed as a series of solid outgrowths from the gill-pouches, the function of which is believed to be associated with growth.

thy'ratron (*Thermionics*). Originally a trade-name for a gas-filled triode operating in an atmosphere of mercury vapour. The name is now generally applied to any gas-filled triode, other common gas fillings being argon, helium, and neon. The operation is similar to that of a high-vacuum triode, except that ionisation takes place when current starts to flow, the anode voltage drops, and the grid loses most of its controlling action.

thy'reohy'al (*Zool.*). In some Fish, a vertical plate connected with the posterior side of the basihyal and serving for the attachment of the muscles of the hyoid apparatus.

thyrid'ium (*Zool.*). In some Insects (as *Trichoptera*), a semi-transparent hairless whitish spot on the wing.

thy'riothe'cium (*Bot.*). An inverted perithecium in which the asci hang down.

thyro- (Greek *thyra*, door). A prefix used in the construction of compound terms relating to the thyroid gland or structures in that region; e.g. *thyro-glossal*, pertaining to the thyroid and the tongue.

thyrohy'oid (*Zool.*). The posterior cornua of the hyoid.

thy'roid (*Zool.*) In Vertebrates, a ductless gland in the pharyngeal region, ventral to the alimentary canal: one of the cartilages of the larynx.

thyroidec'tomise (*Surg.*). To remove the thyroid.

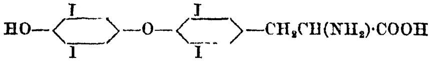
thyroidec'tomy (*Surg.*). The surgical removal of part of the thyroid gland.

thyroidi'tis (*Med.*). Inflammation of the thyroid gland. See also **Riedel's disease.**

thyrot'omy (*Surg.*). See **laryngofissure.**

thy'rotoxico'sis (*Med.*). The condition resulting from overactivity of the thyroid gland (hyperthyroidism), the secretion of which is probably abnormal, as in Graves's disease.

thyrox'ine (*Chem.*). $C_{15}H_{11}O_4NI_4$, a hormone produced by the thyroid gland, which controls the oxidation processes of the organism. Thyroxine has been synthesised, and the following constitution has been ascertained for it:



thyr'soid (*Bot.*). Of the nature of a thyrsus.

thyr'sus (*Bot.*). A densely branched inflorescence, of which the main branching is racemose but the lateral branches are cymose. The term is sometimes applied to any closely branched inflorescence containing many small stalked flowers.

Thysanop'tera (*Zool.*). An order of small *Exopterygota* having two pairs of narrow membranous wings fringed with long hairs and asymmetrical mouth-parts adapted for piercing and sucking; vegetarian forms occurring amongst flowers, foliage, dead leaves, and fungi; some are of economic importance as pests. Thrips, Fringe-wings.

Thysanu'ra (*Zool.*). An order of *Apterygota* having ten or eleven abdominal somites, many-jointed antennae, anal cerci, and abdominal appendages; some forms are blind; of universal distribution. Silver Fish, Bristle Tails.

thysanu'riform (*Zool.*). See **campodeiform.**

Ti (*Chem.*). The symbol for *titanium*.

tib'ia (*Zool.*). In land *Vertebrata*, the pre-axial bone of the crus: in *Insecta*, *Myriapoda*, and some *Arachnida*, the fourth joint of the leg.—*adj.* **tib'ial.**

tibia'le (*Zool.*). A bone of the proximal row of the tarsus in line with the tibia.

tibiofib'ula (*Zool.*). In some *Tetrapoda*, a bone of the leg formed by the fusion of the tibia with the fibula.

tibiotar'sus (*Zool.*). In Birds, a bone of the leg formed by the fusion of the tibia with the astragalus.

tic (*Med.*). See **habit spasm.**

tic douloureux, doo-loo-rê' (*Med.*). Trigeminal neuralgia. An affection of the fifth cranial nerve characterised by paroxysmal attacks of pain in the face and the forehead.

ticks (*Zool.*). See **Acarina.**

tick fever (*Vet.*). See **Texas fever.**

ticker (*Elec. Comm.*). The familiar name for a *tape-machine* (q.v.).

ticker (*Radio*). See **chopper.**

ticketing (*Mining*). A meeting for the sale of concentrates or washed ore. (Cornish.)

tickler coil (*Radio*). An inductance coil included in the anode circuit of a thermionic valve and magnetically coupled to the grid circuit to obtain reaction.

tidal dock (*Civ. Eng.*). A dock within which the level is the same as outside.

tide (*Astron.*). The effect of the gravitational attraction of the moon, and in a lesser degree of the sun, on the waters of the earth, by which they tend to become heaped up at the point below the moon, and at the opposite point to this, so that twice in each lunar day there is an alternate inflow and outflow on the shores, modified by local configurations.

tide gauge (*Surv.*). An apparatus for determining the variation of sea-level with time.

tie (*Eng.*). A frame member sustaining only a tensile load.

tie-beam (*Struct.*). A structural member connecting the lower ends of a pair of principal rafters to prevent them from moving apart.

tie line (*Surv.*). A survey line forming part of a *skeleton* (q.v.) and serving to fix its shape, e.g. a diagonal of a four-sided skeleton.

tie line (*Teleph.*). A line which may pass through exchanges, but which is used solely for connecting private branch exchanges, and over which incoming calls cannot be extended.

tie-rod (*Struct.*). A *tension rod* (q.v.).

tie-rod stator frame (*Elec. Eng.*). A form of stator frame for large electrical machines in which several frame sections are laterally secured by means of tie-rods parallel with the axis of the machine.

tie wall (*Civ. Eng.*). A cross-wall built upon the extrados of an arch at right-angles to the spandrel wall or walls.

tie-wire (*Elec. Eng.*). A wire used to attach a transmission or telephone line conductor to a supporting insulator. Also called a BINDING-WIRE.

Tied'emann's bodies (or **vesicles**) (*Zool.*). In some *Echinodermata*, small gland-like structures of unknown function borne by the water-vascular ring.

Tiemann-Reimer reaction, tē'man rī'mer (*Chem.*). The synthesis of phenolic aldehydes by heating a phenol with chloroform in the presence of concentrated KOH. The intermediate dichloro derivative is hydrolysed to an aldehyde. The ·CHO group takes up the *o-* or *p-*position with respect to the hydroxyl group.

tier or **teir** or **rangs** (*Textiles*). The term applied to the carriages in a lace machine, arranged in working order.

TIF (*Teleph.*). Abbrev. for *telephone interference* (or *influence*) *factor*.

tige, tēzh (*Arch.*). The principal part of a column, between the capital and the base.

tiger's eye (*Min.*). A form of silicified crocidolite stained yellow or brown by iron oxide.

tight coupling (*Elec. Eng.*). Two circuits are said to be *tight-coupled* when the coupling factor is high, i.e. when the rate of transference of energy from one circuit to the other is high. Cf. *weak* (*loose*) *coupling*.

tight coupling (*Radio*). Coupling between two circuits which causes alteration of the current in either to affect materially the current in the other. In the case of mutual reactance coupling, the coupling is said to be *tight* when the ratio of the mutual reactance to the geometric mean of the individual reactances (of the same sign) of the two circuits approaches unity.

tikker (*Radio*). See **chopper.**

tile (*Build.*). A thin slab, often highly ornamental, of baked clay, terra-cotta, glass, cement, or asbestos-cement, used for roofing or for covering walls or floors.

tile-and-a-half tile (*Build.*). A purpose-made tile of extra width, used to form the bond at a *laced valley* (q.v.).

tile creasing (*Build.*). A course formed of two or three thicknesses of plain roofing tiles set in mortar and breaking joint. Laid immediately below a brick-on-edge coping and projecting about 2 in. over each side of the wall, with the top surface sloped in cement, in order to prevent the percolation of water into the wall below the coping.

tile hanging (*Build.*). See **weather tiling.**

tile lintol floor (*Build.*). A type of fire-resisting floor having a steel framework similar to the *filler joist floor* (q v.), but with hollow tile, terra-cotta, or fireclay lintols filling in the panels between filler joists, thus reducing the amount of steel-encasing concrete.

tile ore (*Min.*). The earthy brick-red variety of cuprite; often mixed with red oxide of iron.

Tilgate Stone (*Geol*). Beds of fossiliferous calcareous sandstone found in the Wadhurst Clay in the Weald. These rocks form part of the Hastings Sand Group of the Wealden beds in the Cretaceous System.

tiling batten (*Carp.*). See **slating and tiling battens.**

till or **tillite** (*Geol.*). Boulder clay. The term is sometimes restricted to those boulder clays formed during the glacial periods before the Pleistocene.

tiller (*Bot.*). A branch produced from the base of the stem, especially in corn and grasses.

tilt-and-bend (*Television*). The voltage adjustments which must continually be made to ensure that each part of the mosaic in an electron camera, such as the Emitron, is operating within potential ranges that result in good video modulation.

tilt roof (*Build.*). A roof having the form of a circular arc in which the rise is small compared with the span.

tilting (*Cinema.*). Swinging the motion-picture camera vertically instead of sideways. See **panning.**

tilting fillet (*Build.*). A strip of wood laid beneath a *doubling course* (q.v.) to tilt it up slightly, so that the slates may rest properly on the roof. Also called SKEW FILLET, EAVE-BOARD.

tilting level (*Surv.*). A type of level whose essential characteristic is that the telescope and attached bubble tube may be levelled without the necessity for setting the rotation axis truly vertical.

timber. Felled trees or logs suitable for conversion by sawing or otherwise.

timber brick (*Build.*). See **wood brick.**

timbering (*Build.*, *Civ. Eng.*). Temporary timbers arranged for the support of the earth in excavations, to prevent collapse of the sides.

timbre (*Acous.*). The subjective quality of a complex tone which makes it pleasing and of artistic value.

time (*Astron.*). In its astronomical sense of a measured quantity, essentially a measure of angle. Time is measured by the *hour angle* (q.v.) of some selected point of reference on the celestial sphere with respect to the observer's meridian. The fundamental unit of time measurement is supplied by the earth's rotation on its axis.

See **apparent solar—** **sidereal—**
local— **standard—**
mean solar— **universal—**

time-and-percussion fuse (*Ammunition*). A fuse employed with shrapnel shell to produce a burst at a given time or on percussion.

time ball (*Horol.*). A ball, placed in a conspicuous position at the top of a mast, which is caused to drop at the hour or at any predetermined time.

time base (*Cathode Ray Tubes*). Any device for causing the deflection of the spot in the horizontal or vertical direction (or in some cases in a circular path) to vary in a known manner (usually linearly) with time.

time-constant (*Elec. Eng.*). The time in which a current in an inductance, or a charge in a condenser, changes by the fraction $(1-1/\epsilon)$ of its ultimate change, when the applied voltage is changed; $\epsilon=2{\cdot}71828$ . . . the base of the Napierian, or natural, logarithms. The time-constants are L/R and RC respectively, where R is the total series resistance of the circuit.

time element (*Elec. Eng.*). The time-delay feature in the action of a circuit-breaker.

time exposures (*Photog.*). Exposures in cameras for periods which are long in comparison with so-called instantaneous exposure; generally operated by hand with the assistance of a stop-watch.

timekeeper (*Horol.*). A general term applied to any watch or clock.

time-lag device (*Elec. Eng.*). The apparatus providing the time element in a circuit-breaker. See **time-limit attachment.**

time-limit attachment (*Elec. Eng.*). The mechanical device whereby a circuit-breaker opens only after a predetermined time-delay. Cf. *time-limit relay.*

time-limit relay (*Elec. Eng.*). An electric relay which comes into action some time after it has received the electrical operating impulse.

time-meter (*Elec. Eng*). An instrument for measuring the time during which current flows in a circuit. Also called HOUR-COUNTER, HOUR-METER.

time of reverberation (*Acous.*). See **reverberation time.**

time parallax (*Cinema.*). The blurring of colours when three component colours are registered on successive frames of a film and there are slight displacements due to motion in the object.

timepiece (*Horol.*). A general trade term for any clock that shows the time but does not strike.

time-signal (*Radio, etc.*). A signal to indicate a standardised time, radiated by radio or over telegraph lines. See **chronopher** and **rhythmic time-signals.**

time switch (*Elec. Eng.*). A switch arranged to open or close a circuit at a predetermined time, operating by means of an electrically wound clock.

time valve (*Photog.*). A small valve on the operating bulb of the release of a camera shutter, fitted to enable the actual time of operation of the shutter to be delayed arbitrarily.

timed-spark system (*Radio*). A spark system of radio-telegraphy employing a rotary spark-gap, so that the discharges occur at regular intervals.

timer (*Horol.*). A stop-watch; a watch provided with a large centre seconds hand for timing sporting events, etc.

timing (*Horol.*). The process of (1) setting a clock or watch to time; (2) observing the rate of a clock or watch.

timing (*I.C. Engs.*). The process of setting the valve-operating mechanism of an engine so that the valves open and close in correct angular relation to the crank during the cycle: a similar adjustment of the magneto or distributor drive: the actual valve or magneto setting, referred to as *valve timing, ignition timing.*

timing nuts (*Horol.*). The two nuts on the rim of a chronometer balance, one at each end of the arm, used for timing purposes.

timing screws (*Horol.*). The four diametrically opposite screws in the rim of a compensating balance used for bringing the watch to time.

timing washers (*Horol.*). Thin washers placed under the heads of the screws of a balance to produce slight alteration in the moment of inertia of the balance and so modify the time of vibration.

timing wheels (*Automobiles*). Toothed wheels attached to the crankshaft and camshaft respectively, connected by a driving chain, and giving a reduction ratio of 1 : 2, which constitutes the camshaft drive in most engines.

Timis'kaming Group (*Geol.*). An important member of the Pre-Cambrian succession in the Canadian Shield, of post-Laurentian, pre-Huronian age, and consisting essentially of quartzites and arkoses with a thickness of 29,000 ft. Equivalent to the Sudbury Series (or Sudburian) of Coleman, the Hastings Series of S.W. Ontario, and the Pontiac Series around Lake Quebec.

tin (*Met.*). A white metallic element with a yellowish tinge, in the fourth group of the periodic system. Chem. symbol, Sn (Latin *stannum*, tin). At. wt 118·7, at. no. 50, sp. gr. at 20° C. 7·3, m.p. 232° C. Specific electrical restivity 11·5 microhms per cm. cub. The principal use is as a coating on steel in tin-plate ; also used for collapsible tubes and as a constituent in alloys. See **tin alloys.**

tin. To coat copper or iron articles with a layer of tin by dipping them in a bath of the molten metal.

tin alloys (*Met*). Tin is an essential constituent in soft solders, type metals, fusible alloys, and certain bearing metals. These last contain 50-92% of tin alloyed with copper and antimony, and sometimes lead. Tin is also a constituent of bronze and pewter.

tin-plate (*Met.*). Thin sheet-steel covered with an adherent layer of tin formed by passing the steel through a bath of molten tin. Resists atmospheric oxidation and attack by many organic acids. Used for food-containers, etc.

tin py'rites (*Min.*). See **stannite.**

tin-stone (*Min.*). See **cassiterite.**

tin'type (*Photog.*). *Ferrotype* (q v.).

tin'cal (*Min*). The name given since early times to crude borax obtained from salt lakes, e.g. in Kashmir and Tibet. See **borax.**

tincto'rial power (*Photog.*). The measure of the depth of colour produced by a dye. Precisely, it is the reciprocal of the concentration required to yield a given density in a given thickness of emulsion.

tin'ea (*Med.*). See **ringworm.**

tingle (*Plumb.*). A flat strip of lead or copper, about 2×6 in., used as a clip between jointing sheets of lead.

ting-tang (*Horol.*). A clock that strikes the quarters on two notes only.

tinguaite, ting'gwa-īt (*Geol.*). A fine-grained, usually porphyritic igneous rock which normally occurs in dykes. It has the composition of phonolite, with aegerine-augite and nepheline as essential constituents.

tinman's solder. A tin-lead solder melting below a red heat, used for tinning. The most fusible solder contains 65% tin.

tinni'tus, tinnitus aurium (*Med.*). Persistent sensation of ringing noises in the ear.

tint (*Dec.*). A colour softened by the addition of white. *Tinting* signifies the addition of pigment to white.

tint (*Print.*). A *stipple* (q.v.), especially when used for line-colour purposes.

tinting (*Cinema.*). The addition of colour to the transparent area of motion-picture film, either by dyeing the emulsion or by using a positive stock with a coloured base.

tintom'eter (*Chem., Photog.*). A colorimeter in which colours are compared with those of standard solutions or of specially prepared glass slides.

tintype (*Photog.*). See under **tin.**

tip (*Teleph.*). The outermost contact on the three-way plugs which terminate the flexible cords of an operator's cord circuit in a manual exchange.

tip wire (*Teleph.*). The wire in an operator's cord circuit connected to the tip of the terminating plugs.

tipping-in (*Bind.*). *Plating* (q.v.).

tire. A variant spelling of *tyre* ; chiefly U.S.A.

Tirill regulator (*Elec. Eng.*). An automatic voltage regulator in which a vibrating contact device short-circuits the regulating rheostat to an extent controlled by voltage relays.

tissue (*Biol.*). An aggregate of similar cells forming a definite and continuous fabric, and usually having a comparable function ; as *epithelial tissue, nervous tissue, vascular tissue.*—(*Zool.*) A popular name for the Geometrid moth *Scotosia dubitata.*

tissue (*Photog.*). See **carbon— Japanese—**

tissue culture (*Bot., Zool.*). The growth of detached pieces of tissue in nutritive fluids under conditions which exclude bacteria and fungi.

tissue system (*Bot.*). The whole of the tissues present in a plant which have the same function, whether or not they are in continuity throughout the plant and whatever their position in the plant.

tissue tension (*Bot.*). The mutual compressions and stretchings exerted by the tissues of a living plant.

ti'tanates (*Chem.*). Compounds formed when titanium oxide or dioxide is fused with alkalies.

tita'nia (*Chem.*). See **titanium oxide.**

titanif'erous iron ore (*Min.*). See **ilmenite.**

ti'tanite (*Min.*). Silicate of calcium and titanium, with iron, or manganese, or yttrium in varying amounts. It crystallises in the monoclinic system as wedge-shaped crystals, usually yellow or brown in colour, and occurs as an accessory component in igneous rocks of intermediate composition and also in metamorphic rocks. Also called SPHENE.

tita'nium (*Met.*). A metallic element in the fourth group of the periodic system. Chem. symbol, Ti. At. wt. 47·9, at. no. 22, sp. gr. at 20° C. 4·5, m p. 2000° C., b.p. above 2800° C. Used as a deoxidiser for special types of steel, in stainless steel to diminish susceptibility to intercrystalline corrosion, and as a carbide in *cemented carbides* (q.v.). It occurs only in combination, and is widely distributed on the earth's crust. The chief ore is ilmenite (ferrous titanate).

titanium oxide (*Chem.*). TiO_2. Both acidic and basic. Forms titanates when fused with alkalies. Also called TITANIA.

titra'tion (*Chem.*). The addition of a solution from a graduated vessel (burette) to a known volume of a second solution, until the chemical reaction between the two is just completed. A knowledge of the volume of liquid added and of the strength of one of the solutions enables that of the other to be calculated.

titrim'eter (*Chem.*). A valve apparatus for electrometric titrations, in which potential changes are followed continuously and automatically on a microammeter.

tituba'tion (*Med.*). Staggering and reeling movements of the body, due to disease of the nervous system.

Tl (*Chem.*). The symbol for *thallium.*

Tm (*Chem.*). The symbol for *thulium.*

Tn (*Chem.*). The symbol for *thoron.*

T.N.A. (*Chem.*). An abbrev. for *trinitroaniline,* $C_6H_2(NH_2)(NO_2)_3$.

T.N.B. (*Chem.*). An abbrev. for *trinitrobenzene,* $C_6H_3(NO_2)_3$.

T.N.T. (*Chem.*). An abbrev. for *trinitrotoluene,* $C_6H_2(CH_3)(NO_2)_3$.

T.N.X. (*Chem.*). An abbrev. for *trinitroxylene,* $C_6H(CH_3)_2(NO_2)_3$.

to-and-fro aerial ropeway (*Civ. Eng.*). See **jig-back.**

toadstone (*Geol.*). An old and local name for the basalts found in the Carboniferous Limestone of Derbyshire. The name may be derived from the rock's resemblance in appearance to a toad's skin, or from the fact that it weathers into shapes like a toad, or from the German word *todstein* ('dead stone') in reference to the absence of lead.

toad's-eye tin (*Min.*). A variety of *cassiterite* (q.v.) occurring in botryoidal or reniform shapes which show an internal concentric and fibrous structure. It is brownish in colour.

toat (*Carp., Join.*). The handle of a bench plane.

To'bin bronze (*Met.*). A type of alpha-beta brass or Muntz metal containing tin. It contains 59-62% copper, 0·5-1·5% tin, the remainder being zinc, and is used when resistance to sea water is required. Also called NAVAL BRASS.

toe (*Civ. Eng.*). The part of the base of a reinforced concrete retaining wall projecting in front of the face of the *stalk* (q.v.).

toe (*Photog.*). The lower curvature of the gamma curve of an emulsion, where densities are obtained which are greater than those expected from a given exposure.

toe-in (*Automobiles*). A slight forward convergence given to the planes of the front wheels to promote steering stability and equalise tyre-wear.

toe-picking (*Vet.*). The vice, acquired by individual budgerigars, of biting the feet of birds of other species, particularly finches, within the same aviary.

toe piston (*Acous.*). A large push-button, arranged with others at the side of the balanced pedals in an organ, for operating groups of stops with the foot.

toe puffs (*Boots and Shoes*). Stiffeners that keep the toe part of uppers in position.

toe wall (*Civ. Eng.*). A dwarf retaining-wall built at the foot of an embankment slope as a safeguard against any tendency of the earth to spread.

toed (*Carp.*). Said of an upright or inclined timber which is fastened to a horizontal timber by nails driven in obliquely through its foot.

Toepler machine (*Elec. Eng.*). An early form of electrostatic generator. Also called VOSS MACHINE.

toilet (*Med.*). The cleaning and dressing of a wound or injured part.

tolerance (*Bot.*). (1) The ability of a plant to endure adverse environmental conditions, especially drought and shading.—(2) The ability of the plant to withstand the development within it of a parasite without showing signs of serious disease.

tolerance (*Eng.*). A permissible range of dimension of a finished piece, provided to cover minute and unavoidable inaccuracies in pieces intended to fit together. See **limit gauging.**

toll call (*Teleph.*). A short-distance trunk call covering exchanges in the neighbourhood of London. In America, any long-distance call.

toll exchange (*Teleph.*). That part of the London trunk system which deals mainly with the short-haul trunk circuits classed as *toll*. In America, any exchange which makes long-distance connexions.

toll line (or **circuit**) (*Teleph.*). A short-haul trunk circuit radiating from London. In America, any long-distance circuit.

Tolu balsam (*Chem.*). See **balsam of Tolu.**

tol'uene (*Chem.*). $C_6H_5{\cdot}CH_3$, a colourless liquid, m.p. −94° C., b.p. 110° C. It occurs in coal- and wood-tar; insoluble in water; miscible with alcohol, ether, chloroform. Used as a solvent and as an intermediate for its derivatives. Also called TOLUOL, METHYLBENZENE.

tolu'idines (*Chem.*). $H_3C{\cdot}C_6H_4{\cdot}NH_2$, homologues of aniline. There are three isomers, viz., *o*-toluidine, a liquid, b.p. 197° C.; *p*-toluidine, crystals, m.p. 43° C., b.p. 198° C.; *m*-toluidine, a liquid, b.p. 199° C.

Tombigbee Sand (*Geol.*). See **Eutaw Group.**

tomen'tose (*Bot.*). Covered with a felt of cottony hairs; downy.

tomen'tum (*Bot.*). A covering of felted cottony hairs.

tommy or **tommy bar** (*Eng.*). A rod inserted loosely in a diametral hole in a bolt head or tubular spanner in order to turn it. See **box spanner.**

Tomosvary's organs (*Zool.*). In some Centipedes, transparent chitinous projections, covered with fine hairs, placed on the head near the base of the antennae; they are believed to be auditory in function.

-tomy (Greek *tomē*, a cut, *temnein*, to cut). A suffix used in the construction of compound terms, especially in Medicine; e.g. *phlebotomy*, the cutting of a vein.

ton. A unit of weight for large quantities. The *long ton*, commonly used in Britain, is 2240 lb. The *short ton*, commonly used in America, is 2000 lb. The *metric ton* (1000 kilograms) is 2204·6 lb. In Britain the *short ton* is used in metalliferous mining, the *long ton* in coal-mining; the *smelter's ton* is greater than the long ton. For the nautical sense, see **tonnage.**

to'nalite (*Geol.*). A coarse-grained igneous rock of dioritic composition carrying quartz as an essential constituent, that is, quartz-mica-diorite. Two varieties are distinguished: soda-tonalite, with albite in excess of anorthite, and lime-tonalite, with anorthite in excess of albite.

tonal'ity (*Acous.*). In music, the type of scale and key in which a musical work is written. See **atonality.**—(*Photog.*) See **tone.**

tone (*Acous.*). Strictly, a sound-wave of one frequency, but the term is loosely applied to any steady complex tone or musical combination of complex tones. It is also applied to an electrical current giving rise to an acoustic tone, and (wrongly) to the quality of reproduction of **radio-receivers.** See **alien frequencies.**

See **anti-side—**
busy—
complex—
dialling—
edge—
N.U.—
ringing—
side—
warble—

tone (*Dec.*). The depth or brilliance of a colour.

tone or **tonality** (*Photog.*). The subjective relations between the colours of a photograph.

tone (*Zool.*). The condition of elasticity or tension proper to the living tissues of the animal body, especially muscles.—*adj.* **tonic.**

tone-control transformer (*Elec. Comm.*). A transformer in which the leakage and/or self-capacity can be altered in such a way as to regulate its response over the frequency range it is required to operate.

tone-deaf (*Acous.*). Said of persons who cannot be trained to appreciate musical tones.

tone wheel (*Radio*). See **chopper** (1).

tong-test ammeter (*Elec. Eng.*). An a.c. ammeter and current transformer combination whose iron core can be opened and closed round a cable, thus forming the single-turn primary winding of the transformer.

tongs (*Masonry*). See **stone tongs.**

tongue (*Join.*). A slip feather.

tongue (*Teleg.*). In a telegraph relay, the moving contact which leaves the back or spacing stop and moves towards the marking or front stop on operation of the relay.

tongue (*Zool.*). In Vertebrates, the movable muscular organ lying on, and attached to, the floor of the buccal cavity; it has important functions in connexion with tasting, mastication, swallowing, and (in higher forms) sound production: in Invertebrates, especially Insects, any conformation of the mouth-parts which resembles the tongue in structure, appearance, or function—proboscis; antlia; haustellum; radula; ligula; any structure which resembles the tongue.

tongue-and-groove joint (*Join.*). A joint formed between the butting edges of two boards, one of which has, along the middle of its length, a projecting fin cut to fit into a corresponding plough groove in the other.

tongue bars (*Zool.*). In *Cephalochorda*, the secondary gill-bars.

tongue, blue (*Vet.*). See **malarial catarrhal fever of sheep.**

tonic (*Zool.*). *Adj.* from *tone* and *tonus* (qq v.).

tonic train (*Radio*). See **interrupted continuous waves.**

tonic′ity (*Zool.*). See **tone.**

toning (*Photog.*). The alteration of the colour of a silver print by chemical action.

See **chemical—** **dye—**

tonnage (*Ship Constr.*). A measurement assigned by the Board of Trade, under legal regulations, for assessing dues, etc. It is expressed in tons, one ton being 100 cubic feet. The main item, underdeck tonnage, is measured up to the free-board deck. Above-deck spaces are added to give gross tonnage.

to′noplast (*Bot.*). The cytoplasmic membrane surrounding a vacuole in the protoplast.

tonsillec′tomy (*Med.*). The surgical removal of the tonsils.

tonsilli′tis (*Med.*). Inflammation of the tonsils. See also **quinsy.**

tonsils (*Zool.*). In Vertebrates, lymphoid bodies of disputed function situated at the junction of the buccal cavity and the pharynx.

to′nus (*Zool.*). A state of persistent excitation: in plain or involuntary muscle, a prolonged state of contraction, independent of continued excitation by nervous impulses: in striated or voluntary muscle, a similar state of prolonged contraction dependent on continued impulses from the nerve-centres: in certain nerve-centres, as the respiratory centre, the state in which impulses are constantly given out without any corresponding afferent impulses from the receptors.—*adj.* **tonic.**

tool post (*Eng.*). The clamp by which a lathe or shaping-machine tool is held in the slide rest or ram. In its simplest form it consists of a slotted post, the end of which carries a clamping screw.

tool steel (*Met.*). Steel suitable for use in tools, usually for cutting or shaping wood or metals. The main qualities required are hardness, toughness, ability to retain a cutting edge, etc. Contains 0·6-1·6% carbon. Many tool steels contain high percentages of alloying metals—tungsten, chromium, molybdenum, etc. (see **high-speed steel**). Usually quenched and tempered, to obtain the required properties.

tooled ashlar (*Masonry*). A block of stone finished with parallel vertical flutes.

tooth (*Bot.*). (1) Any small irregularity on the margin of a leaf.—(2) The free tip of one petal of a gamopetalous corolla.

tooth (*Elec. Eng.*). The projection formed in the core-plate of an armature between adjacent slots.

tooth (*Zool.*). A hard projecting body with a masticatory function. In Vertebrates, a hard calcareous or horny body attached to the skeletal framework of the mouth or pharynx, used for trituration or fragmentation of food: in Invertebrates, any similar projection of chitinous or calcareous material used for mastication or trituration.

tooth ratio (*Elec. Eng.*). The ratio of slot width to tooth width as measured at the circumference of the armature.

tooth ripple (*Elec. Eng.*). See **slot ripple.**

toothed wheels (*Eng.*).

See **bevel gear**
helical do.
spiral do.
spur gears
worm do.

toothings (*Build.*). The recesses left in alternate courses of a wall when later extension is allowed for.

top (*Acous.*). A colloquialism for the higher range of audio-frequencies in sound-reproduction.

top (*Spinning*). Combed sliver which has been prepared for spinning into worsted yarn.

top beam (*Carp.*). The horizontal beam connecting the rafters of a collar-beam roof.

top-contact rail (*Elec. Eng.*). A type of contact rail, as used in electric traction, where contact between the collecting-shoe and the rail is made at the upper surface of the rail.

top dead-centre (*Eng.*). See **inner dead-centre.**

top-hung (*Build.*). Said of a window-sash arranged to open outwards about hinges on its upper edge.

top yeast (*Bot.*). The yeast which vegetates at the surface of a fluid in which fermentation is proceeding.

to′paz (*Min.*). Silicate of aluminium and fluorine, usually containing hydroxyl, which crystallises in the orthorhombic system. It usually occurs in granite-like rocks. It is colourless, pale blue, or pale yellow in colour, and is used as a gemstone. Cf. *citrine*, *Scotch topaz*, *Spanish topaz*. ORIENTAL TOPAZ is the name given in the gemstone trade to a yellow variety of sapphire.

topaz′olite (*Min.*). A variety of the calcium-iron garnet *andradite* (q.v.), which has the colour and transparency of topaz. It is sometimes green and the crystals often show a vicinal hexakis octahedron.

topha′ceous (*Med.*). Sandy, gritty, of the nature of tophus; e.g. *tophaceous gout.*

to′phus (*Med.*). A hard nodule composed of crystals of sodium biurate which are deposited in bodily tissues in gout.

topochem′istry (*Chem.*). The study of reactions which occur only at certain definite regions in a system.

topog′raphy (*Geog.*, *Surv.*). The delineation of the natural and artificial features of an area.

topotax′is (*Biol.*). Response or reaction of an organism to a stimulus, in which the organism orientates itself in relation to the stimulus and moves towards or away from it.

to′potype (*Zool.*). A specimen collected in the same locality as the original type specimen of the same genus or species.

topping (*Furs*). The brushing of fur with dyes, to colour tips of hairs only.

topping coat (*Plast.*). The floating coat applied after rendering.

topping-up (*Elec. Eng.*). The process of making good the loss of water by evaporation in a secondary cell by adding distilled water.

topset beds (*Geol.*). Gently inclined strata deposited on the subaerial plain or the just-submerged part of a delta. They are succeeded seawards by the foreset beds and, in deep water, by the bottomset beds.

tor′banite (*Min.*). A variety of oil shale containing 70-80% of carbonaceous matter, including an abundance of spores. It is dark-brown in colour, and is found at Torbane Hill near Bathgate (Scotland).

tor′bernite (*Min.*). A beautiful rich-green hydrous phosphate of uranium and copper which crystallises in the orthorhombic system but is pseudo-tetragonal. It occurs associated with autunite and frequently in parallel growth with it, and also with other uranium minerals. Also called COPPER (or CUPRO-) URANITE.

torching (*Build.*). The operation, sometimes performed on slates which have been laid on battens only and not on boarding, of pointing the horizontal joints from the inside with hair mortar or cement.

torf′schlamm (*Ecol.*). See **dy.**

tor′mae (*Zool.*). Two small chitinous processes of the pharyngeal surface of the labrum in Insecta.

tormentor (*Cinema.*). In motion-picture production, a portable panel for absorbing sound-waves and regulating the reflection of sound-waves in a set.

torna'do (*Meteor.*). An intensely destructive, advancing whirlwind formed from strongly ascending currents. When over the sea, the apparent drawing up of water arises from the condensing of water vapour in the vacuous core; also, in W. Africa, the squall following thunderstorms between the wet and dry seasons.

torna'ria (*Zool.*). The ciliated pelagic larval form of *Balanoglossida.*

to'roid (*Elec. Comm.*). Said of a coil or transformer which corresponds in shape to an anchor ring. Adopted because of the ease of making equal windings, exactly balanced with respect to the circuit in which they are inserted, and because it does not affect other adjacent coils, on account of the entire enclosure of magnetic field.

toroidal winding (*Elec. Eng.*). See **ring winding** (1).

torpedo (*Ammunition*). A projectile provided with a *warhead* containing the explosive charge, an engine and propeller which drive it at high speed, a gyro steering-gear, and a depth-regulating gear. It is usually discharged from a tube by air pressure, or by a small explosive charge; it may be mounted in a ship above water, or launched from an aircraft, or it may be submerged.

torque (*Mech.*). The uniform or fluctuating turning moment exerted by a tangential force acting at a distance from the axis of rotation or twist; expressed in lb.-ft.—(*Aero.*) Airscrew torque is the measure of the total air forces on the airscrew blades, expressed as a moment about its axis.

torque convertor (*Eng.*). A device which acts as an infinitely variable gear, but generally at varying efficiency; e.g. a centrifugal pump in circuit with an inward-flow turbine.

torque meter (*Eng.*). A torsion meter attached to a rotating shaft, the angle of twist of a known length of shaft between the gauge points of the meter being indicated by optical or electrical means, thus enabling the power transmitted to be calculated. A form of transmission dynamometer.

torrent'icoles (*Ecol.*). Animals living in swiftly running waters, such as mountain streams.

Torrid Zone (*Astron.*). The region of the earth bounded by the two tropics and bisected by the equator. So called because, owing to the height of the sun in the sky, the climate is all the year round very hot and has almost no seasonal temperature variations.

Torrido'nian (*Geol.*). A succession of conglomerates and red sandstones and arkoses forming part of the Pre-Cambrian System in the north-west highlands of Scotland. They were deposited in mountain-girt basins under desert-like conditions, and rest on the Lewisian schists and gneisses.

tor'siograph (*Eng.*). An instrument for recording and measuring the frequency and amplitude of torsional vibrations in a shaft.

torsion. The state of strain set up in a part by twisting. The external twisting effort is opposed by the shear stresses induced in the material.

torsion (*Bot.*). Twisting without marked displacement.

torsion (*Zool.*). The preliminary twisting of the visceral hump in gastropod larvae which results in the transfer of the pallial cavity from the posterior to the anterior face, as distinct from the secondary or spiral twisting of the hump exemplified by the spiral form of the shell.

torsion balance (*Phys.*). A delicate device for measuring small forces such as those due to gravitation, magnetism, or electric charges. The force is caused to act at one end of a small horizontal rod, which is suspended at the end of a fine vertical fibre. The rod turns until the turning moment of the force is balanced by the torsional reaction of the twisted fibre, the deflection being measured by a lamp and scale using a small mirror fixed to the suspended rod.

torsion bar suspension (*Automobiles*). A springing system, used in some independent suspension designs, in which straight bars, anchored at one end, are subjected to torsion by the weight of the car, thereby acting as springs.

torsion galvanometer (*Elec. Eng.*). A galvanometer in which the controlling torque is measured by the angle through which the suspension head must be rotated in order to bring the pointer back to zero.

torsional pendulum (*Horol.*). A pendulum in which the bob rotates, in a plane perpendicular to the line of suspension, by the twisting of the suspension ribbon. Used where a long time of vibration is required, as with 400-day clocks.

torticol'lis (*Med.*). Wry neck. Stiff neck. A twisted position of the head on the neck, due to disease of the cervical vertebrae or to affections (especially rheumatic) of the muscles of the neck. See also **spasmodic torticollis.**

tor'ticone (*Zool.*). A spirally twisted shell.

tor'tuose, tortuous (*Bot., etc.*). Pursuing a somewhat zigzag line.

tor'uloid, tor'ulose (*Bot.*). Elongated and cylindrical, with fairly evenly spaced swellings; necklace-like.

torulo'sis (*Med.*). A disease due to infection with the yeast-like micro-organism *Torula histolytica*; affects especially the central nervous system.

tor'ulus (*Zool.*). The socket for the insertion of the antenna in *Insecta.*

tor'us (*Bot.*). (1) The receptacle of a flower.—(2) The tiny thickening on the middle of the closing membrane of a bordered pit.

torus (*Zool.*). A ridge or fold; as in *Polychaeta,* a ridge bearing uncini.

tos'canite (*Geol.*). A quartz-bearing trachy-andesite, i.e. a fine-grained acid igneous rock, commonly occurring as lava-flows and characterised by the presence of orthoclase and plagioclase feldspars.

tossing (*Mining*). The operation of raising the grade or purity of a concentrate by violent stirring, followed by packing, in a kieve or open *dolly tub* (q.v.).

total emission (*Thermionics*). See **saturation current.**

total losses (*Elec. Eng.*). The totality of power loss in an electrical machine, equal to the difference between the input and the output powers.

total modulation (*Radio*). Amplitude modulation to a depth of 100%.

total output panel (*Elec. Eng.*). A panel of a generating station switchboard carrying instruments for measuring and recording the total power output of the station.

total response (*Acous.*). The response of a loudspeaker expressed as the relative ratio of the output sound-power to the applied electrical power for each frequency over the operating frequency-range. Substantially equal to the mean-spherical response of the device.

totally enclosed motor (*Elec. Eng.*). A motor with no provision for ventilation but not necessarily water- or gas-tight.

toti- (Latin *totus*, all). A prefix used in the construction of compound terms; e.g. *totipalmate,* having the foot completely webbed.

totipo'tent (*Zool.*). Capable of development into a complete organ or embryo: capable of self-differentiation.

touch (*Plumb.*). The plumber's term for tallow.

touch, double (*Acous.*). See **double touch.**

touchstone (*Min.*). See **Lydian stone.**

touchwood (*Bot.*). Wood much decayed as a result of fungal attack; it crumbles readily, and when dry is easily ignited by a spark.

tough pitch (*Met.*). A term applied to copper in which the oxygen content has been correctly adjusted at 0·03–0·06% by poling. Distinguished from overpoled and underpoled copper.

toughened glass (*Glass*). See **safety glass.**

toughness (*Met.*). A term denoting a condition intermediate between brittleness and softness. It is indicated in tensile test by a high ultimate tensile stress and low to moderate elongation and reduction in area. It is also associated with high values in notched bar test.

tourbillon watch, toor-bil′yon (*Horol.*). A watch fitted with a revolving carriage which carries the balance and escapement round the fourth wheel, for the purpose of eliminating the positional errors.

tour′maline (*Min.*). A complex silicate of boron and aluminium, with, in addition, magnesium, iron, or the alkali metals, and fluorine in small amounts, which crystallises in the trigonal system. It is usually found in granites or gneisses. The variously coloured and transparent varieties are used as gemstones, under the names *achroite* (colourless), *indicolite* (blue), *rubellite* (pink). The common black variety is *schorl.*

tourmalinisation (*Geol.*). The processes whereby minerals or rocks are replaced wholly or in part by tourmaline. These processes result from the invasion by mineralising fluxes and gases. See **pneumatolysis.**

tourniquet, toor′ni-ket (*Surg.*). Any instrument or appliance which, by means of a constricting band, a pad to lie over the artery, and a device for tightening it, exerts pressure on an artery so as to control bleeding from it.

tow-net (*Ocean.*). A conical net having the mouth kept open by a frame and at the apex a glass or metal vessel in which the catch accumulates; it is towed behind a boat in order to obtain samples of the fauna of the surface waters.

tower (*Elec. Eng.*). The lattice-type steel structure used to carry the several conductors of a transmission line at a considerable height above the ground. Also called PYLON.—(*Struct.*) See **pylon.**

tower bolt (*Build.*). See **barrel bolt.**

tower clock (*Horol.*). A clock for mounting in a tower or similar structure, usually with exposed dials and hands.

tower crane (*Eng.*). A rotatable cantilever pivoted to the top of a steelwork tower, either fixed or carried on rails. The load is balanced by the lifting machinery carried on the opposite side of the pivot. Commonly used in shipbuilding.

tower gantry (*Build.*). See **derrick tower gantry.**

tower line (*Elec. Eng.*). An electric power transmission line carried on steel towers.

town gas (*Fuels, etc.*). Gas made and supplied for domestic or trade use. Usually a mixture of coal gas and carburetted water gas; the calorific value ranges from 450 to 500 B.Th.U. per cubic foot.

Townend ring (*Aero.*). A special form of cowling for a radial engine. It consists of a concentric ring, of aerofoil section, which deflects the air inwards on to the engine cylinders with a minimum drag. Often used in addition as an exhaust collector ring.

toxae′mia, toxe′mia (*Med.*). The condition of a patient caused by the absorption into the tissues and into the blood of toxins formed by micro-organisms at the site of infection.

toxicol′ogy (*Med.*). That branch of medical science which deals with the nature and effects of poisons.

T.P. (*Surv.*). Abbrev. for *turning point* (see **change point**).

trabant′ (*Bot.*). See **satellite.**

trabec′ula (*Bot.*). A rod-like structure, or a rod-like cell, running across a cavity.

trabecula (*Zool.*). A row of cells bridging a cavity: a band or plate of fibrous tissue forming part of the internal supporting framework of an organ: one of a pair of cartilaginous bars lying just anterior to the parachordals in the developing cranium.—*adjs.* **trabec′ular, trabec′ulate.**

trabec′ulate (*Bot.*). (1) Said of peristome teeth marked by transverse bars.—(2) Having trabeculae.

tracer (*Ammunition*). An attachment to the base of a small projectile, which, by emitting smoke or flame, makes the path of the trajectory visible.

trache′a (*Bot.*). See **vessel.**

trachea (*Zool.*). An air-tube of the respiratory system in certain Arthropods, as Insects: in air-breathing Vertebrates, the windpipe leading from the glottis to the lungs.—*adj.* **trache′al.**

tracheal gills (*Zool.*). In some aquatic Insect larvae, filiform or lamellate respiratory outgrowths of the abdomen richly supplied with tracheae and tracheoles.

tracheal system (*Zool.*). In certain Arthropods, as Insects and Myriapods, a system of respiratory tubules containing air and passing to all parts of the body.

trache′idal (*Bot.*). Of the nature of a tracheide.

trach′eide (*Bot.*). An elongated element with pointed ends, occurring in wood. It is derived from a single cell, which lengthens and develops thickened pitted walls, losing its living contents. Tracheides conduct water.

trachel′tis (*Med.*). Inflammation of the mucous membrane of the trachea.

trachel-, trachelo- (Greek *trachēlos,* neck, throat). A prefix used in the construction of compound terms; e.g. *trachelomastoid,* pertaining to the tracheal region and the mastoid process.

trach′elate (*Zool.*). Neck-like.

trachelec′tomy (*Surg.*). Surgical excision of the cervix uteri.

trachelor′rhaphy (*Surg.*). The surgical repair of lacerations of the cervix uteri.

tracheo- (Latin *trachia,* windpipe). A prefix used in the construction of compound terms; e.g. *tracheobronchial* (q.v.).

tracheobron′chial (*Zool.*). Formed from, or pertaining to, the trachea and bronchi; as a particular type of syrinx.

tracheobronchi′tis (*Med.*). Inflammation of the mucous membrane of both the trachea and the bronchi.—(*Vet.*) An inflammation of the trachea and bronchi of dogs due to infection by the nematode worm *Oslerus osleri.*

trach′eocele (*Med.*). An air-containing swelling in the neck due to the bulging of the wall of the trachea between the cartilages of the trachea.

trache′ole (*Zool.*). The ultimate branches of the tracheal system.

tracheos′copy (*Surg.*). Inspection of the interior of the trachea by means of a tubular instrument fitted with a lamp.

tracheot′omy (*Surg.*). The operation of cutting into the trachea, usually for the relief of respiratory obstruction.

tracho′ma (*Med.*). A highly contagious infection of the conjunctiva covering the eyelids, characterised by the presence of small elevations on the inner side of the lid and leading often to blindness.

trachy-andesite (*Geol.*). Fine-grained igneous rock, commonly occurring as lava flows, intermediate in composition between trachyte and andesite, that is, containing both orthoclase and plagioclase in approximately equal amounts. See also **toscanite.**

trachybas′alt (*Geol.*). A fine-grained igneous rock commonly occurring in lava flows and sharing the mineralogical characters of trachyte and basalt. The rock contains sanidine (characteristic of trachyte) and calcic plagioclase (characteristic of basalt).

trachyglos'sate (*Zool.*). Having a rough tongue, adapted for rasping.

Trachyli'na (*Zool.*). An order of *Hydrozoa* in which the hydroid phase is unknown, the medusoid phase developing directly from the egg; tentaculocysts occur; the gonads are situated on the radial canals or on the floor of the gastric cavity. Jelly Fish.

trachysper'mous (*Bot.*). Having seeds with rough surfaces.

trach'yte (*Geol.*). A fine-grained igneous rock-type, of intermediate composition, in most specimens with little or no quartz, consisting largely of alkali-feldspars (sanidine or oligoclase) together with a small amount of coloured silicates such as diopside, hornblende, or mica.

track (*Acous.*). The groove which is cut on a wax blank during disc-recording and is carried through the processing to the finished disc.

track (*Cinema.*). See **tracking shot** and **sound track.**

track (*Rail.*). The rail or rails along which a train travels.

track brake (*Elec Eng.*). A solenoid-operated tram-car track in which a brake-shoe acts directly on the track rail.

track circuit (*Elec. Eng.*). The electric circuit formed by the two running rails of a traction system, as used for track-circuit signalling.

track-circuit signalling (*Elec. Eng.*). An electric signalling system making use of the change in resistance of a track circuit when an electric train passes over a section of the railway track.

track rail-bond (*Elec. Eng.*). A rail-bond for preserving the electrical continuity of the track rails when these are used for carrying traction or other currents.

track relay (*Elec. Eng.*). A relay used in track-circuit signalling for controlling the electrically operated signals.

track rod (*Automobiles*). A transverse link which, through ball-joints, connects arms carried by the stub axles, in order to convey angular motion from the axle directly steered to the other.

track-sectioning cabin (*Elec. Eng.*). A cabin housing switchgear by means of which the supply to different sections of an electrified railway line may be disconnected.

track, showing the (*Cinema.*). The temporary removal of the mask in the film-gate of a sound-film projector to allow an image of the sound-track to be projected for inspection on the left side of the picture on the screen.

track switch (*Elec. Eng.*). A switch controlling the supply of current to a section of an electrified railway line.

tracker (*Acous.*). The feed-motion arrangement for traversing the cutting-head across the wax blank during the making of a record.

tracker wires (*Elec. Eng.*). Wires forming a mechanical connexion between a switch and its operating mechanism situated some distance away.

tracking (*Acous.*). The ability of a reproducing needle to follow the recorded groove on a gramophone record; also, the guidance given by the mechanism to the cutting head, so that the stylus cuts along an accurately spaced spiral.

tracking (*Cables*). Tracks along the surface of oil-impregnated paper caused by a surface stress. Tracking causes waxing and carbon formation.

tracking shot (*Cinema.*). A shot in motion-picture production which involves the longitudinal or sideways motion of the camera, which, with its operators, is mounted on a dolly. This latter may be mounted on rails (*track*), which are nailed to the floor, or laid on the earth.

trackless trolley (*Elec. Eng.*). An obsolescent name for *trolley omnibus.*

tract (*Zool.*). The extent of an organ or system, as the *alimentary tract*: an area or expanse, as the *ciliated tracts* of some *Ctenophora*: a band of nerve-fibres, as the *optic tract*: a *pteryla* (q.v.).

tractel'lum (*Zool.*). An anterior flagellum of *Mastigophora*, which draws the organism after it. Cf. *pulsellum.*

tractile fibre (*Cyt.*). A spindle fibre which begins to develop from an attachment to a chromosome and extends to the pole of the spindle.

traction. The propulsion of vehicles, the motive force being indicated adjectivally, e.g. *electric traction, steam traction,* etc.: specifically, electric traction.

traction battery (*Elec. Eng.*). See **vehicle battery.**

traction engine (*Eng.*). A road locomotive in which large road wheels are gear-driven from a simple or compound engine mounted on top of the boiler, a rope drum being provided for haulage purposes.

traction generator (*Elec Eng.*). A d.c. generator used solely for supplying power to an electric traction system.

traction lamp (*Illum.*). An electric lamp having a specially robust filament to withstand vibration; used on trains or road vehicles.

traction load (*Elec. Eng.*). That part of the load carried by a d.c. generating station which is formed by the traction system which it supplies.

traction motor (*Elec. Eng.*). An electric motor specially designed for traction service.

traction permeameter (*Elec. Eng.*). An apparatus for measuring the permeability of a sample of iron by weighing the mechanical force between the end of the sample and a surface forming part of the yoke of the apparatus.

traction rope (*Civ. Eng.*). The endless rope employed in an aerial ropeway system to effect movement of the carriers transporting the loads. Also called a HAULING ROPE.

tractive force (or **effort**) (*Eng.*). Of a locomotive, the pull, in lbs., which the engine is capable of exerting at the draw-bar, the limiting value of which is given by the product of the weight on the coupled wheels and the coefficient of friction between wheels and rails.—(*Elec. Eng.*) The pull, in lbs., necessary to detach the armature from an excited electromagnet.

tractor. A vehicle capable of propelling itself along a roadway or track, or for drawing other vehicles.

tractor (*Aero.*). A propeller or air-screw which is in front of the engine and the structure of the aircraft, as contrasted with a *pusher*, which is behind the engine and pushes the aircraft forward.

tractor mower (*Agric. Mach.*). A machine similar in design to the *horse mower* (q.v.) but with longer cutter-bars, which are operated directly from a shaft on the tractor.

tractor plough (*Agric. Mach.*). A plough consisting of a frame to which is attached the requisite number of coulters, shares, and breasts, usually not exceeding five of each. Mechanism enables all the working parts to be lifted by the pull of a cord, when the plough is being turned. See **mouldboard plough.**

tractrix horn (*Acous.*). A horn which is so shaped that the area at a distance from the throat is dependent on the tractrix curve, as contrasted with the exponential horn.

trade-winds (*Meteor.*). Persistent winds blowing from the N.E. in the northern hemisphere and from the S.E. in the southern hemisphere between the *horse latitudes* (calm belts at 30° N. and S. of the equator) towards the *doldrums* (equatorial regions of very irregular calms and storms).

traffic (*Teleph.*). The measure, in traffic units, of the telephonic use of a number of circuits or an exchange.

traffic diagram (*Auto. Teleph.*). The diagram which indicates the telephone traffic over the various routes inside an automatic switching exchange.

traffic flow (*Auto. Teleph.*). The number of calls which an exchange, or a set of switches, is carrying at any instant.

traffic lane (*Civ. Eng.*). A longitudinal strip of a road surface regarded as a unit width (usually taken as 10 ft.) for the passage of a single line of traffic.

traffic lights (*Elec. Eng.*). Red, amber, and green signal-lights installed at street intersections, etc., for controlling the flow of traffic; operated by hand, by fixed time sequence, or automatically, depending on the flow of traffic.

traffic meter (*Auto. Teleph.*). A meter which, inserted at any part of an automatic telephone exchange, totals the number of calls passing through a group or switch.

traffic unit (*Teleph.*). The measure of the occupancy of telephonic apparatus during conversation. One traffic unit, T U., equals the use of one circuit for one minute or for one hour. See **congestion traffic-unit meter.**

trail (*Artillery*). The part of a gun-carriage which rests on the ground when the gun is fired and which takes the horizontal component of the force of recoil.

trail (*Automobiles*). The distance by which the point of contact of a steered wheel with the ground lies behind the intersection of the swivel-pin axis and the ground. See **caster action.**

trails (*Astron.*). (1) Long flashes of brightness seen in the wake of some large meteors in the sky.—(2) The lines left on a photographic plate when a star image, instead of being kept stationary by moving the plate, is allowed to 'trail' across it during the exposure.

trail eye (*Artillery*). The means by which a gun is attached to the gun limber for travelling.

Trail formation (*Geol.*). A group of shales with sandstones and conglomerates of non-marine origin, occurring in the Lower Jurassic of the Cordilleran geosyncline, e.g. in California; equivalent to the lower parts of the Lias of Europe.

trailer. A vehicle drawn by a tractor.

trailer (*Cinema.*). (1) The blank piece of film, generally black, which is attached or printed at the end of every reel, so that when the projected picture finishes there is time to close the picture shutter before the threaded film runs out.—(2) A strip of film projected in a cinema to advertise a forthcoming film.

trailing action (*Automobiles*). See **caster action.**

trailing axle,—springs,—wheels, etc. (*Eng.*). In a locomotive, the parts belonging to the rear-most axle.

trailing cable (*Elec. Eng.*). A flexible cable carrying the current to a transportable piece of electric apparatus.

trailing edge (*Elec. Eng.*). See **leaving edge.**

trailing pole tip (or **horn**) (*Elec. Eng.*). The edge of a field pole which is passed last by an armature conductor, irrespective of the direction of rotation of the armature.

train (*Horol.*). The interconnected wheels and pinions of a watch, clock, or similar mechanism. A watch is said to have an 18,000 train when the train is suitable for a balance making 18,000 vibrations per hour; a 21,600 train is used for small wrist-watches, and a 14,400 train for chronometers.

train brake (*Eng.*). See **vacuum brake, air brake.**

train control (*Elec. Eng.*). The method by which the mechanical control operations carried out by the driver of an electric train are translated into the appropriate changes in the electric circuit conditions pertaining to the supply of the traction motors.

train describer (*Elec. Eng.*). An automatic or semi-automatic device for giving information regarding the destination of trains. Also called DESTINATION INDICATOR.

train lighting system (*Elec. Eng.*). The system of electric illumination adopted in electric railway vehicles.

train-line (*Elec. Eng.*). An electric cable extending over the length of a railway coach, and terminating in sockets at each end so that couplers may maintain continuity over the whole length of the train. See **bus-line, control-line, pump-line.**

train of waves (*Radio*). A group of waves of limited duration, such as that resulting from a single spark discharge in an oscillatory circuit.

training works (*Hyd. Eng.*). Works undertaken to remedy instability and eccentricity of flow in channels. See **dyke, levee, groynes, ground sills.**

tram. Abbrev. for *tramcar.*—(*Mining*) A small wagon, tub, cocoa-pan, corve, corf, or hutch, for carrying mineral.

tramcar (*Elec. Eng.*). An electric tractor forming a passenger vehicle, as used on a tramway; a streetcar.

tramway (*Elec. Eng.*). An electric traction system in which one or more passenger vehicles are propelled along a track laid in city streets and along inter-urban roads

tramway motor (*Elec. Eng.*). A d.c. motor specially designed for the propulsion of tramcars.

tramway poles (*Elec. Eng.*). The steel poles fixed at the sides or centre of a street or road for supporting the overhead conductors of a tramway system.

tram (*Spinning*). The term for silk yarn intended for weft; it is formed from two or more single threads, slightly twisted.

tram'a (*Bot.*). The somewhat loosely packed hyphae which occupy the middle of the gill of an agaric.

trammel-net (*Ocean.*). A form of *gill-net* (q.v.) consisting of two taut outer nets of large mesh and a larger slack middle net of finer mesh, all three being attached to each other at the head, foot, and ends.

trammels (*Instruments*). See **beam compasses.**

tramontan'a (*Meteor.*). A northerly mountain wind blowing over Italy.

trans- (*Chem.*). That geometrical isomer in which the two radicals are situated on opposite sides of the plane of a double bond or alicyclic ring.

transconductance (*Elec. Comm.*). The reciprocal of *transfer impedance*. The ratio of the current in one part of an electrical system to the electromotive force or potential difference applied at some other point; this co-exists with the current and varies proportionally with it, but not necessarily with the same frequency, e.g. in a demodulator. See **mutual conductance.**

transcription (*Elec. Comm.*). The recording of a broadcast performance for subsequent re-broadcast or other use.

transcrystalline failure (*Met.*). The normal type of failure observed in metals. The line of fracture passes through the crystals, and not round the boundaries as in intercrystalline failure.

transducer (*Elec. Comm.*). A power-transforming device for insertion between electrical, mechanical, or acoustic parts of systems of communication.

See **active— ideal— passive—**

tran'sect (*Bot.*). A line or belt of vegetation marked off for study.

transep'tate (*Bot.*). Having all the septa placed transversely.

transfer (*Photog.*). A photographic image which has been transferred from one support to another.

transfer admittance (*Elec. Comm.*). The ratio of the current in any part of a mesh to the electromotive force producing it. The latter, however, is applied in another part of the mesh, all other electromotive forces being reduced to zero.

transfer circuit (*Teleph.*). A circuit between operators' positions in an exchange, allowing the functions of one operator to be taken over by another during slack periods.

transfer constant (*Elec. Comm.*). The ratio of the volt-amperes leaving to those entering a network when it is terminated with its image impedances.

transfer (or **mutual**) **impedance** (*Elec. Comm.*). The ratio of the applied voltage at one part of a network or transmission line to the current at another part of the same system.

transfer moulding (*Plastics*). Injection moulding with thermosetting compositions.

transfer printing (*Pot.*). Decoration by means of thin paper prints taken from engraved and inked copper-plates, or from lithographic stones, impressed on the ware and then washed off.

transfer process (*Photog.*). Any means whereby an image, dyed or pigmented, is transferred to a new emulsion.

See **single—** **double—**

transference (*Psycho-an.*). The displacement of affect, positive or negative, from the person to whom it was originally directed, on to another. Used specifically in relation to the psychoanalytical situation where all the earlier emotional attitudes and reactions of the patient to his parents are displaced on to the analyst, and relived in relation to him. See **counter—*, negative—*, positive—*.**

transference number. *Transport number* (q.v.).

transfer'otype (*Photog.*). Bromide printing paper in which the supporting paper is coated with a soluble gelatine layer before the addition of the sensitive emulsion, to facilitate the transfer of the film to other supports.

transformation (*Met.*). A constitutional change in a solid metal, e.g. the change from gamma to alpha iron, or the formation of pearlite from austenite.

transformation (transformer) ratio (*Elec. Eng.*). The ratio between the primary and secondary terminal voltages of a transformer. *

transformer (*Elec. Comm.*). An electromagnetic device, consisting of windings on a core of magnetic material, for separating electrical circuits while permitting the flow of electrical power from one to the other; also for matching impedances in communication circuits, so that the maximum power is extractable from a given source.

See **audio-frequency—** **output—**
bridge— **step-down—**
input— **step-up—**
inter-valve— **tone-control—**
matching—

transformer (*Elec. Eng.*). A static apparatus for converting electrical energy received at one voltage to electrical energy sent out at a different voltage.

transformer booster (*Elec. Eng.*). A transformer connected with its secondary in series with the line, so that its voltage is added to that of the circuit; used to compensate the voltage drop in a feeder or distributor.

transformer core (*Elec. Eng.*). The laminated iron structure forming the magnetic circuit of a transformer.

transformer (or **mutual**) **coupling** (*Elec. Comm.*). The transference, in both directions, of electrical energy from one circuit to another by a transformer, of any degree of coupling, the primary being in one circuit, the secondary in the other. See **inter-valve transformer coupling.**

transformer oil (*Elec. Eng.*). A special type of oil of high dielectric strength, forming the cooling medium of electric power transformers.

transformer plate (*Elec. Eng.*). Sheet-iron of low magnetic loss, for transformer core laminations

transformer ratio. See **transformation ratio.**

transformer stampings (*Elec. Eng.*). The laminations, stamped out of transformer plate, which are assembled to form the transformer core.

transformer switch (*Elec. Eng.*). A switch or circuit-breaker for disconnecting a transformer from the supply at times of uneconomic loading.

transformer tank (*Elec. Eng.*). The steel tank encasing the core and windings of a transformer and holding the transformer oil.

transformer tube (*Elec. Eng.*). One of a number of steel tubes on the outside of a transformer tank to provide a vertical path of circulation for the transformer oil.

transformer winding (*Elec. Eng.*). The electrically active part of a transformer, which surrounds the magnetically active transformer core.

transforming station (*Elec. Eng.*). A point on an electricity supply system where a change of supply voltage occurs.

transfusion (*Med.*). Blood transfusion. The operation of transferring the blood of one person into the veins of another.

transfusion cell (*Bot.*). See **passage cell.**

transfusion tissue (*Bot.*). A group of short tracheides lying by the side of the xylem in a leaf of a pine (and related plants), by means of which material passes to or from the vascular strand and the rest of the leaf.

transient (*Acous.*). A sound of short period and irregular non-repeating wave-form, which implies a continuous spectrum of sound-energy contributions, the frequency distribution of which determines whether the sound is correctly recognisable or not.

transient (*Elec Comm.*). Any non-cyclic change in any part of a communication system. The most general transient is the step, while the steady-state is represented by any number of sinusoidal variations.

transient (*Elec. Eng.*). A term applied to the current resulting from a voltage surge.

transient (*Zool.*). A distinct individual mode in a developmental series, such as a line of descent, corresponding in the time-character concept to a species in the taxonomic concept.

transient reactance (*Elec. Eng.*). The reactance of the armature winding of a synchronous machine which is caused by the leakage flux. Cf. *synchronous reactance.*

transient stability (*Elec. Eng.*). The stability of a power system under transient current conditions.

transient state (*Elec. Comm.*). The transition period between steady-states in the repetition of a wave-form. See **step.**

transient wave (*Elec. Comm.*). A wave set up in transmission circuits or filters on account of changes in the transmission current amplitude and/or frequency.

transillumina'tion (*Med.*). The passing of a strong light through the walls of a cavity so that its outlines may become visible to the observer and any abnormalities in density detected.

transit (*Astron.*). (1) The apparent passage of a heavenly body across the meridian of a place, due to the earth's diurnal revolution. See **culmination.**—(2) The passage of a smaller body across the disc of a larger body as seen by an observer on the earth, e.g. of Venus or Mercury across the sun's disc, or of a satellite across the disc of its parent planet.

transit (*Surv.*). To rotate the telescope of a theodolite about its trunnion axis, so that the positions of the ends of the telescope are reversed. See **change face.**

transit call (*Teleph.*). In international telephony, a call which is established over more than one international telephone circuit, the transit country not being concerned with the switching, except in emergency. See **single switch call, double switch call.**

transit circle (*Astron.*). See **meridian circle.**

transitman (*Surv.*). An American term for a man operating a transit theodolite. See **American transit.**

transit theodolite (*Surv.*). A theodolite whose telescope is capable of being completely rotated about its horizontal axis. See **American transit, wye theodolite, Everest theodolite.**

transit time (*Thermionics*). The time taken by an electron to go from the cathode to the anode of a thermionic valve ; an important factor in the operation of valves at very high frequencies.

transition cell (*Bot.*) A thin-walled cell at the end of a vein in a leaf, representing the last of the phloem.

transition curve (*Surv.*). A curve of special form connecting a straight and a circular arc. Designed to eliminate sudden change of curvature between the two, and to allow of superelevation being applied gradually to the outer rail or outer part of the curve. Also called an EASEMENT CURVE.

transition elements (*Chem.*). The elements in the middle of the long periods (especially the first) of the periodic system. They differ from one another mainly in the completeness of an inner electron shell, which accounts for the similarity of many of their physical and chemical properties.

transition point (*Chem*). The temperature at which one crystalline form of a substance is converted into another solid modification, i.e the temperature at which they can both exist in equilibrium.

transition region (*Bot.*). The portion of the axis of a young plant in which the change from root structure to shoot structure occurs.

transition stops (*Elec. Eng.*) In a traction-motor controller, intermediate electrical positives inserted between the main circuit positions in order to avoid breaking the circuit.

transitional (*Bot.*). Said of an inflorescence which has some racemose and some cymose characters.

transitional epithelium (*Zool.*). A stratified epithelium consisting of only three or four layers of cells; especially that found lining the ureters, the bladder, and the pelvis of the kidney in Vertebrates.

transitory starch (*Bot.*). Starch formed temporarily in a leaf in which photosynthesis is proceeding faster than the removal or consumption of carbohydrates.

transitron (*Radio, Thermionics*). A pentode in which the suppressor grid acts as the control grid. It is characterised by a negative mutual conductance between the suppressor and screen grids.

translation (*Auto. Teleph.*). Alteration of the number and composition of the last two coded trains of impulses which are dialled by a subscriber and represent a desired exchange. The translation is effected in the director, and is for the purpose of routing the call over a multiplicity of junctions.

translation, translocation (*Zool.*). Change of position of an organ.

translation field (*Auto. Teleph.*). The frame of terminal tags by means of which the coded impulses dialled by a subscriber are translated.

translation of heterosis (*Zool.*). An apparent change in the position of a merome from one somite to another, due to the expansion or contraction of tagmata, as the lateral fins of Fish.

translator (*Teleg.*). A telegraph printing machine which prints, on a slip or page, messages which have been received on a punched slip, which is fed into the translator.

transloca'tion (*Bot*). The movement of material in solution inside the body of the plant —(*Cyt.*) The transfer of a portion of a chromosome, either to another part of the same chromosome or to a different chromosome.—(*Zool.*) See **translation.**

translucent, translucid (*Bot., Min., etc.*). More or less transparent.

transmission (*Elec. Comm., Elec. Eng*) The conveying of electrical energy over a distance.

transmission (*Photog*). The ratio of the transmitted light intensity to the incident light intensity in a developed image on film or glass. Reciprocal of *opacity*. See **density.**

transmission band (*Elec. Comm.*). The band in the frequency spectrum over which minimum attenuation of currents is desired, depending on the type of transmission and the speed of desired signals.

transmission dynamometer (*Eng.*). A device for measuring the torque in a shaft, and hence the power transmitted, either (*a*) by inference from the measured twist over a given length of shaft, obtained by a torsion meter, or (*b*) by direct measurement of the torque acting on the cage carrying the planetary pinions of an interposed differential gear.

transmission level (*Elec. Comm.*). The power in a transmission circuit, stated as the number of decibels (or népers) by which it exceeds a reference level. This is 1 milli-watt in Europe and was 5·8 milli-watts in America. Also called POWER LEVEL. See also **zero power-level.**

transmission line (*Elec. Eng.*). The overhead conductor system by which electric power is transmitted at high voltage from one place to another.—(*Radio*) A system of conductors, usually two, for the transmission of power from a transmitter to the antenna, or from the antenna to the receiver, where the separation between them is considerable. The term is usually applied to such a system when special precautions are taken to prevent the formation of standing waves.

transmission line control (*Radio*). The control of the frequency of an oscillator by means of a resonant line.

transmission loss (*Elec. Comm.*). The difference between the output power-level and the input power-level of the whole, or part of, a transmission system. See **V.U.**

transmission pressure (*Elec. Eng.*). The nominal voltage at which electric power is transmitted from one place to another.

transmission ratio (*Illum.*). The ratio of the transmitted luminous flux to that incident upon a transparent medium.

transmission reference system (*Teleph.*). See **master telephone transmission reference system.**

transmission tower (*Elec. Eng.*). The steel structure that carries a high-voltage transmission line.

transmission unit (*Elec. Comm.*). The old name for *decibel* (q.v.) ; abbrev. **T.U.**

transmitter (*Elec. Comm.*). A generic term for the device which transmits electrical power under the control of some signal, conveyed mechanically. Acoustically, the term is substantially synonymous with *microphone*, except that it may be applied to the essential component (e.g. a condenser transmitter) in a complete microphone equipment.

See **carbon—**
condenser—
curb—
telephone—
Wheatstone
automatic—

transmitter (*Radio*). Strictly, the complete assemblage of apparatus necessary for the production and modulation of radio-frequency current together with the associated antenna system, but the term is frequently restricted to that part of the apparatus concerned with the conversion of d c. or low-frequency a.c. into modulated radio-frequency current.

transmitter (*Teleg.*). The mechanical device which sends accurate signals, at a uniform speed, over a telegraph circuit; operated by punched holes on a slip.—(*Teleph.*) The device which converts an acoustic wave-form into an electrical wave-form for telephonic transmission. It generally consists of a metal or carbon diaphragm and a capsule of carbon granules.

transmitting valve (*Thermionics*). A thermionic valve capable of dealing with the amount of power used in a radio transmitter.

transmutation (*Chem.*). The conversion of one element into another, either spontaneously or artificially.

transom, transome (*Join.*). An intermediate horizontal member of a window frame, separating adjacent panes

transpal'atine (*Zool*). In *Crocodilia*, a cranial bone connecting the jugal and maxilla with the pterygoid.

transparency, colour (*Photog.*). See **colour transparency.**

transparent parchment (*Paper*). See **glassine.**

transpiration (*Aero*). The flow of gas along relatively long passages, the flow being determined by the pressure difference and the viscosity of the gas, surface friction being negligible.

transpiration (*Bot*). The loss of water vapour from a plant, mainly through the stomata.

transpiration current (or **stream**) (*Bot.*). The stream of water which passes through the plant from the roots to the leaves, whence it escapes chiefly as water vapour.

transplant (*Zool.*). In experimental zoology, a part or organ which is removed from its normal position and grafted into another position in the same individual or any position in another individual.

transplantation (*Surg., Zool.*). In experimental zoology or surgery, transference of a part or organ to a different position in the same individual or to any position in another individual; grafting. Also, the union of two organisms by artificial means.

transport number (*Chem.*). The fraction of the total current carried by a given ionic species during electrolysis.

transporter bridge (*Civ. Eng.*). A bridge consisting of two tall towers, one on each side of the river, connected at the top by a supporting girder along which a carriage runs. A small platform at the ordinary road-level is suspended from the carriage, and this system can be made to travel along the girder across the river.

transporter mast (*Aero.*). See **mooring mast.**

transposition (*Elec. Comm.*). The ordered interchange of position of the lines on a pole route, and also of the phases in an open power line, so that the effects of mutual capacity and inductance, with consequent interference, are minimised. See **twisting.**

transposition insulator (*Elec. Eng.*). A special type of insulator used at transposition points on a transmission line.

transposition tower (*Elec. Eng.*). A transmission tower specially designed to allow of the transposing of the conductors at that point on the transmission line.

tran'sudate (*Med.*). A passive effusion of fluid from blood-vessels due to obstruction of the circulation, the fluid containing little protein and few cells, and not clotting outside the body.

Transvaal jade (*Min.*). A term applied in the gemstone trade to massive green garnet (grossularite).

transverse, transversal (*Bot., Zool., etc.*). Broader than long: lying across the long axis of the body or of an organ: lying crosswise between two structures: connecting two structures in crosswise fashion.

transverse architrave (*Carp.*). The moulding across the top of a door or window opening.

transverse current microphone (*Elec. Comm.*). A type of Reisz microphone; sometimes modified by having two cells of carbon granules in series, so that, by varying the size of the granules, a combination of characteristics is possible.

transverse frame (*Aero.*). The outer-ring members of a rigid airship frame. It may be of a stiff-jointed type, or braced with taut radial members to a central fitting. It connects the main longitudinal girders together.—(*Ship Constr.*) A stiffening member of a ship's hull, disposed transversely to the longitudinal axis. In double bottom construction, it is that portion above the tank margin.

transverse joint (*Build.*). Any joint in a brick wall which cuts across the bed from the front to the back surface, such joint in the best practice being always a continuous one in order to avoid the setting up of *straight joint* (q.v.).

transverse springs (*Automobiles*). Laminated springs arranged transversely across the car, parallel to the axles, instead of longitudinally; usually *semi-elliptic* (q.v.) and anchored centrally to the chassis.

transversely (*Bot.*). Applied to a member which is longer one way than the other, when it is attached by one of its longer sides; thus, *transversely oval.*

transver'sum (*Zool.*). In *Crocodilia*, a cranial bone joining the palatine and the pterygoid to the maxilla.

transverter (*Elec. Eng.*). Apparatus for converting alternating to direct current, and vice versa. It makes use of a multiphase transformer, in conjunction with a stationary commutator and synchronously rotating brushgear. Cf. *commutator rectifier.*

transvest'itism (*Psycho-path*). A psychological disorder in which a person dresses in the clothes of the opposite sex.

trap (*Geol.*). See **trappean rocks.**

trap (*San. Eng.*). A bend in a pipe so arranged as to be always full of water, in order to imprison air within the pipe.

trap amplifier (*Elec. Comm.*). A parallel amplifier, generally with the grid of the amplifying valve connected to the grid of an amplifying valve in the main amplifier; frequently used to ensure that a short-circuit on any part of the monitoring equipment, such as head-telephones, shall not affect the transmission in the main current.

trap, beam (*Thermionics*). See **beam trap.**

trap cut (*Jewel.*). Long flat facets, slightly inclined, placed one above the other.

trapez'ioid, trap'ezoid. Shaped like a triangle with one corner cut off; irregularly four-sided.

trapezium (*Zool.*). In the Mammalian brain, a part of the medulla oblongata consisting of transverse fibres running behind the pyramid bundles of the pons varolii.

trapezium diagram (*Cathode Ray Tubes, Radio*). The characteristic pattern formed on the screen of a cathode ray oscillograph when a linearly modulated radio-frequency voltage is applied to one pair of plates and the modulating voltage is applied to the other pair.

trapezium distortion (*Cathode Ray Tubes*). Distortion due to *trapezium effect* (q.v.).

trapezium effect (*Cathode Ray Tubes*). An effect which occurs when the deflecting voltage applied to the deflector plates of a cathode ray tube is unbalanced with respect to the anode, i.e. their variations of potential, in opposite directions, with respect to the anode are unequal. If equal alternating voltages, of different frequencies, are applied to the two sets of plates, the resulting pattern on the screen is trapezoidal instead of square.

trapezius (*Zool.*). In land Vertebrates, one of the levators of the fore limb.

trapezohe'dron (*Crystal.*). A form in the quartz class of the trigonal system. See also **icositetrahedron.**

trapezoi'dal rule (*Surv.*). A rule for the estimation of the area of an irregular figure. For this purpose it is divided into a number of parallel strips of equal width. The lengths of the boundary ordinates of the strips are measured, and the area is calculated from the rule stating that the area is equal to the common width of the strips multiplied by the sum of half the first and half the last ordinates plus all the others.

trapezoidal speed-time curve (*Elec. Eng.*). A simplified form of speed-time curve used in making preliminary calculations regarding the energy consumption and average speed of electric trains. The acceleration and braking portions of the curve are sloping straight lines, while the coasting portion is a horizontal straight line, so that the complete curve becomes a trapezium. Cf. *quadrilateral speed-time curve.*

trap'pean rocks (*Geol.*). An obsolete term (from Swedish *trappa*, a stair) applied originally to dolerites and basalts whose outcrops gave rise to a terraced type of scenery; later widened to include a large variety of igneous rocks excluding granite, e.g. mica-trap.

trap'poid breccias (*Geol.*). A succession of breccias found near Nuneaton, Charnwood, and Malvern, consisting of angular blocks of rhyolite and feldspathic tuffs; of Permian age. They probably represent fossil scree material.

trass (*Build.*, *Geol.*). A material similar to pozzuolana, found in the Eifel district of Germany; used to give additional strength to lime mortars and plasters.

trass mortar (*Build.*, *Civ. Eng.*). A mortar composed of lime, sand, and trass or brick-dust, or of lime and trass without sand, the trass making the mortar more suited for use in structures exposed to water.

Traube's rule, trow'be (*Chem.*). The adsorption by carbon of an organic substance from aqueous solution increases with increasing number of carbon atoms in a molecule of the compound.

trau'ma (*Med.*). (1) A wound or bodily injury.—(2) Emotional shock (*psychic trauma*).

traumat'ic (*Bot.*). Relating to wounds.

traumatic response (*Bot.*). A reaction of the plant to wounding.

trau'matonas'ty (*Bot.*). A nastic movement following wounding.

traumotax'is (*Bot.*). Movements of protoplasts and nuclei after wounding.

trau'motro'pism (*Bot.*). The development of curvatures following wounding.

traveller (*Spinning*). A small C-shaped spring clipped upon the ring of a ring spinning frame; it acts as a thread guide and assists in the insertion of the yarn twist.

traveller gantry (*Build.*). A gantry of the platform gantry type, but having a movable carriage on rails in place of the platform; the carriage, on which is fixed a crab or winch, is capable of movement along or across the gantry.

trav'erse (*Surv.*). A survey consisting of a set of connected lines whose lengths and directions are measured.

traverse tables (*Surv.*). Tables from which the differences of latitude and departure of a line of any length and bearing may be read off.

trav'ersing (*Surv.*). A method of plane-table surveying in which the lines of a traverse are drawn to scale on the paper, the instrument being set up over each station in turn, and the alidade being used to mark the directions of the two traverse lines meeting at the station. Also called PROGRESSION.

traversing bridge (*Struct.*). A type of movable bridge which is capable of rolling backwards and forwards across an opening, such as a dock entrance, to allow of the passage of a vessel.

trav'ertine (*Geol.*). A variety of calcareous tufa of light colour, often concretionary and compact, but varying considerably in structure; some varieties are porous.

trawl (*Ocean.*). A sack-like net the mouth of which is kept open by some kind of framework; used on smooth ground for obtaining samples of the fauna of the sea-bottom. There are many different types, e g. the Agassiz trawl, beam trawl, otter trawl.

tread (*Build.*). The horizontal part of a step.

tread (*Eng.*). In the wheels of a vehicle, that part of the tyre in contact with the road or rail.

tread (*Vet.*). An injury of the coronet of a horse's hoof due to striking with the shoe of the opposite foot.

treatment (*Cinema*). Amplification of the theme or plot of a motion-picture story, indicating the filmic aspects of the production and the way in which it is proposed to achieve them.

tree (*Bot.*). A tall, woody perennial plant having a well-marked trunk and few or no branches persisting from the basal parts.

treeing (*Acous.*). Irregular build-up of the metal which is electro-deposited on the surface of a wax record, because of excessive potential drop across the plating solution, resulting in a coarse metal surface.

treeing department (*Boots and Shoes*). The department in which the uppers are ironed, cleaned, and glossed, and the socks inserted; trade-marks, etc., are also impressed on the soles.

Treetex (*Build.*). A proprietary building-board.

treg'a- (*Elec. Eng*). A prefix signifying 10^{12} times. Cf. *mega* and *bega*.

treg'ohm (*Elec. Eng.*). A million megohms. Cf. *megohm* and *begohm*.

Tremad'oc Slates (*Geol.*). A succession of slates about 1000 ft. thick at the type-locality, Tremadoc in North Wales; they are grey in colour, locally provide good roofing slates, and are referred in Great Britain to the top of the Cambrian System. By some continental geologists they are referred to the overlying system, the Ordovician.

tremat'ic (*Zool.*). Pertaining to the gill-clefts.

Tremato'da (*Zool.*). A class of *Platyhelminthes* all the members of which are either ectoparasites or endoparasites, and have a tough cuticle, a muscular non-protrusible pharynx, and a forked intestine; eye-spots never occur; a ventral sucker for attachment is always present, and sometimes also a sucker surrounding the mouth. Flukes.

trembler bell (*Elec.*). A bell with a self-interrupting armature; actuated by d.c. or a.c.

trem'elloid, trem'ellose (*Bot.*). Of jelly-like consistency.

trem'ie (*Civ. Eng.*). A large metal funnel used for the distribution of freshly mixed concrete over a site which is below water.

trem'olite (*Min.*). A silicate of calcium and magnesium which crystallises in the monoclinic system. It is usually grey or white, and occurs in bladed crystals or fibrous aggregates associated with metamorphic rocks. See **amphiboles, asbestos.**

tremor (*Med.*). Involuntary agitation of the muscles of the body or of the limbs, due to emotional disturbance, old age, or disease of the nervous system.

tremulant (*Acous.*). The stop-key in an organ console which actuates a vibrating piston in the wind-chest supporting and operating ranks of pipes, so that the sound emitted has a pulsating or tremolo effect.

tre'nail (*Carp.*). A hardwood pin driven transversely through a mortise and tenon to secure the joint. Also called TRUNNEL. See **draw-bore.**

trench (*Civ. Eng.*). A long narrow excavation for drains, pipes, and the like.

trench drain (*Civ. Eng.*). A *French drain* (q.v.).

trench fever (*Med.*). A disease common among troops in the war of 1914-18; symptoms were relapsing fever, headache, pains in the back and in the limbs, and often by a rose-red eruption; due to infection with a virus conveyed by lice.

Trenton Limestone (*Geol.*). An important member of the Ordovician succession in the region of the Adirondacks, lying between the Black River Limestone below and the Utica Shales above. Usually regarded as the highest member of the Champlainian Series, it is typically exposed at Trenton Falls, Utica, and is an important oil-bearing formation in the central States.

trepan' (*Surg.*). (1) To trephine.—(2) A form of trephine no longer in use.

trepana'tion (*Surg.*). An operation with the trepan; trephining.

trephina'tion (*Surg.*). The operation of trephine.

trephine (*Surg.*). (1) To operate with the trephine: to remove by surgical means a part of the skull: to remove by surgical means a disc from any part, e.g. from the globe of the eye in the treatment of glaucoma.—(2) A crown saw for removing a circular area of bone from the skull.

trev'ette or **triv'et** (*Textiles*). A knife used to release the wire in a row of loop pile, by drawing it along a groove on the top; this produces cut pile.

tri- (Latin *tres*, Greek *tria*, three). A prefix used in the construction of compound terms; e.g. *triflagellate*, having three flagella.

triacid (*Chem.*). Containing three hydroxyl groups replaceable by acid radicals on neutralisation.

tri'aene (*Zool.*). In *Porifera*, a spicule in the form of a trident.

trial pit (*Civ. Eng.*). A pit sunk into the ground to obtain information as to nature, thickness, and position of strata.

trian'drous (*Bot.*). Having three stamens.

triangle, colour (*Photog.*). See **colour triangle.**

triangle of error (*Surv.*). The triangle formed in the trial-and-error solution of the three-point problem when, on drawing back rays through the three known points on plan, they form a small triangle instead of intersecting at a single point, as a result of the orientation of the plane table being not quite correct.

triangular. Having three angles.—(*Bot.*) Having three angles and three flat faces.

triangular notch (*Civ. Eng.*). See **vee notch.**

triangulation (*Surv.*). (1) The process of dividing up a large area for survey purposes into a number of connected triangles, measuring one side of one of the triangles (the 'base line') and all the angles, and thence computing all the other sides.—(2) See **intersection.**

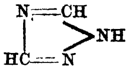
tri'arch (*Bot.*). Having three strands of xylem in the stele.

Tri'as (*Geol.*). The geological system of rocks which succeeds the Permian and precedes the Jurassic System. It was named by von Alberti from the three-fold division in Germany. The rocks in Britain consist of red sandstones and marls, and were deposited under desert condition. The Trias in N. America is largely continental (see **Dolores Beds, Painted Desert Beds, Leroux formation**); but marine sands, shales and sandstones occur in parts of Idaho, Wyoming, and northern Utah.—*adj.* **Triassic.** See also **Bunter Series, Keuper Series, Newark Series.**

triast'er (*Cyt.*). A complex mitotic figure resulting from triple mitosis, as in the ovum after polyspermy.

triax'on (*Zool.*) Having three axes; said of Sponge spicules.

tri'azole (*Chem.*). A heterocyclic compound consisting of a five-membered ring containing three nitrogen atoms, i.e.



triba'sic (*Chem.*). Containing three replaceable hydrogen atoms in a molecule.

tribe (*Bot.*). A section of a family consisting of a number of related genera.

tribute (*Mining*). A method of payment for the working of a portion of a mine, or for the reworking of an old mine, the payment or *tribute* being a percentage of the ore recovered, or its equivalent price.

tricarballyl'ic acid (*Chem.*). $HOOC \cdot CH_2CH(COOH) \cdot CH_2 COOH$, a saturated tribasic acid which crystallises in rhombic prisms; m.p. 166° C.

tricarpel'lary (*Bot.*). Consisting of three carpels.

tri'ceps (*Zool.*). A muscle with three insertions.—*adj.* **tricip'ital.**

trich-, tricho-, trick(o)- (Greek *thrix*, gen. *trichos*, hair). A prefix used in the construction of compound terms; e.g. *trichiasis* (q.v.).

trichi'asis (*Med.*). Distortion of the eyelashes so that they rub against the eye.

Trichinelloi'dea (*Zool.*). A class of *Nematoda* in which the body is divided into an oesophageal portion and a posterior portion; the oesophagus is a cuticular tube embedded in a single chain of cells; in the female the ovary is single; in the male there is one single copulatory spicule or none.

trichini'asis, trichino'sis (*Med.*). Infestation of the human intestine, as a result of eating raw or underdone pork, with the nematode worm *Trichinella* (or *Trichina*) *spiralis*, the larvae of which migrate to, and become encysted in, the muscles of the body.

tri'chite (*Bot.*). A hypothetical crystal, very thin and elongated, presumed to be present in very large numbers in a starch grain.

trichite (*Geol.*). Thin filament- or hair-like crystallite which occurs in volcanic rocks in irregular or radiating groups.

trichite (*Zool.*). A type of Sponge spicule: a rod-like element of the shell in some *Ciliophora.*

tricho-. Prefix. See **trich-.**

trichocephali'asis (*Med.*). See **trichuriasis.**

trich'ocyst (*Zool.*). In some *Ciliophora*, a minute hair-like body lying in the subcuticular layer of protoplasm; it is capable of being shot out, and is believed to serve as an organ of attachment.

trichogyne (*Bot.*). A thread-like extension of the female organ in some fungi, red algae, and lichens, which appears to function, at least sometimes, in receiving the male organ.

tri'choid (*Zool.*). Hair-like.

tri'chome (*Bot.*). (1) A plant hair, i.e. a superficial outgrowth consisting of one or more cells.—(2) The thread of cells which, together with the sheath, makes up the filament in *Myxophyceae.*

trichome hydathode (*Bot.*). A multicellular hair which secretes water.

trichomoni'esis (*Vet.*). A disease of the intestines and liver of gallinaceous birds, due to infection by *Trichomonas meliagris.*

trich'ophore (*Zool.*). A chaeta sac.

trichophyl'lous (*Bot.*). Said of a plant of dry places which has the young stems and leaves protected from desiccation by a thick coating of hairs.

Trichop'tera (*Zool.*). An order of *Endopterygota* having hairy wings, the hinder pair being larger; mandibles are absent and the mouth-parts are imperfectly modified for sucking in the adult; the larva is aquatic and possesses biting mouthparts, while the abdomen bears filamentous tracheal gills; it inhabits a silken case to which it attaches various foreign bodies. Caddis Flies.

tricho'sis (*Zool.*). Arrangement or distribution of hair.

trichothal'lic growth (*Bot.*). A type of growth of an algal filament in which cell division occurs only in a few cells located towards, or at the base of, the filament.

trichotilloma'nia (*Med.*). An obsessional impulse to pull one's own hairs.

trichoto'mous (*Bot.*). Having three equal or nearly equal branches arising from the same part of the stem.

tri'chroism (*Jewel.*). The property, seen in some precious stones, of exhibiting three colours when viewed from different points.

trichromat'ic filter (*Photog.*). In colour photography, a set of three filters arranged to suit a specified emulsion.

trichromatic process (*Photog.*). The *three-colour process* (q.v.).

trichuri'asis (*Med.*). Infestation of the human intestine with the nematode whip-worm *Trichuris trichiura* (also known as *Trichocephalus dispar*).

tricip'ital (*Zool.*). *Adj.* from *triceps*.

trick photography (*Photog.*). The use of non-regular arrangements for attaining novel effects in photographic work, e g. reversing or inverting the camera, double exposure or printing, use of mirrors, screens, or masks, etc.

trick valve (*Eng.*). A slide-valve housing an internal steam passage in addition to the exhaust cavity, in order to supplement the area for steam admission to the port and so reduce wire-drawing. Also known as the ALLAN VALVE.

Triclad'ida (*Zool.*). An order of *Turbellaria*, including marine, fresh-water, and terrestrial forms; the gut has three branches, one forward and two backward.

triclin'ic system (*Crystal.*). The crystallographic system which includes all the forms referred to three unequal axes which are not at right-angles.

tri'colour filter (*Photog.*). One of a set of filters for three-colour photography or a composite filter having the colours on adjacent areas.

tricolour ratio (*Photog.*). The relative inertias of an emulsion for specified primary colours, i.e. deep-blue, green-yellow, and red.

tric'otine (*Textiles*). A dress fabric made from fine Botany worsted yarns, with a whipcord effect.

tricot'ylous (*Bot.*). Having three cotyledons.

tricus'pid (*Zool.*). Having three points, as the right auriculo-ventricular valve of the Mammalian heart.

tridac'tyle (*Zool.*). Said of large pedicellariae having a partially flexible stalk and three toothed jaws, broad at the base and narrow distally, usually without poison-glands; found in *Echinoidea.*

trid'ymite (*Min.*). A high-temperature form of silica, SiO_2, crystallising in the orthorhombic system, but possessing pseudohexagonal symmetry. The stable form of silica above 870° C. An α and a β form are recognised.

trien'nial (*Bot.*). Lasting for three years.

trifa'cial (*Zool.*). The fifth cranial or trigeminal nerve of Vertebrates.

trifar'ious (*Bot.*). Arranged in three rows.

tri'fid (*Bot.*). Divided about half-way down into three parts.

trifol'iate (*Zool.*). Said of very small pedicellariae found in *Echinoidea*, having a very flexible stalk and three broad leaf-like blades without teeth or poison-glands.

trifol'iolate (*Bot.*). Said of a compound leaf having three leaflets.

trifov'eolate (*Bot.*). Marked by three hollows.

trifur'cate (*Bot*). Bearing three prongs.—(*Zool.*) Having three branches.

trifur'cating box (*Elec. Eng.*). A cable dividing box for enclosing the joints between a three-aro or triple concentric cable and three single-core cables or conductor terminals.

trigam'ma (*Zool.*). In *Lepidoptera*, a characteristic feature of wing venation, consisting of a three-pronged fork formed by the veins, M_3, Cu_{1a}, Cu_{1b}.

trigem'inal (*Zool.*). Having three branches: the fifth cranial nerve of Vertebrates, dividing into the ophthalmic, maxillary, and mandibular nerves.

trigger (*Chem.*). The agent which causes the initial decomposition of a chain reaction.

trigger hair (*Zool*). See **cnidocil.**

trigger relay (*Elec. Comm.*). A relay which, when operated, remains in its operated condition when the operating current or other control is removed. See **locking relay.**

trigger relay (*Thermionics*). A device, such as a gas-filled triode or certain combinations of high-vacuum thermionic valves, in which a disturbance of sufficient magnitude can initiate or terminate a discharge but has no subsequent control thereof.

trigger valve (*Thermionics*). A thermionic or gas discharge valve used as a trigger relay. A typical example is the discharging valve in a linear time base circuit.

tri'glyph (*Arch.*). A group of three glyphs, or of two glyphs and two half-glyphs, used as a decoration for a flat surface.

trig'onal (*Bot.*). Triangular in section.

trigonal system (*Crystal.*). A style of crystal architecture characterised essentially by a principal axis of threefold symmetry; otherwise resembling the hexagonal system. Such important minerals as calcite, quartz, and tourmaline crystallise in this system.

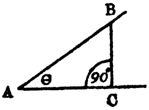
tri'gone (*Bot.*). A thickened angle of a cell.

trigone, trigo'num (*Zool.*). A triangular space or area.—(*Anat.*) The triangular area of the interior of the urinary bladder between the openings of the ureters and of the urethra.—*adjs.* **trig'onal, trig'onate.**

Trigo'nia Grit (*Geol.*). A rubbly, granular limestone (not a true grit) which occurs in Gloucestershire and is characterised by *Trigonia*. It is part of the Middle Jurassic rocks.

trigoni'tis (*Med.*). Inflammation of the trigone.

trigonometrical ratios (*Maths.*). If θ is any angle,



and ABC is the right-angled triangle formed by dropping a perpendicular BC from a point B in one of the lines enclosing the angle to the other, the trigonometrical ratios are as follows:

$$\text{sine } \theta = \frac{BC}{AB}; \quad \text{cosecant } \theta = \frac{1}{\text{sine } \theta}$$

$$\text{cosine } \theta = \frac{AC}{AB}; \quad \text{secant } \theta = \frac{1}{\text{cosine } \theta}$$

$$\text{tangent } \theta = \frac{BC}{AC}; \quad \text{cotangent } \theta = \frac{1}{\text{tangent } \theta}$$

In use these are abbreviated to *sin, cosec, cos, sec, tan, cot.*

trigonometrical station (*Surv.*). A survey station used in a triangulation.

trigonometrical survey (*Surv.*). A survey based on a triangulation.

trigo'nous (*Bot.*). Having three obtuse angles.

trihy'dric alcohols (*Chem.*). Alcohols containing three hydroxyl groups attached to three different carbon atoms, e.g. *glycerine* (q.v.).

trihy'drol (*Chem.*). The polymerised compound, H_6O_3, supposed to be present in liquid water.

Trilobi'ta (*Zool.*). A class of extinct aquatic *Arthropoda* which possessed a flattened body; the head was covered by a broad crescentic shield bearing a pair of compound eyes on its upper surface; there was a single pair of antennae, and the remaining limbs were all similar and biramous and bore gnathobases. Trilobites occur abundantly in certain Palaeozoic strata, reaching their maximum development in the Cambrian and Ordovician Systems.

trim (*Aero.*). The general condition of an aircraft in flight. Particularly the adjustment of the angle of *pitch* (q.v.).

trim (*Build.*). Architraves and other finishings around a door or window opening.

trimer'ic (*Chem.*). Having the same empirical formula but a molecular weight three times as great.

trimer'ous (*Bot.*). Arranged in threes or in multiples of three.

trimeth'yl-gly'cocoll (*Chem.*) *Betaine* (q.v.).

trimet'ric system (*Crystal.*). See **orthorhombic system.**

trimmer (*Carp.*). The cross-member which is framed in between the full-length members to afford intermediate support to the shortened joists in a trimming.

trimmer (*Radio*). See **trimming condenser.**

trimmer arch (*Build.*). A somewhat flat arch turned from the wall to the trimmer to support a hearthstone at a fireplace. Also called a BRICK-TRIMMER.

trimmer joint (*Carp.*). A joint formed with a *tusk tenon* (q.v.).

trimming (*Carp.*). The operation by which bridging joists or rafters are shortened and given intermediate support around a fireplace or chimney.

trimming (*Foundry*). See **dressing-off.**

trimming condenser (*Radio*). A variable condenser of small capacitance used in conjunction with ganging for taking up the discrepancies between the self and stray capacitances of the individual ganged circuits, so that they remain in step for all settings of the main tuning control. Also called TRIMMER.

trimming joist (*Carp.*). One of the two full-length members between which the trimmer is framed. As these members have to carry more load than the other bridging joists, they are made wider.

trimming machine (*Join.*). A lever- or treadle-operated machine for cutting, trimming, or mitring purposes.

trimonoe'cious (*Bot.*). Having hermaphrodite, male, and female flowers on the same plant.

trimor'phic (*Bot.*). Said of a species which has three kinds of flowers, differing in the relative lengths and positions of the filaments, anthers, and stigmata.—*n.* **trimor'phism.**

trimor'phous (*Chem.*). Existing in three crystalline forms.

Tri'mya'ria (*Zool.*). A class of *Nemertinea* in which there are three muscle layers in the body-wall—an outer longitudinal layer, a circular layer, and an inner longitudinal layer.

trimya'rian (*Zool.*). Having three muscular layers, as certain *Nemertinea.*

trinac'riform (*Bot.*). Having three prongs.

trini'trides (*Chem.*). Salts of hydrazoic acid. Also called AZIDES and HYDRAZOATES.

trini'troaniline (*Chem.*). See **T.N.A.**

trinitrobenzene (*Chem.*). See **T.N.B.**

trinitroglycerine (*Chem.*). See **nitroglycerine.**

trinitrophenol (*Chem.*). *Picric acid* (q.v.).

trinitrotoluene (*Chem.*). The symmetrical isomer, 2,4,6-trinitrotoluene, $C_6H_2(CH_3)(NO_2)_3$, is a solid, melting at 82° C. It is manufactured by slowly adding toluene to a mixture of nitric and sulphuric acids containing oleum. It is used as a high explosive, and is known as T.N.T.

trinitroxylene (*Chem.*). See **T.N.X.**

trini'trogen monohydride (*Chem.*). See **hydrazoic acid.**

Trinity Series (*Geol.*). The lowest of the three divisions into which the Comanchean is divided. These beds are marls, limestones, and marine argillaceous strata in Zacatecas; they cover half Texas and part of Arizona, where a limestone member (the Glen Rose Limestone) rests upon continental Comanchean beds.

tri'ode hexode (*Thermionics*). A combination of triode and hexode in the same envelope, used as a frequency convertor in a supersonic heterodyne receiver. The triode section is used as the oscillator and the hexode as modulator.

triode valve or **triode** (*Thermionics*). A thermionic vacuum tube containing an emitting cathode, an anode, and a control electrode or grid, whose potential controls the flow of electrons from the cathode to the anode. Also called THREE-ELECTRODE VALVE.

trioe'cious (*Bot.*). Having hermaphrodite, female, and male flowers on distinct plants of the same species.

tri'oses (*Chem.*). The simplest monosaccharoses. They contain three oxygen atoms in the molecule, e.g. $HO{\cdot}CH_2\,CO\,CH_2\,OH$.

trip (*Horol.*). See **tripping.**

trip circuit (*Elec. Eng.*). The electric circuit operating the tripping mechanism of a circuit-breaker. Cf. *shunt-trip.*

trip coil (*Elec. Comm.*). Any magnet coil which operates some other circuit or mechanism by motion of an armature; more particularly, a coil which operates a circuit-breaker, or the release mechanism of a telegraph machine.

trip gear (*Eng.*). A valve-actuating gear, used for drop valves and rocking (Corliss) valves of large steam-engines, in which the valve is opened by a trigger mechanism, which is then tripped out of engagement to allow the valve to close under a heavy spring. See **Corliss valve, drop valve.**

trip relay (*Elec. Eng.*). A relay controlling the electromagnetic tripping mechanism of a circuit-breaker.

trip switch (*Elec. Eng.*). A control switch for closing the tripping circuit of a circuit-breaker.

tri'pack (*Photog.*). A process involving the use of three emulsions on separate bases, so that exposure is effected by light passing through them when they are all in contact. For cinematography, separate magazines are used, the separate films being brought together at the gate.

tripar'tite (*Bot., etc.*). Divided nearly to the base into three parts.

tri'phane (*Min.*). See **spodumene.**

triphenylmethane dyes (*Chem.*). A group of dyestuffs derived from triphenylmethane. They comprise the malachite green group derived from diaminotriphenylmethane, the rosaniline group derived from triaminotriphenylmethane, the aurine group derived from trihydroxytriphenylmethane, the phthalein group derived from triphenylmethane-carboxylic acid.

tripin'nate (*Bot.*). Said of a pinnate compound leaf with pinnately divided leaflets, themselves pinnately divided.

triple bond (*Chem.*). An indication of a state of unsaturation between two polyvalent atoms, showing that two hydrogen atoms or their equivalent can be attached to each atom connected by a triple bond before saturation is reached.

triple-concentric cable (*Elec. Eng.*). A three-core cable in which the conducting cores are arranged concentrically about the axis of the cable.

triple-expansion engine (*Eng.*). An engine in which the steam expands, successively, in a high pressure, intermediate pressure, and low pressure cylinder, working on the same crankshaft. See **multiple-expansion engine.**

triple fusion (*Bot.*) The nuclear union in the embryo sac between the two polar nuclei and a male nucleus; it provides the starting-point for the development of the endosperm.

triple point (*Chem.*). The temperature and pressure at which three phases of a substance can co-exist.

triple-pole switch (*Elec. Eng*). A switch for simultaneously making or breaking a three-wire electric circuit.

triplet (*Chem.*). A chemical bond which consists of three electrons shared between two atoms.

triplets (*Bot.*). Individuals resulting from the division of the ovum into three parts, each then developing.

trip'lex (*Bot.*). A tetraploid zygote which has three doses of any given dominant.

triplex boards (*Paper*). See **cardboards.**

Triplex glass (*Glass*). A patented form of laminated glass. See **safety glass.**

triplex winding (*Elec. Eng.*). A d.c. armature winding having three parallel paths per pole between positive and negative terminals.

tripli-, triplo- (Latin *triplex*, triple). A prefix used in the construction of compound terms; e.g. *triploblastic* (q.v.).

trip'linerved (*Bot.*). Having three main veins in the leaf.

triploblas'tic (*Zool.*). Having three primary germinal layers, namely, ectoderm, endoderm, and mesoderm.

triplocaules'cent (*Bot.*). Having a main stem bearing branches which are themselves branched.

trip'loid (*Cyt.*). Having three times the haploid number of chromosomes for the species.

tri'pod (*Surv.*). The device by which some surveying instruments are supported firmly off the ground. It consists of three legs hinged to a common head on which the instrument is secured.—(*Photog.*) A similar device used for cameras when time-exposures are required.

Trip'oli powder (*Min.*). See **tripolite.**

trip'olite (*Min.*). A variety of opaline silica which is formed from the siliceous frustules of diatoms. It looks like earthy chalk or clay, but is harsh to the feel and scratches glass. When finely divided it is sometimes called EARTHY TRIPOLITE. Also called DIATOMITE, INFUSORIAL EARTH.

tripping (*Horol.*). An escapement is said to *trip* when a tooth of the escape wheel runs past the locking face.

tripping battery (*Elec. Eng.*). The secondary battery which provides the supply for the trip-coil circuits of a number of circuit-breakers.

triprosthom'erous (*Zool.*). Having three somites in front of the mouth.

tri'pus (*Zool.*). In *Ostariophysi*, one of the Weberian ossicles.

triquetrous, —kwet'rus (*Bot.*). Having three angles and three concave faces.

trisac'charoses (*Chem.*). Carbohydrates consisting of molecules composed of three monosaccharose anhydrides; they result from the elimination of two molecules of water from three molecules of a monosaccharose.

tris'mus (*Med.*). Lock-jaw; tonic spasm of the muscles of the jaw, causing the jaws to be clenched, as in tetanus.

trisom'ic (*Cyt.*). Said of a nucleus (or organism) which is triploid and has one chromosome present in triplicate, the others in duplicate.

tristich'ous (*Bot.*). Having leaves or branches arranged one above another in three rows.—(*Zool.*) Arranged in three rows.

trit'ium (*Chem.*). In addition to deuterium, the hydrogen isotope of mass 2, there is another isotope of mass 3, to which the name *tritium* has been given. This ion has been detected in the mass spectrograph and also arises from the bombardment of deuterons by deuterons.

tritocer'ebron, tritocer'ebrum (*Zool.*). In higher *Arthropoda*, as *Insecta* and *Crustacea*, the fused ganglia of the third somite of the head, forming part of the 'brain.'

tritog'nathous (*Zool.*). Having the jaws borne on the third somite of the head.

tri'tor (*Zool.*). The masticatory surface of a tooth.

trituber'cular (*Zool.*). (Of teeth) possessing three cusps.

trit'urate (*Chem.*). To grind to a fine powder, especially beneath the surface of a liquid.

triun'gulin (*Zool.*). In *Meloidae* (Oil-Beetles), the small active hard-skinned campodeiform larva: the similar larva of *Strepsiptera*.

triva'lent (*Cyt.*). Said of a chromosome which is threefold.

trivalent (*Chem.*). Capable of combining with three atoms of hydrogen, or their equivalent.

triv'et (*Textiles*). See **trevette.**

triv'ium (*Zool.*). In *Echinodermata* generally, the three radii farthest from the madreporite: in *Holothuroidea*, the three rays which form the 'ventral' surface of the body.

tro'car (*Surg.*). A sharp-pointed perforator which, inserted into a cannula, enables this to be introduced into the body.

tro'chal (*Zool.*) Wheel-shaped.

trochal disc (*Zool.*). In *Rotifera*, the flattened anterior end

trochan'ter (*Zool.*). The second joint of the leg in Insects: a prominence for muscle attachment near the head of the femur in Vertebrates.

trochan'tin (*Zool.*). In primitive Insects, an articular sclerite situated at the base of the coxa.

Trochelmin'thes (*Zool.*). A phylum of minute non-metameric animals of aquatic habit in which part of the epidermis is always ciliated; in some forms there is an epidermal syncytium underlying a chitinous cuticle; there is a forked tail containing cement glands, a sac-like mesenteric stomach, and a central nervous mass without cords or commissures; excretion is by flame-cells.

troch'ilus (*Arch.*). A hollow moulding whose profile is formed of two circular arcs of different radii.

troch'lea (*Zool.*). Any structure shaped like a pulley, especially any foramen through which a tendon passes.—*adj.* **troch'lear.**

troch'lear nerve (*Zool.*). The fourth cranial nerve of Vertebrates, running to the superior oblique muscle.

troch'oblasts (*Zool.*). Those cells of a segmenting ovum destined to become a trochophore which will give rise to the prototroch.

troch'ophore, troch'osphere (*Zool.*). A free-swimming pelagic larval form of *Annelida*, *Mollusca*, and *Polyzoa*, possessing a prominent preoral ring of cilia, an apical tuft of cilia, a ventrally curved gut, and a blastocoelic body cavity containing the primitive mesoblasts.

Trochosphaer'ida (*Zool.*). An order of *Rotifera* in which the tail is absent and the body globular in form; the trochal disc is represented by an equatorial circlet of cilia.

tro'chus (*Zool.*). In *Rotifera*, the inner pre-oral circlet of cilia; *cf. cingulum*.—*adj.* **tro'chal.**

troc'tolite (*Geol.*). A coarse-grained basic igneous rock, consisting essentially of olivine and plagioclase only. The former mineral occurs as dark spots on a light ground of feldspar, giving the rock a characteristic spotted appearance, whence the name *troutstone.*

trolley-bus (*Elec. Eng.*). A trackless electric passenger vehicle of the omnibus type, running on a highway.

trolley bush (*Elec. Eng.*). The graphite bushing between the steel axle-pin and the trolley wheel.

trolley-car (*Elec. Eng.*). The American equivalent of *tramcar.*

trolley cord (*Elec. Eng.*). The rope by which the trolley head may be drawn down so that the trolley wheel disengages from the overhead contact wire.

trolley-frog (*Elec. Eng.*). A device used at a junction of two overhead contact wires on a traction system to permit the passage of the current-collector along either wire as desired.

trolley head (*Elec. Eng.*). The complete fitting housing the trolley wheel.

trolley pole (*Elec. Eng.*). The steel tube or pole carrying the trolley head, which is insulated from it, and down which runs the cable connecting the trolley wheel to the traction-motor circuit.

trolley standard (*Elec. Eng*) The short vertical iron pillar supporting the trolley pole in the open type of double-deck tramcar.

trolley system (*Elec. Eng*). The overhead current-collecting system used on tramcars and trolley-buses, in which a small grooved wheel runs under the contact wire.

trolley wheel (*Elec. Eng*). The small grooved wheel by means of which current is collected from the overhead contact wire in the trolley system.

trolley wire (*Elec Eng*) The overhead contact wire in the trolley system of current collection.

trommel (*Mining*). A cylindrical revolving sieve for sizing crushed ore or rock.

trondh'jemite (*Geol.*). A coarse-grained igneous rock consisting essentially of plagioclase (ranging from oligoclase to andesine), quartz, and small quantities of biotite, in some instances accompanied, or replaced by, amphibole and pyroxene.

troos'tite (*Met.*). The name applied to structures in steel which consist of very fine aggregates of ferrite and cementite, which cannot be resolved under the microscope, which etch rapidly, and appear very dark. Such structures may be very fine pearlite, or the product of tempering martensite at temperatures lower than those which give sorbite.

tropae'olines (*Chem.*). A group of dyes derived from *p*-hydroxy-azobenzene.

trope'ic (*Zool.*). See **carinate.**

troph-, tro'pho- (Greek *trophē*, nourishment). A prefix used in the construction of compound terms; e.g. *trophochromidia* (q.v.).

trophallax'is (*Zool.*). Mutual exchange of food between imagines and their larvae, as in some social Insects.

trophamn'ion (*Zool.*). In the eggs of certain parasitic *Hymenoptera,* a protoplasmic sheath surrounding a central embryonic mass during early development.

tro'phi (*Zool.*). In *Insecta,* the mouth-parts: in *Trochelminthes,* the masticatory mechanism of the mastax.

tro'phic (*Bot., Zool.*). Pertaining to nutrition.

trophic race (*Zool.*). A collection of individuals within the limits of a species, but differing from the typical members of the species in their choice of food.

tro'phifer, tro'phiger (*Zool.*). That part of the head of an Insect with which the mouth-parts articulate.

tro'phoblast (*Zool.*). The differentiated outer layer of epiblast in a segmenting Mammalian ovum.

trophochondrio'ma (*Cyt.*). Mitochondria as concerned in nutrition.

trophochro'matin (*Cyt.*). A substance within the nucleus which controls the metabolism of the cell.

trophochromid'ia (*Cyt.*). Vegetative chromidia; chromidia concerned with nutritive processes.

tro'phocyte (*Zool.*). In Insects, a cell of the larval fat-body which accumulates albuminoid reserve material and plays a part in tissue-building during histogenesis.

trophone'mata (*Zool*) Finger-shaped projections of the wall of the uterus in some viviparous lower Vertebrates.

trophoneuro'sis (*Med.*) Any functional disorder of the body due to derangement of the trophic action of the nerves.

trophonu'cleus (*Zool*). In some *Mastigophora,* the large vegetative nucleus which regulates metabolism and growth Cf. *kinetonucleus.*

tro'phophore (*Zool*). In *Porifera,* an aggregation of cells destined to become a gemmule.

tro'phophyll (*Bot*). A vegetative leaf.

tro'phoplasm (*Cyt.*). Protoplasm which is mainly concerned with nutrition.

tro'phoplast (*Bot.*). A plastid.

tro'phosome (*Zool.*). All the zooids of a hydroid colony which are concerned with nutrition.

trophospon'gium (*Zool*). Holmgren canaliculi of nerve cells occupied by branching processes of neuroglia cells.

trophotax'is (*Zool*). The movements of an animal when it directs itself symmetrically.

trophothy'lax (*Zool*). In certain Ant larvae (*Pseudomyrminae*), a food-pouch on the first abdominal somite.

tro'photro'pism (*Bot.*) A reaction in a growing organ induced by the chemical nature of the environment.

trophozo'ite (*Zool*). In *Protozoa,* the trophic phase of the adult, which generally reproduces by schizogony.

trophozo'oid (*Zool.*). In some *Urochorda* colonies, a nutritive zooid.

tropiba'sic (*Zool.*). Said of a skull in which the trabeculae are near together and fuse in the middle line.

trop'ic acid (*Chem.*). $C_6H_5{\cdot}CH(CH_2OH)COOH$, *α*-phenyl-*β*-hydroxypropionic acid; crystallises in fine prisms; m p. 117° C.

tropic curvature (*Bot.*). A curvature of a plant organ caused by one-sided growth under the influence of a stimulus falling on the plant from one side.

tropical month (*Astron.*). The period of lunar revolution with respect to a point on the ecliptic (27 days, 7 hours, 43 minutes, 4·7 seconds).

tropical revolving storm (*Meteor.*). A small intense cyclonic depression originating over tropical oceans. See **cyclone, hurricane, typhoon, willy-willy.**

tropical switch (*Elec. Eng.*). A switch mounted on feet or bosses; it thus guards against the effect of excessively damp climates by having an air space between its base and mounting surface. Also called FEET-SWITCH.

tropical year (*Astron.*). The interval between two successive passages of the sun in its apparent motion through the First Point of Aries; hence the interval between two similar equinoxes or solstices and the period of the seasons; its length is 365·242196 mean solar days.

Tropics (*Astron.*). The two parallels of celestial latitude which touch the ecliptic at its most northerly and southerly points, the First Point of Cancer and the First Point of Capricorn respectively, and which therefore mark the limits of the sun's extreme north and south declinations. Hence the terms *Tropic of Cancer* and *Tropic of Capricorn.* The terrestrial counterparts are the two parallels of terrestrial latitude on either side of the equator and each distant from it by about 23° 27′, the value of the *obliquity of the ecliptic* (q.v.). In popular language, the term is sometimes used of the zone of the earth, bounded by these parallels, in which the sun can be vertically overhead.

tro′pism (*Physiol.*). A reflex response to an external stimulus, differing from an ordinary compound reflex in that it involves movements of the whole body rather than a part.

tropitrab′ic (*Zool.*). See **tropibasic.**

tro′popause (*Meteor.*). The boundary between the *troposphere* and the *stratosphere* (qq.v.).

tro′posphere (*Meteor.*). The hollow sphere of atmosphere on the surface of the earth in which there are relatively large temperature gradients and in which the weather functions.

Trotter photometer (*Illum.*). A portable photometer in which the brightness of the comparison screen is varied by tilting.

trough fault (*Geol.*). Actually a pair of parallel, normal faults hading towards one another and throwing in opposite directions.

trough gutter (*Build.*). A parallel gutter used along roof valleys or parapets.

Trousseau's phenomenon, troo-sō (*Med.*). Spasm of the muscles of a limb whose blood-vessels or nerves are compressed, occurring in tetany.

Trouton's rule, trow′ton (*Chem.*). For most non-associated liquids, the ratio of the latent heat of vaporisation per gram-molecule, measured in calories, to the boiling-point, on the absolute scale of temperature, is approximately equal to 21 at atmospheric pressure.

trout′stone (*Geol.*). See **troctolite.**

trowel (*Build., Plast.*). A flat steel tool used for spreading and smoothing mortar or plaster.

truck-type switchgear (*Elec. Eng.*). Switchgear in which each circuit-breaker, with its associated equipment, is mounted on a truck capable of withdrawal, so that it may be completely removed from the rest of the gear for maintenance and repair. Also called CARRIAGE-TYPE SWITCHGEAR.

true altitude (*Surv.*). The *altitude* (q.v.) of a heavenly body as deduced from the *apparent altitude* (q.v.) by applying corrections for atmospheric refraction, for instrumental errors, and where necessary for geocentric parallax, sun's semi-diameter, and dip of horizon.

true angle of incidence (*Aero.*). See **angle of incidence.**

true bearing (*Surv.*). The horizontal angle between any survey line and the direction of true north.

true horizon (*Surv.*). A great circle of the celestial sphere parallel to the horizon and passing through the earth's centre. Also called the RATIONAL HORIZON.

true ohm (*Elec. Eng.*). The actual realisation of the practical unit of resistance, exactly equal to 10^9 electromagnetic units of resistance. Cf. *international ohm, B.A. ohm, legal ohm.*

true resistance (*Elec. Eng.*). See **d.c. resistance.**

true section (*Surv.*). A section which has been drawn, with the same scales, horizontally and vertically.

true watts (*Elec. Eng.*). A synonym for the active power flowing in an a.c. circuit.

trumpet arch (*Build.*). A *splaying arch* (q.v.).

trumpet hypha (*Bot.*). A filament inside the thallus of a brown alga which is markedly enlarged at each transverse septum.

trun′cate (*Bot.*). Blunt-ended, as if cut off abruptly.

truncus (*Zool.*). A main blood-vessel; as, in *Icthyopsida,* the *truncus transversus* or ductus Cuvierii, and the *truncus arteriosus* or great vessel, through which blood passes from the ventricle.

trunk (*Anat., Zool.*). The body, apart from the limbs: the proboscis of an elephant.

trunk (*Arch.*). The shaft of a column.

trunk (*Bot.*). The upright, massive main stem of a tree.

trunk piston (*Eng.*). A piston, long in relation to its diameter, used where there is no piston-rod or crosshead, the piston having to take the connecting-rod thrust; most I.C. engine pistons are of this type.

trunk (*Teleph.*). In America, the name for a junction circuit between exchanges.—(*Auto. Teleph.*) The same as *link.* See **common trunk, individual trunk.**—(*Cables*) A *trunk feeder* (q.v.).

trunk call (*Teleph.*). In Britain, a telephone call from one telephone area to another, involving a connexion between two trunk centres each dealing with all calls passing in or out of its area. See **long-distance call, toll call.**

trunk circuit (*Teleph.*). In Britain, a 2- or 4-wire connexion between trunk centres, for establishing trunk calls between telephone areas. In America, a circuit between exchanges in the same telephone area.

trunk distribution frame (*Auto Teleph.*). A frame carrying the terminals for connecting the trunks between ranks of selectors.

trunk exchange (*Teleph.*). An exchange in a telephone area which is connected, by trunk or long-distance lines, to other trunk exchanges, and to subscribers through their local exchanges.

trunk feeder (*Cables*). A feeder connecting two generating stations, or a generating station and a large sub-station.

trunk frame terminal assembly (*Auto. Teleph.*). A cross-connexion terminal frame for connecting trunks between ranks of selectors.

trunk junction circuit (*Teleph.*). The junction between an exchange and the trunk exchange, for routing subscribers to the trunk exchange system.

trunk line (*Teleph.*). The same as *trunk circuit.*

trunk main (*Cables*). A *trunk feeder* (q.v.).

trunk-offering final selector (*Auto. Teleph.*). The final selector which enables a trunk operator to offer a trunk call to a subscriber although he may be engaged on another call.

trunk-offering selector (*Auto. Teleph.*). The first selector operated by impulse trains coming from a trunk operator who wishes to break into a conversation to offer a trunk connexion.

trunk position (*Teleph.*). A position in a trunk exchange at which delayed trunk calls are handled.

trunk-record circuit (*Teleph.*). The circuit to a trunk operator who records the long-distance connexion requirements of a subscriber, so that the latter may be called when the trunk line is available, and may be properly charged, when delay-working is in operation.

trunk-record position (*Teleph.*). A position in a trunk exchange at which particulars of a trunk call are recorded on a card which is routed to a trunk operator, who rings back the calling subscriber when a line is free. The record is made by any trunk operator when no-delay is in operation.

trunk road (*Civ. Eng.*). A road for which the responsibility for control and maintenance has been transferred from the existing highway authorities to the Ministry of Transport. (Great Britain.)

trunk terminal (*Teleph.*). The location of the special apparatus required at trunk centres for connecting the normal telephone exchange pairs to trunk lines.

trunking (*Auto. Teleph.*). The cables which contain the links between one rank of selectors and others in the sequence of operation, the cables taking a common route through the exchange building.

trunking diagram (*Auto. Teleph.*). A diagram which indicates the cable routes between the various groups of telephone switching apparatus in an automatic telephone exchange.

trun'nel (*Carp.*). A *trenail* (q.v.).

trunnion axis (*Surv.*). The horizontal axis about which the telescope of a theodolite or tacheometer may be rotated on its trunnion bearings.

trunnion bearing (*Eng.*). A pair of short journals, supported in bearings, projecting co-axially from opposite sides of a vessel or cylinder required to pivot about their axis.

Truscon floor (*Build.*) A type of fire-resisting floor formed in monolithic reinforced concrete, in imitation of the ordinary wood joist and boarding floor.

truss (*Struct.*). A framed structure built up entirely from tension and compression members, arranged in panels so as to be stable under load; used for supporting loads over long spans.

See **English roof— sickle-shaped—**
French— Whipple-Murphy—

truss (*Surg.*). A surgical appliance consisting of a pad incorporated in a spring or belt for retaining a reduced hernia in place.

truss-beam (*Build.*). A steel framework acting as a beam, or a timber beam or framework stiffened against deflection by a steel tie-rod.

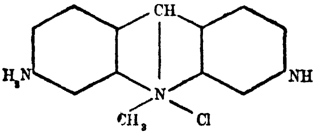
trussed partition (*Carp.*). A partition which is framed so as to be self-supporting between its ends; used in cases where the floor is not strong enough to carry it.

Trussit (*Build.*). Trade-name of a form of metal lathing used for thin plaster or concrete walls.

try square (*Carp., etc.*). A tool similar to the bevel but having the blade fixed at 90° to the stock.

trying plane (*Carp.*). A tool similar to the jack plane but about 22 in. long; used after the jack plane to obtain a straight and true surface.

tryp'afla'vine (*Chem.*). 3, 6-Diamino-methylacridinium chloride, a dye used for the treatment of wounds, on account of its antiseptic and non-toxic properties. The formula is



trypano- (Greek *trypanon*, borer) A prefix used in the construction of compound terms; e.g. *trypanorhynchus* (q v).

trypanomo'nad (*Zool.*). See **crithidial.**

trypanorhyn'chus (*Zool.*). In *Cestoda*, a protractile proboscis armed with hooks.

trypanosomi'asis (*Med.*). Sleeping-sickness. A general term for diseases caused by infection with flagellate protozoan of the genus *Trypanosoma.* Sleeping-sickness is caused by infection by *Trypanosoma gambiense* or by *Trypanosoma rhodesiense*, transmitted by the bite of tsetse flies, and characterised by irregular fever, erythematous rash, enlargement of the glands and the spleen, and, finally, by headache, apathy, abnormal sleepiness, wasting, weakness, and coma.

tryp'sin (*Zool.*). A protein-digesting ferment of the alimentary canal of Vertebrates, secreted by the pancreas.—*adj.* **tryp'tic.**

trypsin'ogen (*Zool.*). In Vertebrates, an inactive substance produced by the pancreas from which *trypsin* (q.v.) is formed by the action of the enterokinase of the succus entericus.

***l*-tryp'tophan** (*Chem.*). $C_{11}H_{12}N_2O_2$, β-indole-α-aminopropionic acid, obtained by the cleavage of certain proteins, e.g. of casein by pancreatic enzymes.

T.S. (*Chem.*). Abbrev. for *test solution.*

tsutsu'gamushi fever (*Med.*). See **shimamushi fever.**

T.U. (*Teleph.*). Abbrev. for *traffic unit* and for *transmission unit.*

Tu (*Chem*). An alternative symbol for *thulium.*

tub (*Mining*). A tram, wagon, corf, or corve.

tubbing (*Mining*) The lining of a circular shaft, formed by timber or by steel segments.

tubby (*Acous.*). An acoustically defective set in motion-picture or other recording; characterised by reverberant booming for frequencies which are familiar when barrels are struck.

tube (*Ammunition*). The tube used for the ignition of B L. cartridges. It is usually filled with gunpowder and fired by means of a cap. See **cap.**

tube (*Bot.*). The lower, cylindrical portion of a gamopetalous corolla.

tube (*Elec. Eng.*). Abbrev. for *tube railway.*

tube (*Thermionics*). An alternative name, used chiefly in America, for an electric *valve* (q.v.).

tube-drawing (*Eng.*). The production of seamless tubes by drawing a large, roughly formed tubular piece of material through dies of progressively decreasing size.

tube feet (*Zool.*). See **podium** (2).

tube fuse (*Elec. Eng.*). A fuse in which the fuse wire is enclosed in an insulating tube. Cf. *cartridge fuse.*

tube germination (*Bot.*). Germination of a spore by the formation of a hypha (germ tube).

tube nucleus (*Bot.*). A non-gametic nucleus in a pollen tube which probably plays a part in regulating the development and behaviour of that organ.

tube plates (*Eng.*). The end walls of a surface condenser, between which the water tubes are carried; they are bolted between the casing and the water-chamber covers. See **condenser tubes.**

tube railway (*Civ. Eng.*). An underground electric railway running in tunnels of circular cross-section, and lined with cast-iron facing segments, each tunnel accommodating one track.

tube ring (*Elec. Comm.*). Undesired ringing noise, sustained in an amplifying system because of continual mechanical impulsing of a microphonic thermionic valve from some external source.

tuber (*Bot.*). A swollen, underground stem, or less often a root, consisting mainly of parenchymatous cells containing much stored food material.

tuber cine'reum (*Zool.*). A nerve-centre of the diencephalon.

tu'bercle (*Bot.*) (1) A general name for a small swelling.—(2) A small swelling on the roots of beans and other plants, inhabited by symbiotic bacteria.—(*Med.*) (1) Any small rounded projection on a bone or other part of the body.—(2) A solid elevation of the skin larger than a papule.—(3) A small mass or nodule of cells resulting from infection with the bacillus of tuberculosis.—(4) Loosely, tuberculosis; the tubercle bacillus.—(*Zool*) A small rounded projection: the dorsal articulator process of a rib: a cusp of a tooth. Also called TUBERCULUM.—*adjs.* **tu'bercled, tuber'cular, tuber'culate, tuber'culose.**

tuber'cular (*Med*). Of, pertaining to, resembling, or affected with, nodules (tubercles): less correctly, affected with tuberculosis (i.e. *tuberculous*).

tuber'cularoid (*Bot.*). Having a warted surface.

tuber'culate (*Bot.*). Provided with tubercles.

tuber'culide, tuber'culid (*Med.*). Any skin lesion due to infection with the bacillus of tuberculosis.

tuber'culiform (*Bot.*). Wart-like.

tuber'culin (*Bacteriol.*). Any one of a number of preparations from a culture of *Mycobacterium tuberculosis*, for use in the diagnosis and treatment of tuberculosis.

tuberculo'ma (*Med.*). A slow-growing, circumscribed tuberculous lesion, sometimes present in the brain.

tuberculo'sis (*Med.*). Infection of the body by *Mycobacterium tuberculosis*, especially of the lungs, lymphatic glands, and joints; characterised by the development of tubercles in the bodily tissues and by fever, anorexia, and loss of weight.

tuber'culous (*Med.*). Pertaining to, affected with, or caused by, tuberculosis.

tu'beriform, tu'berous (*Bot.*). Having the form of a tuber.

tuberose (or **tuberous**) **sclerosis** (*Med.*). A condition in which hyperplasia of the neuroglia gives rise to hard, tumour-like masses in the brain, associated with epilepsy and mental deficiency; the disease is part of the developmental defect known as *epiloia* (q.v.).

tuberos'ity (*Zool.*). A prominence on a bone, generally for muscle attachment, especially prominences near the head of the humerus.

tu'berous (*Bot.*). Thickened and forming tubers.

tubic'olous (*Zool.*). Living in a tube.

tubifa'cient (*Zool.*). Tube-building, as certain *Polychaetes*.

tubip'arous (*Zool.*). Tube-producing; said of certain glands in some tubicolous animals which secrete the material with which the tube is built.

tubular lamp (*Illum.*). An electric lamp in the form of a tube, the connexion to which is generally made at either end.

tubular scaffold (*Build.*). A form of scaffold constructed of weldless steel tubes which can be clamped together in any desired manner by special steel collar-pieces with screw fixings.

tu'bule, tu'bulus (*Bot.*). (1) The neck of a perithecium.—(2) A pore lined by a hymenium-bearing basidia.—(*Zool.*) Any small tubular structure.—*adjs.* **tu'bulate, tubulif'erous, tu'buliform, tu'bulose.**

tu'buliform (*Bot.*). Composed of cylindrical, pipe-like filaments.

tuck pointing (*Build.*). Pointing finished by cutting a groove in the surface at the joints and tucking into the groove a narrow projecting artificial joint of putty.

Tudsbury machine (*Elec. Eng.*). A form of electrostatic generator which operates inside a vessel containing compressed air, and is therefore able to employ smaller clearances for a given voltage.

tufa (*Geol.*). A porous, concretionary, or compact form of calcium carbonate which is deposited from solution around springs.

tuff (*Geol.*). A rock formed of compacted volcanic fragments, some of which can be distinguished by the naked eye. If the fragments are larger, then the rock grades into an agglomerate.

Tufnol (*Plastics*). A proprietary laminated plastic; light-weight, tensile strength 3½-7¼ tons per sq. in.; strong insulation qualities.

tufted (*Bot.*). Having many short crowded branches all arising at about the same level.

tularae'mia, tulare'mia (*Med., Vet.*). A disease of rodents due to infection with *Bacterium tularense*, transmitted to Man by blood-sucking flies, fleas, or bugs, or directly from the infected rodent. In Man it is characterised by prolonged fever, enlargement of the lymphatic glands, or by a condition resembling that of typhoid fever.

tumble-home (*Ship Constr.*). A term defining the narrowing of a ship's breadth. It is the measure of the inward fall when the deck breadth is less than the maximum breadth.

tumbler switch (*Elec. Eng.*). A small single-pole switch having a quick-break action, universally used in electric-lighting installations for controlling individual lamp circuits.

tumbling bay (*Civ. Eng.*). A form of weir used to measure the rate of flow of water passing over it, or to act as an overflow dam diverting water in excess of a given discharge.

tumbling-in (*Build.*). A term applied to the brickwork forming the top surface of a pier and sloping in towards the general face of the wall.

tumbu disease (*Med.*). A disease, common in Central and West Africa, due to invasion of the surface of the body by the larvae of the tumbu fly *Cordylobia anthropophaga*; it is characterised by the formation of a boil or a warble in the skin.

tumefaction (*Med.*). The process or act of swelling: the state of being swollen.

tu'mid (*Bot.*). Swollen; inflated.

tumour, tumor (*Med.*) Any swelling or morbid enlargement. The term now usually denotes neoplasm, a non-inflammatory mass formed by the growth of new cells in the body and having no physiological function. An *innocent tumour* is encapsulated and usually solitary, pressing upon, but not invading, adjacent tissues; a *malignant tumour* (*carcinoma, sarcoma*) invades tissues, tends to recur, and spreads to other parts of the body.

Tunbridge Wells Sand (*Geol.*). A succession of ferruginous sandstones which are almost unfossiliferous. It occurs in Southern England, and forms the upper division of the Hastings Sand Group of the Wealden beds, which are usually grouped in the Cretaceous System.

tune (*Acous.*, *Radio*). To carry out the operation of *tuning* (q.v.).

tune in (*Radio*). To carry out the operation of *tuning-in* (q.v.).

tuned amplifier (*Radio*). An amplifier containing tuned circuits, and therefore sharply responsive to particular frequencies.

tuned-anode circuit (*Radio*). An inductance coil shunted by a condenser (either or both of which may be variable) connected in series with the lead to the anode of a thermionic valve.

tuned-anode coupling (*Radio*). A form of coupling between stages of a high-frequency thermionic valve amplifier, in which the coupling impedance is provided by a tuned anode circuit.

tuned circuit (*Radio*). A circuit comprising an inductance coil and a condenser connected in series or in parallel, and offering a low or high impedance respectively to the passage of alternating current at the resonant frequency.

tuned grid circuit (*Radio*). A parallel tuned circuit included between the grid and the cathode of a thermionic valve.

tuned spark system (*Radio*). See **musical spark system.**

tuner (*Radio*). An assemblage of one or more resonant circuits, used for accepting a wanted signal and rejecting others.

tung oil or **China wood oil** (*Chem.*). A yellow drying oil, obtained from the seeds of *Aleurites cordata*. M.p. 31°-44° C., sp. gr. 0·936-0·943, saponification value 193, iodine value 150-165. Used in paints and varnishes, especially enamels.

Tungar rectifier (*Elec. Eng.*). A rectifier of the gas-discharge type, employing a thermionic cathode and operating in an atmosphere of inert gas, e.g. argon.

tung'sten or **wolfram** (*Met.*). A metallic element in the sixth group of the periodic system. Chem. symbol, W. At. wt. 184, at. no. 74, sp. gr. at 20° C. 19·3, m.p. 3400° C., specific electrical resistivity 5·48 microhms per cm. cub. Used as the filament in electric lamps, as a constituent in magnet and high-speed steels, and as carbide in cemented carbides.

tungsten arc (*Elec. Eng.*). A high-intensity arc of small dimensions, obtained between tungsten electrodes enclosed in a glass bulb.

tungsten lamp (*Elec. Eng.*). An electric lamp employing an incandescent tungsten filament.

tung'stic acid (*Chem.*). WO_3. The starting-point for the preparation of tungsten metal. Also called TUNGSTIC OXIDE and TUNGSTEN TRIOXIDE.

tungstic ochre or **tungstite** (*Min.*). Trioxide of tungsten, which probably crystallises in the orthorhombic system. It is usually earthy and yellow or greenish in colour, and is a mineral of secondary origin, usually associated with wolframite.

tunic (*Zool.*). An investing layer.—*adj.* **tu'nicate.**

tu'nica albugin'ea (*Zool.*). In Mammals, the fibrous capsule of the testis.

tunica vagina'lis (*Zool.*). The serous layer covering the tunica albuginea of the testis.

Tunica'ta (*Zool.*). See **Urochorda.**

tu'nicate, tu'nicated (*Bot.*). Having a coat or covering.—(*Zool.*) Enclosed by a non-living test or mantle.

tunicate bulb (*Bot.*). A bulb composed of a number of swollen leaf bases, each of which completely encloses all parts of the bulb inside it; an onion is a familiar example.

tu'nicin (*Zool.*). A gelatinous substance, allied to cellulose, found in the test of *Urochorda.*

tuning (*Acous.*) (1) The pitch adjustment of one note to another, or to a specified frequency of oscillation.—(2) The adjustment of tension in the strings of a piano, harp, or violin, so that the specified notes emitted coincide in frequency with a standard scale, e.g concert pitch.—(3) The adjustment of the length of pipes in organs to obtain the correct emitted pitch. See **aliquot tuning.**—(*Radio*) The operation of adjusting the resonant frequency of a circuit or circuits to a particular value, generally to coincide with the frequency of an impressed e m.f. Tuning is normally effected by variation of the capacitance and/or inductance of the circuit.

tuning coil (*Radio*). See **tuning inductance.**

tuning condenser (*Radio*). A variable condenser used for tuning purposes

tuning control (*Radio*). The mechanical means for tuning a resonant circuit.

tuning curve (*Radio*). A curve relating the resonant frequency of a tuned circuit to the setting of the variable element, e.g. the condenser.

tuning error (*Radio*). See **loop tuning error.**

tuning-fork (*Acous.*). A fork with two tines and heavy cross-section, generally made of steel. Expressly designed to retain a constant frequency of oscillation when struck. See **maintained tuning-fork.**

tuning-fork control (*Radio*). Control of the frequency of the waves emitted from a radio transmitter by means of a tuning-fork oscillator.

tuning-fork oscillator (*Radio*). See **maintained tuning-fork.**

tuning-in (*Radio*). The operation of adjusting the circuit settings of a radio receiver so as to produce the maximum response to a particular signal.

tuning inductance (*Radio*). A fixed or variable inductance coil used for tuning purposes.

tuning note (*Radio*). A steady musical note radiated from a broadcasting transmitter at the commencement of, or during the intervals in, a programme, to facilitate the tuning of receivers thereto.

tuning-out (*Radio*). The opposite of *tuning-in* (q.v.), i.e. adjustment for minimum response to a signal, consistent with acceptance of another.

tunnel (*Civ. Eng.*). An underground passage which is nearly or quite horizontal, and through which passes a railway, road, aqueduct, or canal.

tunnel slots (*Elec. Eng.*). See **closed slots.**

tunnel vault (*Build.*). See **barrel vault.**

tunnel windings (*Elec. Eng.*). A term sometimes applied to armature windings in which the conductors are inserted, end-on, into closed slots.

Tunnelite (*Civ. Eng.*). A form of rapid-hardening cement.

tup (*Civ. Eng.*). A *monkey* (q.v.).

tu'ranose (*Chem.*). A disaccharose, formed from one molecule of fructose and one molecule of glucose, obtained by the hydrolysis of the trisaccharose melezitose.

Turbella'ria (*Zool.*). A class of *Platyhelminthes* comprising forms of free-living habit, marine, fresh-water, or terrestrial; with a ciliated ectoderm containing rhabdites; usually with a muscular protrusible pharynx and a pair of eye-spots. Planarians.

turbidim'eter (*Civ. Eng.*). An instrument for measuring the size of the particles in a *filler* (q.v.).

turbidimet'ric analysis (*Chem.*). See **nephelometric analysis.**

tur'binal (*Zool.*). Coiled in a spiral: one of certain bones of the nose in Vertebrates which support the folds of the olfactory mucous membrane.

tur'binate (*Bot.*). Shaped like a top and attached by the point.—(*Zool.*) In the form of a whorl or an inverted cone; as certain Gastropod shells.

turbinate bone. See **turbinal.**

turbine (*Eng*). See **steam— water—**

turbinec'tomy (*Surg.*). Surgical removal of a turbinal.

turbo-convertor (*Elec. Eng*) A combination of turbine-driven induction generator and rotary convertor, in which the rotor of the generator revolves at turbine speed; the stator, being in this case free to revolve also, is coupled to the armature of a rotary convertor.

turbo-dynamo (*Elec. Eng.*). A specially designed d.c. generator for direct coupling to a high-speed steam turbine.

turbo-electric propulsion (*Elec. Eng.*). A form of electric drive, used in marine and locomotive work, in which turbine-driven generators supply electric power to motors coupled to the propeller or axle shafts.

turbo-generator (*Elec. Eng.*). A combination of steam turbine and electric generator, directly coupled together.

turbulent burner (*Eng*). A pulverised-coal burner in which the coal-bearing primary air and secondary air pass through the burner, resulting in a short flaring flame.

turbulent flow (*Hyd*). See **eddy flow.**

turges'cence (*Bot*). The condition of cells or tissues which are distended with water.—*adj.* **turges'cent.**

turgescence (*Med.*). The act or condition of swelling up: the state of being swollen.

tur'gid (*Bot.*). (1) Said of a cell which is distended and tense, well supplied with water.—(2) Said of a young or soft plant member which is stiff and rigid owing to internal pressure arising from a plentiful supply of water.

turgid'ity (*Bot.*). The condition of rigidity when the cells of a plant member are distended and press against one another, owing to turgor pressure.

turgite (*Min.*). See **hydrohaematite.**

tur'gor (*Bot.*). The balance between the osmotic pressure of the cell sap and the elasticity of the cell wall.

turgor pressure (*Bot.*). The hydrostatic pressure set up within the cell by the water present acting against the elasticity of the wall.

tu'rion (*Bot.*). A swollen perennating bud, containing much stored food, formed by a number of water plants; it comes away from the parent, remains inert during winter, and gives rise to a fresh plant in the following spring.

Turkey-red oil (*Chem.*). Sulphonated castor oil, sp. gr. 0·95, acid value 174, iodine value 82, saponification value 189. Used in dyeing.

Turkish mortar (*Build.*). See **Khorassar mortar.**

turn bridge (*Struct.*). A *swing bridge* (q.v.) or *pivot bridge* (q.v.).

turn'buckle (*Struct.*). A *screw shackle* (q.v.).

turn indicator (*Aero.*). Any instrument that indicates the departure of an aircraft from its set course in a horizontal plane. Necessary for flying in clouds or at night when the horizon is not visible.

turnout (*Rail., etc*). The movable tapered rails or points by which a train or tram is directed from one set of rails to another.

turnover (*Elec. Comm.*). The reversing of the legs of a balanced transmission circuit. The turnover test is very important in all transmission measurements with balanced circuits, because if the same results are not obtained when any legs of the balanced system are interchanged, the presence of longitudinal currents is indicated, and no measurement can be accurate unless such currents are eliminated.

turnover board (*Moulding*). A smooth square board on which an inverted bottom-half box is placed and rammed up round a pattern having a flat joint, thus saving the labour of making the facing joint. After turning over, removing the board, and adding facing sand, the top half may be rammed up at once.

turnshoe (*Shoes*). See **sewround.**

turnsick (*Vet.*). See **coenurosis.**

turn-table (*Acous*). The rotating table which supports the wax-blank during cutting and the processed record while being reproduced. It is of relatively high inertia, to keep down fluctuations of speed.

turn-table (*Rail.*). A circular platform capable of rotation about its centre; used to reverse locomotives, which are driven on, turned through a half-circle, and driven off pointing the opposite way.

turn tread (*Build.*). A tread, generally triangular in plan, to form a step at a change of direction of the stair.

turned sorts (*Typog.*). Characters purposely turned face-downwards so that the feet print prominent black marks in a proof, thus ensuring that letters temporarily missing shall be inserted later

turning (*Build.*). A term applied to the process of building an arch.

turning-bar (*Build.*). An iron bar supporting the arch over a fireplace opening.

turning-on (*Silk*). See **beaming.**

turning-piece (*Build.*). A simple form of centring, consisting of a single solid wooden piece shaped to the form of the intrados of the arch, and supported in its temporary position by wooden struts at its ends.

turning-pin (*Plumb.*). See **tampin.**

turning-point (*Surv.*). The point at which consecutive straight lines of a traverse meet at an angle.

turning-saw (*Tools*). See **sweep-saw**

turning tools (*Eng.*) See **lathe tools.**

turns (*Horol.*). A small dead-centre lathe used by watchmakers. Usually held in a vice, and driven by a hand wheel or a bow. Used for pivoting, polishing, and turning small parts.

tur'pentine (*Chem.*). An essential oil, $C_{10}H_{16}$, obtained by the steam distillation of rosin. It is a colourless liquid, of aromatic pine-like odour; b.p. 155°-165° C., sp. gr. 0·85-0·91; the chief constituent is pinene. American turpentine is dextro-rotatory, others are usually laevo-rotatory. An important solvent for lacquers, polishes, etc.

tur'quoise (*Min.*). A hydrous phosphate of aluminium and copper which crystallises in the triclinic system. It is a mineral of secondary origin, found in thin veins or small masses in rocks of various types, and used as a gem. The typical sky-blue colour often disappears when the mineral is dried. Much of the gem turquoise of old was fossil bone of organic origin and not true turquoise.

turret (*Build.*). A small tower built on a building as a special feature.

turret clock (*Horol.*). A tower clock; a large clock in which the movement is quite separate from the dials.

turret lathe (*Eng.*). A large *capstan lathe* (q.v.) in which the turret (capstan) head and the carriage are generally automatically operated by power in the correct sequence for a particular job.

turric'ulated (*Arch.*). Pertaining to a building which is ornamented with small turrets.

tur'war bark (*Tanning*). The bark of a species of acacia (*Acacia auriculata*), used extensively for tanning in India. The leaves are used for tea.

Tuscaloo'sa Beds (*Geol.*). Glauconitic sands and lignitic clays containing fossil plants, deposited under shore and deltaic conditions; occur locally as the basal member of the Cretaceous System in the southern U.S.A., but are overlapped northwards by the Eutaw Group.

tusk tenon (*Carp.*). A form of tenon used for framing one horizontal piece into another, e.g. a trimmer into a trimming joist. The tenon is strengthened by a short projection underneath, and by a bevelled shoulder above, both fitting into a suitably cut mortise in the other piece.

tusks (*Masonry*). See **tusses.**

tus'sah or **tus'sur silk** (*Silk*). Yarn or fabric produced from the silk of the wild silkworm, of which the tussah moth of India (*Antheraea mylitta*) is an example. The fabric is light brown in colour and of rather irregular texture.

tusses (*Masonry*) Stones left projecting from the face of a wall, when later extension is allowed for. Also called TUSKS.

tus'sive (*Med*). Pertaining to, or caused by, a cough.

tus'sores (*Textiles*). Plain cotton cloths, dyed, or dyed and mercerised; made for Eastern and African markets

tussur silk (*Textiles*). See **tussah.**

tut-work (*Mining*). Work paid for according to the amount excavated, e.g. per fathom.

tuyère or **twyere**, twē-ār′ (*Met.*). A nozzle through which air is blown into a blast furnace. Usually made of copper and kept cool by circulating water.

Twaddell or **Twaddle** (*Chem.*). A scale for measuring the specific gravity of acids, etc., used in the trade. It is abbreviated °Tw., and the calculation in relation to specific gravity is $x°$ Tw. $=(\text{sp. gr.}-1)\times 200$.

tweeter loudspeaker (*Acous.*). A loudspeaker designed to operate efficiently over a restricted high audio-frequency range, so that, in combination with a larger unit for operating over most of the lower audio-frequency range, the entire range of audio-frequencies is reproduced with uniformity. May be piezo or electro-dynamically driven.

twelve-mo (*Print.*). See **duodecimo.**

twilight sleep (*Med.*). A state of semi-consciousness produced by the administration of morphine and scopolamine, used for diminishing pain in labour and for producing forgetfulness of the event after it is over.

twilled mats (*Woollen*). See **Celtic twills.**

twills (*Textiles*). Fabrics with diagonal lines on the face. Regular twills have continuous lines; zigzag twills have the lines reversed at intervals See **broken— combined— figured—**

twin. One of a pair of two and related entities similar in structure or function; often synonymous with *double*.

twins (*Biol.*). (1) Individuals arising from the division into two of the fertilised egg, each part proceeding to develop.—(2) In Mammals, two individuals produced at the same birth.

twins (*Cinema.*). A double lighting unit in a motion-picture studio, containing arc lamps.

twin cable (*Elec. Eng., etc.*). A lead-sheathed cable comprising two individually insulated conductors twisted together. A twin cable for telecommunication may have a large number of such pairs, e.g. up to 2400 pairs for telephone connexions between large exchanges.

twin-carbon arc lamp (*Illum.*). An arc lamp having two pairs of carbons, so arranged that the second pair comes into operation automatically as soon as the first pair has burnt away. Also called DOUBLE-CARBON ARC LAMP.

twin-columns (*Build.*). Two columns coupled on one base.

twin-concentric cable (*Elec. Eng.*). A two-core cable in which the conducting cores are concentrically arranged about the axis of the cable.

twin contacts (*Teleph.*). The double contacts which are used on the springs of the standard Post Office telephone-type relay, to ensure uniform wear and enhanced reliability.

Twin Creek Series (*Geol.*). Dark calcareous shales and shaly limestones representing a marine intercalation in the continental Jurassic strata of Wyoming. Underlain by aeolian sandstones and succeeded by the Beckwith formation.

twin crystal (*Crystal.*). A crystal which results from the growing together of two crystals in a symmetrical manner.

twin feeder (*Radio*). A two-wire transmission line.

twin flexible cord (*Elec. Eng.*). Two flexible cords plaited together to form *go* and *return* leads for pendant or portable electric fittings.

twin lens camera (*Photog.*). A camera with matched lenses, one for exposing, the other for focusing, generally with a reflex mirror.

twiner (*Bot.*). A plant which climbs by winding around a support.

twinned grooves (*Acous.*). A defect in cutting a wax record, in which the grooves are not uniformly spaced, generally because of the flexing of some part of the traversing mechanism.

twinning (*Crystal.*). The formation of twin crystals.

twist (*Textiles*). A cotton trade term for *warp yarn.*

twist (*Timber*). A form of warp in which the distortion is of a spiral character; as when the ends of a board are twisted or rotated permanently in opposite directions.

twist cop (*Textiles*). A large size cop of warp yarn.

twist drill (*Eng.*). A hardened steel drill in which cutting edges, of specific rake, are formed by the intersection of helical flutes with the conical point, which is backed off to give clearance; of universal application.

twist gimlet (*Carp.*). A gimlet having a tapered shank for easy withdrawal.

twist lace (*Textiles*). A lace which has been formed simply by the twisting together of bobbin and warp threads.

twisted aestivation (*Bot.*). See **contorted aestivation.**

twisting (*Teleph.*). The regular rotation of the unit of four telephone or telegraph wires on a pole route, to equalise capacities to earth and minimise induction to and from other circuits. See **transposition.**

twisting frame (*Spinning*). See **doubling frame.**

twitch (*Vet.*). A noose for compressing the lip of a horse as a means of restraint.

twitty (*Textiles*). A term applied in the woollen trade to slubbings or yarns that are uneven in form.

twixt brain (*Zool.*). See **diencephalon.**

two-and-two (2-and-2) twill (*Textiles*). A weave in which all ends work 2-up and 2-down, the ends being lifted in consecutive order, thus producing a diagonal line in the cloth. In the cotton trade it is often referred to as the *Harvard twill* or *sheeting twill.* In the woollen and worsted trades it is known as the *Cassimere twill.*

two bells (*Cinema.*). The signal (O.K.) to indicate that the take is over and silence may be broken.

two-circuit prepayment meter (*Elec. Eng.*). A prepayment meter for use when the load is connected to two separate circuits, energy being charged at a different rate in each.

two-circuit tuner (*Radio*). A tuner, formerly much used for receivers, in which the antenna circuit is tuned by an inductance and variable condenser, and inductively coupled to a closed resonant circuit to which the detector is connected.

two-circuit winding (*Elec. Eng.*). An alternative name for *wave winding* (q.v.).

two-coat work (*Plast.*). Plastering in two coats—a first coat of coarse stuff, and a second coat of fine stuff.

two-colour process (*Photog.*). Any additive or subtractive colour photographic process for obtaining colour positives with two records only, corresponding to two arbitrarily selected colour-bands.—(*Print.*) The application of the subtractive process to printing for the reproduction of a two-colour original.

two-core cable (*Elec. Eng.*). A cable containing two individually insulated conducting cores.

two-dimensional gas (*Chem.*). A unimolecular film whose behaviour in two dimensions is analogous, qualitatively and quantitatively, to that of an ordinary gas in three dimensions.

two-edged (*Bot.*). Flattened and having two sharp edges.

two-electrode valve (*Thermionics*). See **diode.**

two-fluid theory (*Elec. Eng.*). The obsolete theory of electrostatics which regarded positive and negative electricity as two separate fluids which neutralised each other when present in equal quantities. Also called DOUBLE-FLUID THEORY.

two-hinged arch (*Civ. Eng.*). An otherwise continuous rigid arch which is hinged at the abutments.

two-light frame (*Join.*). A window frame having one mullion dividing the window space into two compartments.

two-line letters (*Typog.*). Letters having a body depth double that of the specified size, such as 2-line pica. They are often used as initial letters to chapters in bookwork.

two-lipped (*Bot.*). See **bilabiate.**

two-part prepayment meter (*Elec. Eng.*). A prepayment meter in which the supply is cut off by the combined action of a time element (to collect the fixed charge) and an energy element (to collect the running charge).

two-part step-rate prepayment meter (*Elec. Eng.*). A prepayment meter combining the functions of a two-part prepayment meter and a step-rate prepayment meter.

two-part tariff (*Elec. Eng.*). An electricity tariff divided into a fixed charge, calculated per annum, and a variable charge for the actual amount of electrical energy consumed in a given period.

two-phase (*Elec. Eng.*). A term applied to a.c. systems employing two phases, whose voltages are displaced from one another by 90 electrical degrees.

two-phase four-wire system (*Elec. Eng.*). A system of two-phase a.c. distribution employing two conductors per phase.

two-phase three-wire system (*Elec. Eng.*). A system of two-phase a.c. distribution in which two conductors (lines) belong one to each phase, and the third (neutral) is common to both phases.

two-pin plug (*Elec. Eng.*). A plug for connecting a twin-flex lead to a socket forming the terminal of a two-wire electric circuit.

two-point problem (*Surv.*). A field problem arising in plane-table surveying, in which it is required to locate on the plan the position of the instrument station if only two points represented on the plan are in fact visible from the station.

two-rate meter (*Elec. Eng.*). A meter for use with a two-part tariff.

two-rate two-part prepayment meter (*Elec. Eng.*). A two-part prepayment meter in which the running charge collected by the energy element is automatically changed to a lower rate per unit during certain hours of the day.

two-reaction theory (*Elec. Eng.*). A theory used in calculations on salient-pole synchronous machines; the m.m f.'s in the machine are assumed to be divided into two components, one acting along the axis of the main poles, the other at 90° to this.

two-start thread (*Eng.*). See **double-threaded screw.**

two-step relay (*Teleph.*). A telephone relay which is partially operated by a weak current, and so makes an *x*-contact or fly-contact, thereby closing a winding in a local circuit, which passes sufficient current for the full operation of the remaining contacts of the relay.

two-stroke cycle (*I.C. Engs.*). An engine cycle completed in two piston strokes, i e. in one crankshaft revolution, the charge being introduced by a blower or other means, compressed, expanded, and exhausted through ports in the cylinder wall, before and during the entry of the fresh charge. See **Otto cycle, Diesel cycle.**

two-tone (*Textiles*). The term applied to a lace fabric in which the materials have a different affinity for dyes.

two-way switches (*Elec. Eng.*). See **double-throw switches.**

two-wire circuit (*Elec. Comm.*). A circuit in which go and return wires take equal currents, with potentials balanced with respect to earth.

two-wire repeater (*Elec. Comm.*). A repeater for insertion into a two-wire telephone circuit, in which the two amplifiers, one for amplifying the telephonic current in each direction, are connected into the two-wire line by hybrid coils.

two-wire system (*Elec. Eng.*). A system of d.c. transmission and distribution making use of two conductors.

twyere (*Met.*). See **tuyère.**

ty'chopot'amous (*Ecol.*). Occurring in a river fauna, but derived from a pond fauna.

tye (*Mining*). A form of strake, in which a considerable thickness of low-grade concentrate is collected

tylo'sis, ty'lose (*Bot.*). A bladder-like growth of a parenchymatous cell through a pit into the lumen of a neighbouring vessel or tracheide; the vessel or tracheide becomes blocked by the tyloses, and ceases to function as a conducting element.

tylosis (*Zool.*). The development of irregular cells in a cavity.

tym'pan (*Print.*). In a hand-press, the frame on which the paper is placed when printing.

tympan hooks (*Print*). In a hand-press, thumb-hooks used for locking the outer and inner tympans together.

tympan'ic bulla (*Zool.*). In some Mammals, a bony vesicle surrounding the outer part of the tympanic cavity and external auditory meatus formed by the expansion of the tympanic bone.

tympan'iform (*Bot.*). Drum-like.

tympani'tes (*Med.*). Distension of the abdomen by accumulation of gas in the intestines or in the peritoneal cavity.—(*Vet.*) Rapid distension of the rumen and reticulum of cattle, due to the formation of gases.

tym'panum (*Arch.*). The triangular or segmental space forming the central panel of a pediment.

tympanum (*Zool.*). A drum-like structure: in some Insects, the external vibratory membrane of a chordotonal organ: in some members of the Grouse family (*Tetraonidae*), an inflatable air-sac of the neck-region: in Vertebrates, the middle ear, or the resonating membrane of the middle ear: in Birds, the resonating sac of the syrinx.—*adjs.* **tympan'ic, tym'panal.**

tyndallim'etry (*Chem.*). The determination of the concentration of suspended material in a liquid by measurement of the amount of light scattered from a Tyndall cone.

type (*Biol.*). The individual specimen on which the description of a new species or genus is based: the sum-total of the characteristics of a group.—*adj.* **typ'ical.**

type locality (*Geol.*). The locality from which a rock, formation, etc., has been named and described, usually because of its characteristic occurrence there.

type specimen (*Biol.*). The actual specimen from which a given species was first described.

type (*Typog*). A rectangular piece of metal on the top of which is cast any of the characters used in letterpress printing. Styles of type are divided broadly into four groups: Roman Old Style, Roman Modern, *Italics*, Sans Serif. There are innumerable variations and modifications of the original letter forms (see **type face**).

type face (*Typog.*). A particular family or fount of type in which the characters have distinctive features. The following specimens name and illustrate the type faces most commonly used in modern book-work:

Aldine Bembo: Chambers's Tech. Dict.
Baskerville: Chambers's Technical Dict.
Caslon: Chambers's Technical Dict.
Fournier: Chambers's Technical Dictionary.
Garamond: Chambers's Technical Dict.
Imprint: Chambers's Technical Dict.
Plantin: Chambers's Technical Dict.

type-high (*Typog.*). When a printing plate or block is mounted on wood or metal and brought to the proper height for printing it is said to be *type-high.*—*n.* **type-height.**

type holder (*Bind*). A hand tool for holding the letters to be impressed on the cover of a book by the finisher.

type metal (*Met.*). A series of alloys of lead, antimony, and tin, used for type. The composition is antimony 10-20%, tin 2-12%, and the remainder lead.

type-setting machines (*Typog.*). See **composing machines.**

typhli'tis (*Med.*). Inflammation of the caecum.

typh'losole (*Zool.*). In some *Invertebrata*, a longitudinal dorsal inwardly projecting fold of the wall of the intestine, by which the absorptive surface is increased.

ty'phoid, typhoid fever (*Med.*). Enteric, enteric fever. An infectious disease due to infection with the *Bacillus typhosus* (*Bacterium typhosum*), characterised by prolonged fever, enlargement of the spleen, a rose-red rash, and ulceration of the intestines, with diarrhoea and possibly haemorrhage from, or perforation of, the intestines.

typhoid, avian (*Vet.*). A contagious disease of birds due to infection by *Bacterium gallinarum.*

typhoon (*Meteor.*). A tropical revolving storm in the seas bordering on China; a cyclone.

ty'phus, typhus fever (*Med.*). Jail fever. A contagious disease characterised by high fever, severe prostration, and an eruption of macules, papules, and petechiae, the infection being conveyed by lice harbouring *Rickettsia prowazeki.*

typhus, canine (*Vet.*). See **Stuttgart disease.**

typhus, equine (*Vet.*). See **purpura haemorrhagica.**

tyre (*Eng.*). A renewable, forged steel, flanged ring, shrunk on the rim of a locomotive wheel to give additional strength and durability.

tyre-measurer. See **circumferentor.**

***l*-ty'rosine** (*Chem.*). $C_9H_{11}NO_3$, *β-p*-hydroxyphenyl-*α*-aminopropionic acid. It has the constitution $HO{\cdot}C_6H_4{\cdot}CH_2{\cdot}CH(NH_2){\cdot}COOH$, is obtained by the cleavage of certain proteins, and is found in cheese, in the pancreas, etc.

u **(*Chem.*).** (With subscript) a symbol for velocity of ions.

U (*Chem.*). The symbol for *uranium*.

U (*Chem.*). A symbol for *intrinsic energy*.

U-bolts (*Automobiles*). Bars bent into U-shape and threaded at each end; used for anchoring a semi-elliptic spring to an axle beam, a plate being threaded over the ends and secured by nuts.

U-leather, U-packing (*Eng.*). A leather ring of U-section, used to pack the glands of hydraulic rams. The open side is the pressure side, and the water in expanding the inner face against the ram effectively seals it against leakage.

U-links (*Elec. Comm.*). The spring links used to join isolated parts of telegraph or other communication channels, the ends of which are brought to a special link-board. Removal of a link opens the circuit, so that testing apparatus can be rapidly inserted to detect and locate faults.

udder (*Vet.*). The organ containing the mammary glands of certain animals, particularly the cow and mare.

U.F. (*Plastics*). Abbrev. for *urea-formaldehyde* plastics.

uferflucht, oo′fer-floohht (*Ecol.*). A concentration of limnetic plankton towards the centre of a lake

Uin′ta formation (*Geol.*). Strata of Eocene age and continental origin occurring typically in the Uinta Basin in Utah and Colorado.

Uinta Quartzite Series (*Geol.*). See **Belt Series.**

uintaite, oo-in′ta-īt (*Min.*). A variety of natural asphalt occurring in the Uinta Valley, Utah, as rounded masses of brilliant black solid hydrocarbon. Also called GILSONITE.

Ulbricht globe photometer (*Illum.*). A photometer for giving a direct measurement of the mean-spherical candle-power of a lamp. It consists of a hollow sphere, whitened on the inside, with the lamp under test at the centre. Owing to the internal reflection, the illumination on any part of the internal surface of the sphere is proportional to the total light output from the lamp; this is measured through a small window.

ulcer (*Med.*). A localised destruction of an epithelial surface (e.g. of the skin or of the gastric mucous membrane), forming an open sore; it is usually a result of infection.

ulceration (*Med.*). The process of forming an ulcer: the state of being ulcerated.

ul′cerative (*Med.*). Of the nature of, or pertaining to, ulcers: causing ulceration: associated with ulceration (e.g. *ulcerative colitis*).

u′lexite (*Min.*). A hydrous borate of sodium and calcium occurring in saline crusts on alkali flats in arid regions, as in Chile and Nevada, where it forms rounded masses of extremely fine acicular white crystals.

uliginose, uliginous, ū-lij′— (*Bot.*). Growing in wet places.

ull′manite (*Min.*). See **nickel antimony glance.**

Ullswater Basalt Group (*Geol.*). A subdivision of the Borrowdale Volcanic Series of the Ordovician System in the English Lake District.

ulna (*Zool.*). The post-axial bone of the antebrachium in land Vertebrates.—*adj.* **ulnar.**

ulna′re (*Zool.*). A bone of the proximal row of the carpus in line with the ulna.—*pl.* **ulna′ria.**

ulno- (Latin *ulna*, elbow). A prefix used in the construction of compound terms with reference to the ulna; e.g. *ulnocarpal*, pertaining to the ulna and the carpus.

ulot′richous (*Zool.*). Having wool or curly hair.

Ulsterian (*Geol.*). The lower of the two divisions of the Middle Devonian rocks in N. America; it is succeeded by the Erian stage.

ultimate limit switch (*Elec. Eng.*). See **final limit switch.**

ultimate lines (*Chem.*). See **raies ultimes.**

ultimate tensile stress (*Met.*). The highest load applied to a metal in the course of a tensile test, divided by the original cross-sectional area. In brittle or very tough metals it coincides with the point of fracture, but usually extension continues under a decreasing stress, after the ultimate stress has been passed. Also called TENACITY.

ultimobran′chial bodies (*Zool.*). In Vertebrates, a pair of glandular bodies, of unknown function, arising from the last pair of gill-pouches.

ultra-basic rocks (*Geol.*). Igneous rocks containing less silica than the basic rocks (i.e. less than 45%), and characterised by a high content of mafic constituents, particularly olivine (in the peridotites) and amphiboles and pyroxenes (in the perknites and picrites).

ultra-centrifuge (*Chem.*). A high-speed centrifuge for the separation of submicroscopic particles.

ultra-dextral (*Zool.*). Said of sinistral Gastropod shells when the organisation of the animal is dextral.

ultra-filtration (*Chem.*). The separation of colloidal particles by filtration, under suction or pressure, through a colloidal filter or semi-permeable membrane.

ultrama′fites (*Geol.*). Those igneous rocks in which there is an abnormally high content of ferromagnesian silicates, but which contain no feldspar; subdivided into picrites (with accessory plagioclase), pyroxenites and peridotites.

ultramicrobe (*Biol.*). An agent of obscure nature, able to cause disease in organisms, but too small to be visible with the microscope.

ultra-short waves (*Radio*). Electromagnetic waves of wavelength less than 10 metres.

ultrasonics (*Acous.*). The science of mechanical vibrations and radiations in solids, gases, and fluids, which have frequencies in excess of those which, in a sound-wave, are normally perceivable by the ear.

ultrasonic frequency (*Radio*). The same as *supersonic frequency*.

ultraud′ion (*Radio*). The name given by Lee de Forrest to one of the earliest forms of detector circuit employing reaction in conjunction with a three-electrode valve.

ultra-violet radiation (*Phys.*). Invisible radiations of wave-length less than 3900 A.U.—the limit of visibility at the violet end of the spectrum. From 3900 to 2000 A.U., the spectrum may be photographed with ordinary plates in air. Below 2000 A.U., Schumann plates and vacuum spectrographs are necessary. Ultra-violet radiation may also be detected by *fluorescence* (q.v.).

ultra-violet cell (*Photo-electric Cells*). A cell having a maximum response to light in the ultra-violet end of the spectrum.

umbel (*Bot.*). An inflorescence consisting of numerous small flowers in flat-topped groups, borne on stalks all arising from about the same point on the main stem; in most umbels this sort of branching is repeated, the stalks which bear the groups of flowers themselves arising at about the same point on a main axis.

um′bellate (*Bot.*). Having the characters of an umbel: producing umbels.

umbel'lifer (*Bot.*). A plant which has its flowers in umbels.

um'bellule (*Bot.*). A partial umbel.

umbilec'tomy (*Surg.*). Surgical removal of the umbilicus.

umbil'ical cord (*Anat., Zool.*). In eutherian Mammals, the vascular cord connecting the foetus with the placenta.

umbilical cord (*Bot.*). See **funicle.**

umbil'icate, umbil'icated (*Bot*). Having a small central depression.—(*Med*) Having a depression which resembles the umbilicus.

umbil'icus, *or* —ī'kus (*Anat., Zool.*). In Gastropod shells, the cavity of a hollow columella: in Birds, a groove or slit in the quill of a feather: in Mammals, an abdominal depression marking the position of former attachment of the umbilical cord.—*pl.* **umbilici.**

umbo (*Bot.*). (1) A small central hump in the middle of the top of the pileus of an agaric.—(2) A small projection on the apophysis of the scale of a pine cone.—(*Zool.*) A boss or protuberance: the beak-like prominence which represents the oldest part of a Bivalve shell.—*pl.* **umbo'nes.**

um'bonate (*Bot., Zool*). Bearing, resembling, or pertaining to an umbo.

umbra (*Astron.*). The cone of shadow bounded by the external tangents of one celestial body to another, whose interposition causes the eclipse of a third; thus used of the earth's shadow in a lunar eclipse, and of the moon's shadow in a solar eclipse. The shadow cone bounded by the internal tangents is called the *penumbra.*

umbracu'liform (*Bot.*). Shaped like an umbrella.

umbrella (*Zool.*). A flat cone-shaped structure, especially the contractile disc of a medusa.

umbrella antenna (*Radio*). An antenna comprising a vertical uplead from the top of which a number of wires extend radially towards the ground.

umbrella roof (*Struct.*). A *station roof* (q.v.).

umbrella-type alternator (*Elec. Eng.*). A vertical-shaft alternator, driven by a water turbine, in which the field system is overhung and revolves around the stationary armature.

um'brine (*Bot.*). Dull darkish-brown.

umlaut, oom'lowt (*Typog.*). The *diaeresis* mark used in German words (e.g. *Männer*). Strictly, a philological term signifying the modification of a vowel by a succeeding vowel.

U'naflow (or **U'niflow**) **engine** (*Eng.*). A steam-engine in which the steam enters through drop valves at the ends of the cylinder and exhausts through a piston-controlled belt of ports at the centre.

unarmed (*Bot.*). Without thorns or prickles.

unarmoured cable (*Cables*). A cable in which the outer covering of steel wire (armouring) is absent.

u'nary (*Chem.*). Consisting of one component, etc.

unbalanced circuit (*Elec. Comm.*). A circuit in which the impedance of one leg, the return, is substantially zero, and the potential substantially earth potential, the conductor being connected to earth at least at one point.

unbalanced load (*Elec. Eng.*). A load which is unequal on the two sides of a three-wire d.c. system, or on the three phases of a symmetrical three-phase a.c. system.

unbalanced network (*Elec. Comm.*). A network arranged for insertion into an unbalanced circuit, the earthy terminal of the input end being directly connected to the earthy terminal of the output end.

unbalanced system (*Elec. Eng.*). A three-phase a.c. system carrying an unbalanced load.

unbreakable record (*Acous.*). A gramophone record made from a non-brittle material, such as celluloid.

unbuttoning (*Struct.*). A term applied to the process of dismantling steel frameworks.

un'cate, un'ciform, un'cinate (*Bot., Zool.*). Hooked at the tip: hook-like.

un'cinate fit (*Med.*). A hallucination of smell or of taste, due either to a cerebral tumour or to epilepsy.

unci'nus (*Zool*). A hook, or hook-like structure; as a hook-like chaeta of *Annelida*: in *Gastropoda*, one of the marginal radula-teeth.

unconformity (*Geol.*). A geological structure involving two sets of rocks of different ages, usually dipping in different directions and at different angles.

unconscious (*Psychol.*). A general term used to include all processes which cannot be made conscious by direct effort of will. These processes are present in a dynamic state, and require a powerful force to maintain them in the unconscious. This force is supplied by the *superego* (q.v.), and by the *censor* (q.v.) present in dreams, causing distortion, displacement, and condensation, which are forms of *resistance* (q.v.). The unconscious contains the reservoir of instinct, real desires, and all experiences in the past history of the individual which have never been made completely conscious and resolved. Jung also includes the racial history of the individual, forming a racial or collective unconscious. See **psyche.**

uncoursed (*Masonry*). *Random* (q.v.).

uncus (*Zool.*). In *Rotifera*, the head of the malleus: in some male *Lepidoptera*, a hook-like dorsal process of the ninth abdominal somite: any hook-shaped structure.

uncut (*Bind.*). Said of a book whose edges have been left untrimmed, the bolts therefore remaining *uncut.*

undamped oscillations (*Radio*). *Continuous oscillations.*

undamped waves (*Radio*). *Continuous waves.*

underbridge (*Civ. Eng.*). A bridge carrying one road along the top of an embankment, and providing space for another road to pass under it.

undercarriage (*Aero.*). The main part of the alighting structure of an aircraft, approximately under the centre of gravity of the machine; usually carries the main wheels, skids, or floats; often retractable into the body or wings to reduce head resistance.

undercast (*Mining*). A duct to carry ventilating air under a roadway at a crossing.

underclay (*Geol.*). A bed of clay, in some cases highly siliceous, in many others highly aluminous, occurring immediately beneath a coal-seam, and representing the soil in which the trees of the Carboniferous swamp-forests were rooted. Stigmarian roots commonly occur as fossils in underclays, many of which are used as fire-clays. Also called SEAT EARTH.

undercloak (*Plumb.*). The first or lower sheet of lead in a *roll* (q.v.). Cf. *overcloak.*

undercoat (*Paint.*). A coat of *flatting* (q.v.).

under-compensated meter (*Elec. Eng.*). An induction-type meter provided with insufficient phase compensation, as the result of which it reads high with leading currents and low with lagging currents.

under-contact rail (*Elec. Eng.*). A conductor-rail supported and protected from above, in order that the collecting-shoe of the electric tractor may make contact with the bottom surface.

under-exposure (*Photog.*). Insufficient exposure of the sensitive surface of a plate, paper, or film to the incident image, resulting in lack of detail and reduced contrast.

underfeed stoker (*Eng.*). A *mechanical stoker* (q.v.) in which the fuel is fed automatically and progressively from below the fire, and gradually forced up into the active zone, air being injected into the fuel bed just below the combustion-level. See **single-retort— multiple-retort—**

under-gettings (*Mining*). See **shorts.**

underglaze (*Pot.*). Coloured decoration applied before the final process of glazing.

underground cable (*Cables*). An armoured cable suitable for laying underground either direct or in conduit.

underground collector (*Elec. Eng.*). See **plough.**

underground conduit (*Cables*). A cement or stoneware underground channel in which cables are laid.

underground railway (*Civ. Eng.*). A railway laid either wholly or in the main below the surface-level of a town or city, so as to be in tunnel, with perhaps occasional open cuttings.

underlay (*Mining*). The departure of a vein or thin tabular deposit from the vertical; it may be measured in horizontal feet per fathom of inclined depth. Also UNDERLIE.

underlay (*Print.*). To paste paper or card under the mount of a printing plate in order to bring it to type-height.

underlay shaft (*Mining*). A shaft sunk in the rock below an inclined reef or lode, and at the same dip or inclination as the lode.

underleaf (*Bot.*). One of a row of leaves on the under side of the stem of a liverwort.

underlie (*Mining*). See **underlay.**

underlining felt (*Build.*) *Sarking felt* (q.v.).

undermodulation (*Cinema*). Modulation which is unnecessarily low in relation to the possible level of modulation that can be accommodated on the sound-track.—(*Radio*) That state of adjustment of a radio telephone transmitter at which the peaks of speech or music do not produce 100% modulation, so that the carrier power is not used to full advantage.

underpick (*Weaving*). The condition when the picking arm of a loom is below the shuttle box.

underpinning (*Build., Civ. Eng.*). The operation of rebuilding the lower part of a building without damaging or weakening the superstructure.

underpitch groin (*Build.*). See **Welsh groin.**

underpoled copper (*Met.*). See **poling.**

underproof (*Spirits*). See **proof*.**

underrunning trolley (*Elec. Eng.*). The normal form of trolley system, in which contact is made from under the trolley wire.

undersaturated exciter (*Elec. Eng.*). An auxiliary exciter operating on the straight part of its magnetisation curve; used to compensate a rotary convertor for field weakening due to lagging currents.

undershot wheel (*Eng.*). A water-wheel used for low heads, in which the power is obtained almost entirely from the impulse of the water on the vanes. See **Poncelet wheel.**

undershrub (*Bot.*). A small woody perennial in which the flowering branches die back after flowering, leaving a persistent basal system of woody branches from which new growth arises in the next season.

under-voltage no-close release (*Elec. Eng.*). A device which acts upon the trip coil of a circuit-breaker in such a way as to prevent the circuit-breaker being closed if the voltage is below a certain predetermined value.

under-voltage release (*Elec. Eng.*). A device to trip an electrical circuit should the voltage fall below a certain predetermined value. Also called a LOW-VOLT RELEASE.

undine, un'dēn (*Med.*). A small flask for applying lotions to the eye.

un'dulant fever (*Med.*). (1) Malta fever, Mediterranean fever, Gibraltar fever, Rock fever. A disease characterised by alternating febrile and afebrile periods, splenomegaly, transient painful swelling of joints, neuralgia, and anaemia; due to infection with *Brucella melitensis*, conveyed to Man in goat's milk.—(2) A disease having the same characteristics as above, due to infection of Man by *Brucella abortus*, a micro-organism which causes abortion in cows and is conveyed to Man in cow's milk.

un'dulate (*Bot.*). Having a wavy margin.

undulated (*Bot.*). With gentle elevations and depressions; repand.

undulating membrane (*Zool.*) See **vibratile membrane.**

unequal (*Bot.*). (1) Having the two sides not symmetrical.—(2) Not all of the same length.

unequally pinnate (*Bot.*). See **imparipinnate.**

unessential element (*Bot.*). A chemical element which may be found in plants, but which appears to play no part in nutrition and seems not to be necessary to the welfare of the plant.

un'gual (*Med.*). Pertaining to or affecting the nails.

unguarded interval (*Auto. Teleph.*). A brief interval of time during which false operation of automatic switching apparatus is possible.

unguiculate, un-gwik'— (*Bot., Zool.*). Provided with claws.—Specifically (*Bot.*) applied to a petal with an expanded limb supported on a long narrow stalk-like base.

un'guis (*Zool.*). In Insects, one of the tarsal claws: in Vertebrates, the dorsal scale contributing to a nail or claw (cf. *subunguis*): more generally, a nail or claw.—*pl.* **ungues.**—*adj.* **un'guinal.**

un'gula (*Zool.*). A hoof.—*adj.* **ungulate.**

Ungula'ta (*Zool.*). An order of herbivorous terrestrial Mammals in which there are never more than four digits in the hind limb; hoofed digitigrade forms with inguinal or abdominal mammae and the testes in a scrotal sac; a collar-bone is lacking. Oxen, Sheep, Goats, Deer, Horses, Asses, Zebras, Antelopes, Giraffes, Camels, Swine, Hippopotami, Tapirs, and Rhinoceroses.

un'guligrade (*Zool.*). Walking on hoofs, i.e. on the tips of the enlarged nails; as Horses.

unhairing (*Leather*). The operation of removing from hides and skins the hair that has been loosened by the process of liming; carried out by hand on a sloping beam, or by machine.

uni- (Latin *unus*, one). A prefix used in the construction of compound terms; e.g. *uniflagellate*, having a single flagellum.

uniax'ial (*Bot., Zool.*). Having an unbranched main axis; haplocaulescent.

uniaxial (*Min.*). A term embracing all those crystalline minerals in which there is only one direction of single refraction (parallel to the principal crystal axis and known as the optic axis). All minerals which crystallise in the tetragonal, trigonal, and hexagonal systems are *uniaxial*. Cf. *biaxial*.

uniaxial construction (*Bot.*). The structure of an algal thallus, consisting of a main filament with its branches packed closely round it.

unicel'lular (*Biol.*). Consisting of a single cell.

unidac'tyl (*Zool.*). Having one digit.

unidirectional antenna (*Radio*). An antenna in which the radiating or receiving properties are largely concentrated in one direction.

unidirectional current (*Elec. Eng.*). A current whose direction is unchanging. More commonly known as a *direct current*.

Uniflow engine (*Eng.*). See **Unaflow engine.**

unifol'iolate (*Bot.*). Said of a compound leaf which has one leaflet only.

uniform extension (*Met.*). The extension produced in a tensile test before the ultimate tensile stress is reached, and uniform over the gauge length. See **local extension.**

uniform system (*Photog.*). A method of marking the stop adjustment of lenses so that equal unit-steps correspond to doubling or halving the exposure, unity on the scale corresponding to *f*/4. Abbrev. **U.S.**—See ***f*-system.**

uniju'gate (*Bot.*). Said of a compound leaf having one pair of leaflets.

unilat'eral (*Bot.*). Said (1) of members which are all inserted on one side of the axis, or are all turned to one side of the axis; (2) of a raceme with all the flowers turned to one side; (3) of a stimulus falling on the plant from one side; as when a plant is placed so that light reaches it through a small aperture.

unilateral conductivity (*Elec. Eng.*). The property of unipolarity by which current can flow in one direction only; exhibited by a perfect rectifier.

unilateral impedance (*Elec. Comm.*). Any electrical or electromechanical device in which power can be transmitted in one direction only; e g. a thermionic valve or carbon microphone.

uniloc'ular (*Bot.*). Consisting of a single compartment.

unimolec'ular layer, — reaction (*Chem.*). See **monomolecular layer, — reaction.**

uninsulated conductor (*Elec. Eng.*). A conductor at earth potential, such that no care need be taken to insulate it from earth.

uninu'cleate (*Biol.*). Containing one nucleus.

union (*Med.*). In the process of healing, the growing together of parts separated by injury (e.g. the two ends of a broken bone, the edges of a wound).

union (*Plumb.*). A connexion for pipes.

union (*Textiles*). A mixture of two or more materials in a yarn or cloth; generally the presence of the less expensive material is not apparent.

union blanket (*Textiles*). A blanket made from cotton warp and woollen or shoddy weft; or one made from Angola yarns.

unionised, un-ī'on-izd (*Chem.*). Not ionised.

unip'arous (*Zool.*). Giving birth to one offspring at a time.

Unipiv'ot instrument (*Elec. Eng.*). An instrument whose moving-coil system is balanced on a single pivot passing through its centre of gravity.

unipo'lar (*Zool.*). Said of nerve cells having only one process.

unira'mous (*Zool.*). Having only one branch; as some Crustacean appendages.

uniselector (*Auto. Telcph.*). A selector switch which only rotates its wipers about an axis, in contrast with the normal selector, in which the wipers are raised to a specified level in the rows of contacts by the impulse trains, and then enter the bank of contacts, either by hunting or by a further train of impulses. See **selector.**

uniselector distribution frame (*Auto. Teleph.*). A frame carrying terminals, so that the extent of the multiple outlets from uniselectors can be varied to suit the demand on outlets in the multiple.

unise'rial (*Zool.*). Said of a type of fish fin in which the radial elements occur on one side only of the basalia.

unise'riate (*Bot.*). (1) Arranged in a single row, series, or layer.—(2) Said of a vascular ray which is one cell wide in cross-section.

uniseriate sorus (*Bot.*). A sorus having a single series of sporangia, forming a rosette around a central cushion.

unisex'ual (*Bot., Zool.*). Showing the characters of one sex or the other; distinctly male or female. Cf. *hermaphrodite.*

unison (*Acous.*). In an organ, the production of notes which have the same pitch as the keys which actuate them: in singing or orchestral music, the use of octaves only in the harmony.

unistrat'ose (*Bot.*). Forming a single layer.

unit cell (*Crystal.*). The smallest group of atoms, ions, or molecules, whose repetition at regular intervals, in three dimensions, produces the lattice of a given crystal.

unit characters (*Gen.*). Independent characteristics, which act as units, are traceable in each generation, and are assorted and distributed by the laws of chance.

unit-fee call (*Teleph.*). A call in the local area of a telephone exchange for which the unit-fee charge is not exceeded.

unit of attenuation (*Elec. Comm.*). See **néper.**

unit of bond (*Build.*). That part of a brickwork course which, by being constantly repeated throughout the length of the wall, forms a particular bond.

unit of illumination (*Light, etc.*). See **foot-candle, lux, phot.**

unit of mass. See **gram.**

unit of reluctance (*Elec. Eng.*). See **oersted.**

unit of vegetation (*Bot.*). See **community.**

unit orchestra. See **theatre organ.**

unit organ (*Acous.*). A theatre organ in which the stops, including extension stops, are arranged in units, the number of units measuring the size of the instrument.

unit pole (*Elec. Eng.*). A magnetic pole which, when placed at a distance of one centimetre from a like pole, experiences a force of repulsion equal to one dyne.

unit weight (*Eng.*). In a steam boiler, the weight of the complete boiler, in tons, per ton of the hourly maximum steam production.

unitary ratio (*Elec. Eng.*). The ratio between the electromagnetic and electrostatic absolute units; equal to the velocity of propagation of radiated energy, viz., 3×10^{10} cms. per sec.

univa'lent (*Cyt.*). One of the single chromosomes which separate in the first meiotic division.

univalent (*Chem.*). Monovalent.

u'nivalve (*Zool.*). In one piece; said of Molluscan shells.

univariant (*Chem.*). Having one *degree of freedom* (1, q.v.).

universal chuck (*Eng.*). See **self-centring chuck.**

universal controller (*Elec. Eng.*). A crane controller, similar in action to the 'joystick' of an airplane, in which a vertical motion of the control handle operates the hoist motor, whilst a lateral motion controls the travel motor.

universal indicator (*Chem.*). A mixture of *indicators* (1, q.v.) which gives a definite colour change for each integral change of *p*H-value over a wide range.

universal joint (*Automobiles, etc.*). A joint placed at the ends of the propeller shaft to allow for movement of the rear axle relative to the gear box; generally of modified Hooke's type, enclosed in a grease-cover.

universal machine (*Print.*). A printing machine of the platen type.

universal shunt (*Elec. Eng.*). A resistance box containing several shunts, for use with galvanometers of different resistances.

universal time (*Astron.*). A system of time reckoning adopted by international agreement; the same as Greenwich Civil Time (that is, Greenwich Mean Solar Time) but counted from 0 hours, beginning at Greenwich Mean Midnight. Abbrev. U.T.

universal veil (*Bot.*). A coating of hyphae which completely surrounds the young fruit body of a fungus.

univo'ltine (*Zool.*). Producing only one set of offspring during the breeding season or year.

unloaded antenna (*Radio*). An antenna containing no inductance coils to increase its natural wavelength.

unloaded wavelength (*Radio*). The natural wavelength of an unloaded antenna.

unlocking (*Horol.*). The action of removing the locking corners of the pallet from the tooth of the escape wheel.

unmasked hearing (*Acous.*). In deaf-aids, the principle of applying to one ear the higher-frequency components of wanted sounds, in order that their presence may be appreciated; such frequencies are swamped by amplitude-distortion, and consequent alien tones, when all the desired component frequencies are applied at high level to the other ear.

unmodulated track (*Cinema*). Those parts of the finished sound-track on which the modulation is zero, the transparent part of the track being responsible for the residual noise-level.

unmodulated waves (*Radio*). Waves which do not vary in amplitude with time, such as those radiated from a radio-telephone transmitter when no sound enters the microphone.

unorganised ferments (*Chem.*). *Enzymes* (q.v.).

unpitched sound (*Acous*). Any sound or noise which does not exhibit a definite pitch, but consists of components spread more or less continuously over the frequency spectrum.

unreduced apogamy (*Bot.*). Euapogamy.

unsaturated (*Chem.*). (1) Less concentrated than a saturated solution or vapour.—(2) Containing a double or a triple bond, especially between two carbon atoms; unsaturated molecules can thus add on other atoms or radicals before saturation is reached.

unseptate (*Bot.*). Aseptate.

unsoundness (*Met.*). The condition of a solid metal which contains blowholes or pinholes due to gases, or cavities resulting from the liquid-to-solid contraction (i e. *contraction cavities*, q.v.).

unstability (*Cables*). See under **stability test.**

unstable (*Chem.*). Subject to spontaneous change.

unstable or **deficient** (*Struct.*). A term applied to a structural framework having fewer members than it would require to be perfect.

unstable community (*Bot.*). A plant community which does not remain constant over a period of years.

unstable equilibrium (*Phys., etc.*). See **equilibrium (unstable).**

unstable oscillation. Any oscillation, in a mechanical body, aircraft, or electrical circuit, which increases with time.

unstri'ated muscle (*Zool.*). A form of contractile tissue composed of spindle-shaped fibrillar uninucleate cells, occurring principally in the walls of the hollow viscera. Cf. *striated muscle.*

unsymmetrical (*Bot.*). Said of a flower in which all the parts are not regular.

unsymmetrical grading (*Auto. Teleph.*). *Grading* (q.v.) in which subscribers originating higher-than-average traffic are given access to a greater proportion of individual trunks.

unsymmetrical oscillations (*Radio*). Oscillations in which the positive and negative halves of the wave-form are unequal and of different shape.

untrimmed floor (*Carp.*). A floor consisting of bridging joists only.

untuned antenna (*Radio*). An antenna not separately tuned to the operating frequency, although it may be effectively tuned by coupling to a resonant circuit.

untuned circuit (*Radio*). A circuit not sharply resonant to any particular frequency.

unvoiced sound (*Acous.*). In speech, any elemental sound which has not discrete harmonic frequencies but consists of noise-frequencies generated by air rushing through the mouth and nasal cavities; these are modified in spectral energy distribution by the posture of the cavities of the mouth and the resultant broad resonances.

up (*Mining*). A working place which has reached the boundary.

up-and-down indicator (*Horol.*). A mechanism which indicates when a chronometer or watch requires to be wound, *up* indicating fully wound.

upcast (*Geol.*). In faulted rocks, *upcast* refers to the strata in which the *relative* displacement has been upwards, i.e. away from the earth's centre, along the fault plane. Cf. *downthrow.* See **fault.**

upcast or **uptake** (*Mining*). (1) The shaft or pit up which the ventilating current returns to the surface.—(2) The lifting of a seam or bed by a dyke.

upcast shaft (*Civ. Eng*). A ventilating shaft through which the vitiated air passes in an upward direction.

upper (*Boots and Shoes*). The part of a boot or shoe that is above the sole and welt.

upper (*Bot.*). Posterior.

Upper Avonian (*Geol.*). See **Dinantian Stage.**

upper case (*Typog.*). The *type case* (q.v.) which contains the capital letters; it is placed above the case containing the small letters. Cf. *lower case.*

upper culmination (*Astron.*). See under **transit.**

upper deck (*Ship Constr.*). The term correctly denotes the main strength deck of a ship. From this deck all scantlings are determined, freeboard assigned, and subdivision arranged, according to types.

Upper Greensand (*Geol.*). So named to distinguish it from the Lower Greensand, is the arenaceous facies of the Albian stage of the English Cretaceous rocks. Best developed in the more westerly outcrops, it passes eastwards laterally into the Gault Clay at Maidstone, Kent, to the east of which town no Upper Greensand occurs.

upper leathers (*Leather*). The name for leathers prepared from the hides of a class of small animals found in India, Nigeria, and Abyssinia; they are more lightly tanned than heavy hides, and are used extensively for the uppers of boots and shoes, harness, straps, etc.

upper mean-hemispherical candle-power (*Illum*). See **mean-hemispherical candle-power.**

Upper Pottsville Series (*Geol.*). See **Kanawha Series.**

upper transit (*Astron.*). Another name for *upper culmination* (see **culmination**).

upright (*Struct*). A vertical member in a structure.

uprighting (*Horol*). The process of correcting the pivot holes in a plate so that the hole in one plate is exactly in line with the corresponding hole in the other plate, and a line through the two holes is at right-angles to the plates.

upset (*Timber*). A timber defect, the fibres being torn across the grain.

upsetting (*Eng.*). The operation of increasing the diameter of a bar during forging, uniformly or locally, by heating and hammering axially.

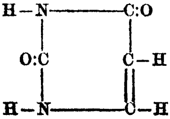
uptake (*Eng.*). The flue or duct which leads the flue gases of a marine boiler to the base of the funnel.

uptake (*Mining*). See **upcast.**

upturn (*Plumb.*). The part of a lead flashing which is dressed up against a wall face.

u'rachus (*Zool.*). The median ligament of the umbilical cord.

u'racil (*Chem.*). 2,6-Dioxypyrimidine having the following constitution:



urae'mia, ure'mia (*Med.*). The state resulting from failure of a diseased kidney to perform its normal functions; associated with retention of urea in the blood, and characterised by varied symptoms, among which are headache, foul breath, diarrhoea and vomiting, visual disturbances, lethargy, convulsions, and coma.

Ura′lian emerald (*Min.*). A green variety of andradite garnet, occurring as nodules in ultrabasic rocks in the Nizhni-Tagilsk district of the Urals; used as a semi-precious gemstone, though rather soft for this purpose. Known also as BOBROVSKA GARNET.

Uralite (*Chem.*). Trade-name for moulded articles or sheets made with asbestos cement.

uralitisation (*Geol.*). A type of alteration of pyroxene-bearing rocks, involving the replacement of the original pyroxenes by fibrous amphiboles, as in some epidiorites.

uran′inite (*Min.*). Uranate of uranyl, lead, thorium and the metals of the lanthanum and yttrium groups, occurring as opaque cubic crystals, varying in colour from white to black; it appears as an accessory mineral in granitic rocks and in metallic veins. When massive, and probably amorphous, known as PITCHBLENDE (q.v.).

u′ranite (*Min.*). For *copper uranite* see **torbernite.** —LIME URANITE, a tetragonal mineral occurring as thin tabular crystals or in mica-like aggregates of a bright-yellow colour resembling torbernite in composition; a hydrated phosphate of uranium and calcium. See **autunite.**

ura′nium (*Chem.*). Symbol, U. A metallic element in group VI of the periodic system and in the subgroup Cr : Mo : W : U. It is radioactive, with a half-life period of $4{\cdot}5 \times 10^9$ years. At. wt. 238·2, at. no. 92, sp. gr. 18 9, m.p. about 1690° C.

u′rano-argen′tophile apparatus (*Zool.*). See **Golgi apparatus.**

u′ranoplas′ty (*Surg.*). Plastic operation for closing a cleft in the hard palate.

U′ranus (*Astron.*). The seventh planet in the solar system in order of distance from the sun; the first to be discovered by the telescope (by Herschel in 1781); it has four satellites; its mass is about 14½ times that of the earth; its sidereal period is 84·01 years.

u′ranyl (*Chem.*). The group UO_2.

Urastone (*Build.*). Trade-name for an asbestos-cement building material.

urce′olus (*Bot., Zool.*). An urn-shaped or pitcher-shaped structure, as the tube in which some *Rotifera* live.—*adj.* **ur′ceolate.**

ure′a (*Chem.*). Carbamide, $H_2N{\cdot}CO{\cdot}NH_2$; long rhombic prisms or needles; m.p. 132° C., very soluble in water, insoluble in ether. It is found in the urine of Mammals. Woehler synthesised urea from ammonium *iso*cyanate, which undergoes an intramolecular transfiguration when its aqueous solution is heated, forming urea.

urea resins (*Plastics*). Thermosetting resins manufactured by heating together urea and an aldehyde, generally formaldehyde. They are pale-coloured or water-white and translucent, and can therefore take delicate dyes and tints. They are non-inflammable, and are resistant to weathering, weak acids and alkalies (*p*H between 6 and 8·4), alcohol, acetone, greases, and oils.

urease, ū′rē-āz (*Chem.*). An enzyme which occurs in several plants, e.g. in the soya bean and in *Micrococcus ureae*, hydrolysing urea quantitatively with the formation of ammonium carbonate.

ured-, uredo- (Latin *uredo*, a blight). A prefix used in the construction of compound words, especially in Botany; e.g. *uredospore* (q.v.).

ure′dicole (*Bot.*). Growing as a parasite upon a rust fungus.

Uredina′les (*Bot.*). A group of parasitic *Basidiomycetes*, including about 2000 species. The mycelium lives inside the host plant, spores being formed in pustules on the surface of the host. Some species pass part of their life on one host and part on another. Some have a complicated life-history, forming *uredospores, teleutospores, basidiospores, spermatia,* and *aecidiospores*; others omit one or more of these kinds of spores. *Wheat rust* is a destructive parasite on wheat, and other members of the family are of some economic importance. The *Uredinales* are popularly known as *rust fungi.*

uredin′ial stage (*Bot.*). An American term for *uredo-stage.*

uredin′iospore (*Bot.*). An American term for *uredospore.*

uredin′ium (*Bot.*). An American term for *uredosorus.*

ure′diospore (*Bot.*). An American term for *uredospore.*

uredogonid′ium (*Bot*). See **uredospore.**

uredoso′rus (*Bot.*). A pustule consisting of uredospores, with their supporting hypha, and some sterile hyphae.

ure′dospore (*Bot.*). An orange or brownish spore formed by rust fungi when growth is vigorous, and serving as a means of rapid propagation; it gives rise to a mycelium which may produce more uredospores, or, later in the year, uredospores and teleutospores.

ure′do-stage (*Bot.*). The phase in the life-history of a rust-fungus when uredospores are formed.

ureides, ū′rē-idz (*Chem.*). The acid derivatives of urea. They correspond to amides or anilides.

ure′ido acids (*Chem.*). The mono-substituted products of urea and a dibasic acid, in which only one hydroxyl of the carboxyl group has been substituted by the urea group with elimination of water.

ure′mia (*Med.*). See **uraemia.**

ure′ter (*Zool.*). The duct by which the urine is conveyed from the kidney to the bladder or cloaca.

ureteral′gia (*Med.*). Pain in the ureter.

ureteri′tis (*Med.*). Inflammation of the ureter.

ure′terocele, —sēl (*Med.*). Cystic dilatation of that part of the ureter which lies within the wall of the urinary bladder, due to congenital narrowing at its point of entry into the bladder.

ureterocolos′tomy (*Surg*). The operation of implanting the ureter into the colon so that it may drain into it.

ureterog′raphy (*Med.*). Radiography of a ureter filled with a medium opaque to X-rays.

ureterolithot′omy (*Surg.*). The operation of cutting into the ureter to remove a stone from it.

ureteropyeli′tis (*Med.*). Inflammation both of a ureter and of the pelvis of the kidney on the same side.

ureterot′omy (*Surg.*). Surgical incision of a ureter.

u′rethan (*Chem.*). $H_2N\,CO{\cdot}OC_2H_5$, ethyl carbamate; crystallises in large plates; m.p. 50° C., b p. 184° C., soluble in water.

ure′thra (*Zool.*). The duct by which the urine is conveyed from the bladder to the exterior, and which in male Vertebrates serves also for the passage of the semen.—*adj.* **ure′thral.**

urethri′tis (*Med.*). Inflammation of the urethra.

ure′throcele, —sēl (*Med.*). Prolapse of the floor of the female urethra; usually associated with cystocele.

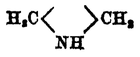
urethrocysti′tis (*Med.*). Inflammation of both the urethra and the urinary bladder.

ure′throscope (*Surg.*). A tubular instrument for viewing the interior of the urethra.

ure′throspasm (*Med.*). Spasmodic contraction of the muscular tissue of the urethra.

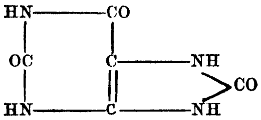
urethrot′omy (*Surg.*). The operation of cutting a stricture of the urethra.

uret′idine (*Chem.*). A four-membered heterocyclic compound containing two nitrogen atoms in the ring, and having the following constitution;



$$H_2C\begin{matrix}\diagup NH \diagdown \\ \diagdown NH \diagup\end{matrix}CH_2$$

uric acid (*Chem*.). An acid of the purine group, $C_5H_4N_4O_3$, 2,6,8-trihydroxypurine. It has the constitution:



It is a white crystalline powder, insoluble in cold, hardly soluble in hot, water. Uric acid deposits in the organism are the cause of gout and rheumatism. It forms soluble lithium and piperazine salts. It can be recognised by the *murexide test* (q.v.).

Urico′nian Rocks (*Geol.*). Lavas (largely rhyolites), tuffs, and intrusive rocks of presumed Pre-Cambrian age occurring in Shropshire in the hills east of the Longmynd, and in the Wrekin. Possibly the rocks of similar type occurring on Pontesford Hill, west of the Longmynd, are of the same age; some refer to these as the *Pontesfordian Group.*

urine (*Zool*.). In Vertebrates, the excretory product elaborated by the kidneys, usually of a more or less fluid nature.—*adj.* **urinary.**

urinif′erous, urinip′arous (*Zool.*). Urine-secreting, urine-producing; as the glandular tubules of the kidney.

urinogen′ital (*Zool*.). Pertaining to the urinary and genital systems.

urinogenital system (*Zool.*). The organs of the urinary and genital systems when there is a direct functional connexion between them, as in male Vertebrates.

urinom′eter (*Med*.). An instrument for measuring the specific gravity of urine.

u′rite, u′romere (*Zool.*). In *Arthropoda*, one of the somites of the abdomen.

urn (*Bot.*). The capsule of a moss.

urn-shaped (*Bot.*). Having the form of a rounded vase swollen in the middle.

uro- (1. Greek *ouron*, urine; 2. Greek *oura*, tail). A prefix used in the construction of compound terms; e.g. (1) *urorectal*, pertaining to the urinary or urinogenital ducts and to the rectum; (2) *urosacral*, pertaining to the caudal and sacral regions of the vertebral column.

urobilinae′mia, urobiline′mia (*Med.*). The presence of urobilin in the blood.

urobilinu′ria (*Med.*). The presence of (an excess of) urobilin in the urine.

urocar′diac (*Zool.*). In higher *Crustacea*, said of one of the ossicles of the gastric mill.

u′rochord (*Zool.*). Having the notochord confined to the tail region.

Urochor′da (*Zool.*). A subphylum of *Chordata* having the typical characters of the phylum in the larva only; the adults are degenerate forms lacking a notochord, coelom, or metameric segmentation; the nervous system is much reduced, and the pharynx surrounded by a dorsal atrium; there is usually a test composed of gelatinous material (tunicin).

urodae′um (*Zool.*). The division of the cloaca which receives the urinary ducts.

Urode′la (*Zool.*). See **Caudata.**

urode′lous (*Zool.*). Having a persistent tail; as Salamanders.

urohy′al (*Zool.*). A posterior element of the hyoid copula.

urol′ogy (*Med.*). That part of medical science which deals with diseases and abnormalities of the urinary tract and their treatment.—Hence **urologist.**

u′romere (*Zool.*). See **urite.**

uropata′gium (*Zool.*). In *Insecta*, the podical plate: in *Cheiroptera*, the membrane of the hind limbs.

u′ropod (*Zool.*). In *Malacostraca*, an appendage of the abdominal somite preceding the telson.

uropygial, —pij′i-al (*Zool.*). Pertaining to or situated on the uropygium; as the oil gland.

uropygial gland (*Zool.*). See **oil gland.**

uropygium (*Zool.*). In Birds, the short caudal stump into which the body is prolonged posteriorly.

uros′copy (*Med.*). The inspection and scientific examination of urine for diagnostic purposes.

u′rosome (*Zool*.). In aquatic *Vertebrata*, the tail region: in *Crustacea*, the hinder part of the abdomen.

u′rostege, uros′tegite (*Zool.*). In *Ophidia*, a ventral tail-plate.

uroster′nite (*Zool*.). In *Arthropoda*, the sternite of an abdominal somite.

urosthen′ic (*Zool.*). Having the tail adapted for propulsion.

u′rostyle (*Zool.*). In Fish, the hypural bone: in *Anura*, a rod-like bone formed by the fusion of the caudal vertebrae.

urotro′pine (*Chem.*). *Hexamethylene-tetramine* (q.v.).

ur′ticant, ur′ticating (*Zool*.). Irritating; stinging.

urtica′ria (*Med.*). A condition in which smooth, elevated, whitish patches (wheals) appear on the skin and itch intensely, as a result of taking drugs or certain foods (e.g. shell-fish), or as a reaction to the injection of serum, insect bites, or the stings of plants (nettle-rash).

U.S. (*Photog.*). Abbrev. for *uniform system.*

useful life (*Elec. Eng.*). The period for which an incandescent electric lamp can be used. Beyond this its falling candle-power renders it inefficient.

useful load (*Aero.*). The gross weight of an aircraft, less the tare weight. Usually includes fuel, oil, crew, equipment not necessary for flight (such as parachutes), and paying load.

U.S.S. thread (*Eng.*). See **Sellers screw-thread.**

Ustilaginales, —laj-in-āl′ēz (*Bot.*). A group of parasitic *Basidiomycetes*, including about 400 species. The mycelium lives inside the host, and frequently the flowers of the host are destroyed, and their ovaries replaced by a mass of dark-coloured spores looking like small masses of soot. Several species cause a good deal of damage to cereals. The *Ustilaginales* are popularly known as *smuts* or *smut fungi.*

U.T. (*Astron.*). Abbrev. for *universal time.*

utero- (Latin *uterus*, womb). A prefix used in the construction of compound terms; e.g. *utero-vaginal*, pertaining to the uterus and the vagina.

u′terus (*Bot.*). The peridium in some fungi, especially in the *Gasteromycetes.*

uterus (*Zool.*). In female Mammals, the muscular posterior part of the oviduct in which the foetus is lodged during the prenatal period: in lower *Vertebrata* and *Invertebrata*, a term loosely used to indicate the lower part of the female genital duct, or in certain cases (as in *Platyhelminthes*) a special duct in which eggs are stored or young developed.—*adj.* **uterine.**

uterus masculi′nus (*Zool.*). In male Mammals, a small blind tube embedded in the prostate gland, opening dorsally into the urethra; believed to represent the vestige of the Müllerian ducts.

U′tica Shale (*Geol.*). An important member of the Upper Ordovician succession in the eastern parts of N. America, succeeding the Trenton Limestone, and placed at the base of the Cincinnatian Series.

utilisation factor (*Illum.*). The ratio of the luminous flux reaching a specified plane to the total flux emanating from an electric lamp.

utility factor (*Elec. Eng.*). The ratio of the equivalent d.c. power output of a rectifier transformer to its mean volt-ampere rating.

u′tricle (*Bot.*). A more or less inflated, membranous, bladder-like envelope surrounding the fruits of various plants.

utricle, utric'ulus (*Zool.*). A small sac: in Vertebrates, the upper chamber of the inner ear from which arise the semicircular canals: the *uterus masculinus* (q.v.).

utric'ular, utricu'liform (*Bot., Zool.*). Like a bladder: pertaining to a utricle.

utric'uloplas'ty (*Surg.*). The operation of excising a portion of the body of the uterus; done for the treatment of uterine haemorrhage.

u'va (*Bot.*). A berry formed from a superior ovary.

uvar'ovite (*Min.*). A variety of garnet, of an attractive green colour, essentially silicate of calcium and chromium. Named after Uvarov, a Russian statesman.

u'vea (*Zool.*). In Vertebrates, the posterior pigment-bearing layer of the iris of the eye.—(*Med.*) The iris, the ciliary body, and the choroid considered as one structure; also called the UVEAL TRACT.

uveitis, ū-ve-it'is (*Med.*). Inflammation affecting the iris, the ciliary body, and the choroid.

u'veoparot'id fever (*Med.*). A condition characterised by inflammation of the parotid glands and bilateral iridocyclitis, often with paralysis of the seventh cranial nerve.

V

v- (*Chem.*). *Vicinal* (q.v.).

v (*Elec. Eng.*). The symbol for (1) *voltage gradient*; (2) *electric field strength*.

v (*Phys.*). (1) The symbol for *velocity*.—(2) In heat and thermodynamics, the symbol for the specific volume of a gas.

V (*Chem.*). The symbol for *vanadium*.

V (*Elec. Eng.*). The symbol for *potential* or *voltage*.

V (*Phys.*). In heat and thermodynamics, the symbol for the volume of a gas.

V-connexion (*Elec. Eng.*). An alternative name for the open delta connexion of two phases of a three-phase a.c. system.

V-curve (*Cables*). The power-factor/temperature curve of a cable with moisture shows a pronounced minimum at about 40° C., and is called the *V-curve*.

V-end connexions (*Elec. Eng.*). V-shaped conductors connecting the ends of corresponding pairs of bars in a bar-wound armature.

V-antenna, V-gutter, V-joint, etc. See **vee antenna*, vee gutter, vee joint,** etc.

V-rings (*Elec. Eng.*). V-shaped mica rings insulating the segments of a commutator from the end rings.

V-type commutator (*Elec. Eng.*). A commutator whose segments are provided with projecting spigots, which dovetail into the end rings.

vac'cinal (*Med.*). Of, pertaining to, or caused by, vaccine or vaccination.

vaccination (*Med.*). (1) Inoculation into the skin of the virus of vaccinia in order to immunise the person so treated against smallpox.—(2) The therapeutic application of a vaccine made from any micro-organism.

vac'cine (*Med.*). (1) The lymph (containing virus) taken from the cow-pox vesicle.—(2) Of, or pertaining to, vaccinia.—(3) Of, pertaining to, or connected with, the cow.—(4) A preparation of any micro-organism or virus, either killed or so treated as to lose its virulence, for introduction into the body in order to stimulate the production of antibodies to the micro-organism(s) introduced, in order to confer immunity against any subsequent infection by the same type of micro-organism(s.)

vaccin'ia (*Med., Vet.*). Cow-pox. A disease of cows characterised by the eruption of vesicles on the udders and teats, due to infection with a virus which is probably a modified form of that causing smallpox.

vaccinial (*Med.*). Of, pertaining to, or caused by, vaccinia.

vac'uolar (*Biol.*). Resembling, or pertaining to, a vacuole.

vacuolar membrane (*Biol.*). The protoplasmic membrane which bounds a vacuole, separating it from the surrounding cytoplasm.

vac'uolate (*Biol.*). Vesicular; provided with vacuoles.

vac'uole (*Biol.*). A small space or cavity in cytoplasm, generally containing fluid.

vacuolisation (*Biol.*). The formation of vacuoles.

vac'uome (*Zool.*). A system of vacuoles in close relation with the Golgi apparatus.

vacuum (*Phys.*). A region in which the gas pressure is considerably lower than atmospheric pressure. A 'perfect' vacuum, i.e. one which contains no gas, is unobtainable, but, by the use of mercury-vapour pumps and liquid air traps, pressures down to 10^{-6} millimetre of mercury may be obtained.

vacuum augmenter (*Eng.*). An *air-ejector* (q.v.) placed in a steam condenser to produce a higher degree of vacuum than is obtainable by the use of an air-pump alone.

vacuum brake (*Eng.*). A brake system used on passenger trains, in which a vacuum, maintained in reservoirs by exhausters, is simultaneously applied to brake cylinders throughout the train. See **continuous brake.**

vacuum cell (*Photo-electric Cells*). A cell in which the photo cathode and anode are situated in a high vacuum. It is less sensitive than the corresponding gas-filled cell, but time-lag effects are absent.

vacuum distillation (*Chem.*). Distillation under reduced pressure. As a reduction of pressure effects a lowering of the boiling-point, many substances can be distilled which otherwise would not stand high temperatures without decomposition.

vacuum filament lamp (*Illum.*). An incandescent electric lamp in which the filament is enclosed in a highly evacuated bulb.

vacuum filtration (*Chem.*). A process of filtration where a partial vacuum is applied to increase the rate of filtration by causing the liquid to be sucked through the filter.

vacuum impregnation (*Elec. Eng.*). The process of treating armature and transformer windings by applying moisture-resisting varnish to the insulation, under vacuum, thereby ensuring that the varnish penetrates the pores of the insulating material when normal atmospheric conditions are restored.

vacuum oven (*Elec. Eng.*). An oven for heating armature and transformer windings under vacuum, so as to drive off all moisture from the insulation prior to impregnation.

vacuum pump. See **air-pump.**

vacuum rectifier (*Elec. Eng.*). A rectifier operating by virtue of the unipolarity of the electric discharge *in vacuo* between an incandescent cathode and an anode at normal temperature.

vacuum tube, vacuum valve (*Thermionics*). See **thermionic tube.**

vagi'na (*Bot.*) A sheathing leaf-base.

vagina (*Zool.*). Any sheath-like structure; the terminal portion of the female genital duct leading from the uterus to the external genital opening.—*adjs.* **vag'inal, vag'inant, vag'inate, vaginif'erous.**

vaginal plug (*Zool.*). In female Rodents and Insectivores, the coagulated secretion of Cowper's glands which blocks the vagina and prevents premature escape of the seminal fluid.

vaginic'olous (*Zool.*). Living in a sheath, as some *Protozoa*.

vaginis'mus (*Med.*). Painful spasmodic contraction of the muscles of the vagina and/or of the muscles forming the pelvic floor.

vagini'tis (*Med.*). Inflammation of the vagina.

vagin'ula (*Bot.*). A minute sheath surrounding the base of the seta in *Bryophyta*.

vagi'tus uteri'nus (*Med.*). The crying of a child while still *in utero*, just before birth.

vagoto'nia, vagot'ony (*Med.*). The condition of heightened activity of the vagus nerve.—*adj.* **vagoton'ic.**

va'gus (*Zool.*). (1) The tenth cranial nerve of Vertebrates, supplying the viscera and heart (see also **pneumogastric**), and, in lower forms, the gills and lateral line system.—(2) In Mammals, the larynx.

valence (*Chem.*). See **chemical bond.**

valency (*Chem.*). The combining power of an atom or group in terms of hydrogen atoms or their equivalent. The valency of an ion is equal to its charge.

valency (*Zool.*). The numerical arrangement of the chromosomes in a nucleus, i.e. whether single, paired, etc. See **univalent, bivalent.**

valency bond (*Chem.*). See **chemical bond.**

valency electrons (*Chem.*). The electrons in the outermost shell, or those having the highest principal quantum number, of an atom; they are largely responsible for the chemical and physical properties of the atom.

Valentian Series (*Geol.*). The lowest series of rocks in the Silurian System, lying between the Bala Series of the Ordovician and the Wenlock Series of the Silurian. Equivalent to the Llandovery Series or Llandoverian.

val'entinite (*Min.*). Trioxide of antimony, Sb_2O_3, occurring as orthorhombic crystals or radiating aggregates; snow-white when pure; formed by the decomposition of other ores of antimony.

valerian'ic acid (*Chem.*). Valeric acid.

valer'ic acids (*Chem.*). $C_4H_9 \cdot COOH$, monobasic fatty acids, of which isomers are known, viz. *normal* valeric acid, $CH_3 \cdot (CH_2)_3 \cdot COOH$, b.p. 185° C.; *iso*valeric acid, $(CH_3)_2{:}CH \cdot CH_2COOH$, b.p. 175° C.; methylethylacetic acid, $(CH_3)(C_2H_5)CH \cdot COOH$, b.p. 177° C.; trimethylacetic acid, $(CH_3)_3C \cdot COOH$, b.p. 164° C.

***d*-valine** (*Chem.*). $(CH_3)_2{:}CH \cdot CH(NH_2) \cdot COOH$, α-amino-*iso*valerianic acid, an amino acid obtained by the hydrolysis of certain proteins.

vallec'ula (*Zool.*). A groove.—*adj.* **vallec'ulate.**

valley (*Build.*). The outer angle (less than 180°) between two intersecting roof slopes. Cf. *hip*.

valley (*Geol.*). Any hollow or low-lying tract of ground between hills or mountains, usually traversed by streams or rivers, which receive the natural drainage from the surrounding high ground. Deep, narrow valleys are more appropriately termed *glens*, *ravines*, *gorges*, *canyons*, according to their size and the steepness of the valley walls. Usually valleys are developed by stream erosion; but in special cases faulting may also have contributed, as in rift valleys.

valley (*Plumb.*). A V-shaped gutter between two roof-slopes.

valley board (*Build.*). A board nailed along the top of the valley rafter as a support for a *laced valley* (q.v.).

valonia (*Tanning, etc.*). The large unripe acorn-cup of the Valonia oak (*Quercus aegilops*) of Asiatic Turkey; used extensively in tanning, dyeing, and ink-making.

val'soid (*Bot.*). Having the perithecia in a circle in the stroma.

values (*Photog.*). Those qualities which determine the correspondence between the brightnesses of the elements of a pictorial image when the original coloured subject is reproduced in black and white.

Valva'ta (*Zool.*). An order of *Asteroidea* in which the dorsal surface is protected by plates covered with minute granules; the tube-feet terminate in suckers and the pedicellariae are valvate or alveolate.

valvate aestivation (*Bot.*). The condition when the perianth segments touch but do not overlap at the edges.

valvate dehiscence (*Bot.*). Liberation of pollen from anthers, or of seeds from dry fruits, by means of little flaps of upraised wall material.

valve (*Bot.*). (1) A part of the wall of the fruit-wall which separates at dehiscence.—(2) One of the two silicified halves of the cell wall of a diatom.

valve (*Cinema.*). See **light-valve,** and for *magazine valve* see **fire-trap.**

valve (*Radio, Thermionics*). A term strictly applicable to a device which allows the passage of current in one direction only, i.e. a rectifier; but generally applied to all forms of thermionic or gas-discharge tubes used as rectifiers, amplifiers, modulators, oscillators, etc. Also called TUBE. See **valve nomenclature.**

See **diode—**
electrolytic—
electron—
ionic—
Lodge—
pentode—
rectifying—
screened-grid—
thermionic—
triode—

valve, valva (*Zool.*). Any structure which controls the passage of material through a tube, duct, or aperture, usually in the form of membranous folds, as the auriculo-ventricular valves of the heart: any membranous fold resembling a valve, as the valve of Vieussens: in *Mollusca*, *Cirripedia*, *Brachiopoda*, one of several separate pieces composing the shell: in *Insecta*, a covering plate or sheath, especially one of a pair which can be opposed to form a tubular structure, as the valves of the ovipositor.—*adjs.* **valval, valvar, valvate, valvif'erous val'viform, valvular.**

valve adaptor (*Radio, Thermionics*). A device which enables a valve to be fitted to a socket for which it was not originally designed.

valve amplifier (*Radio*). See **thermionic amplifier.**

valve base (*Radio, Thermionics*). An insulating cap cemented to the envelope of a valve and fitted with contacts connected to the electrodes. It enables the valve to be plugged readily into the circuit.

valve box (or **chest**) (*Eng.*). In a force-pump or steam-engine, the chamber which contains the valves or valve: the *steam chest* (q.v.) of a steam-engine.

valve coupling (*Elec. Comm*). Coupling by means of a thermionic valve which permits power to pass in one direction only in a communication channel.

valve detector (*Radio*). See **thermionic detector.**

valve diagram (*Eng.*). For a steam-engine slide-valve, a graphical method of correlating the throw and angle of advance of the eccentric, the lead and laps of the valve, and the points of admission, cut-off, compression, and release. The 'Bilgram,' the 'Reuleaux,' and the 'Zeuner' valve diagrams are examples of the method.

valve effect (*Chem.*). The unilateral conductivity of certain electrodes (notably aluminium) in suitable solutions. As anodes they may withstand several hundred volts, although current will pass freely in the opposite direction.

valve face (*Eng.*). The sealing surface of a valve which slides over, or beds on to, the seating.

valve hiss (*Thermionics*). The same as *valve noise* (q.v.).

valve holder (*Radio, Thermionics*). See **valve socket.**

valve inserts (*I.C. Engs.*). Valve seatings of special heat- and lead-resisting steel which are pressed into the alloy heads of high-duty petrol-engines.

valve noise (*Thermionics*). A noise present in telephones connected in the anode circuit of a thermionic valve, even in the absence of signals applied to the grid, due to shot effect, microphonic action of the electrodes, thermal agitation voltage, etc.

valve nomenclature (*Thermionics*). The description of thermionic valves in terms of the number of electrodes therein, e.g. *diode*, *triode*, *tetrode*, *pentode*, *hexode*, *heptode*, *octode*, etc.; suggested by Eccles.

valve-opening diagram (*I.C. Engs.*). A diagram showing the lift or the opening area of a valve to a base of engine crank angle or piston displacement.

valve oscillator (*Radio*). See **thermionic oscillator.**

valve rectifier (*Elec. Eng.*). A rectifier of the vacuum or the gas-discharge type.

valve relay (*Elec. Eng.*). A thermionic valve arranged to operate as a synchronous voltage relay in high-frequency a.c. circuits.

valve rocker (*I C. Engs*). A small lever, generally pivoted at about its mid-point, used to transmit motion from a cam or a push-rod to a valve stem.

valve rustle (*Cinema.*). A rustling noise accompanying sound-film reproduction; caused by the clashing of the ribbons in the light-valve in the recorder.

valve socket (*Radio, Thermionics*). An arrangement of contact springs or pins into which a valve can be plugged for connexion to the rest of the circuit.

valve spring (*Eng.*). The helical spring (or springs) used to close a poppet valve after it has been lifted by the cam: generally, any spring which closes a valve after it has been lifted mechanically or by fluid pressure.

valve, time (*Photog*). See **time valve.**

valve tower (*Civ. Eng.*). A hollow cast-iron or masonry tower built within a reservoir; equipped with draw-off pipes at different levels for taking off water for supply purposes.

valve voltmeter (*Elec. Comm*). A thermionic valve used for measuring voltages, the rectified output current being dependent on the voltage applied to the grid. It uses practically no power for operation, and can be calibrated at low frequencies for use at very high frequencies, when other means are impossible.

val'vula (*Zool.*). In bony Fish, a process of the cerebellum projecting downwards and forwards beneath the roof of the mid-brain.

val'vular (*Bot*). Opening by means of valves.

valvulate, valvate (*Zool.*). Said of pedicellariae in which the jaws are broader than they are long; such pedicellariae are always sessile.

valvuli'tis (*Med.*). Inflammation of a valve of the heart.

vamp (*Boots and Shoes*). The front upper part of a boot or shoe.

vanad'inite (*Min.*). Vanadate and chloride of lead, typically forming brilliant blood-red hexagonal crystals or globular masses encrusting other minerals in lead-mines.

vana'dium (*Met.*). A metallic element. Chem. symbol, V. At. wt. 50 95, at. no. 23, sp. gr. at 20° C. 5·68, m.p. 1720° C., specific electrical resistivity 26 microhms per cm. cub. Its principal use is as constituent of alloy steel, e.g. in chromium-vanadium, manganese-vanadium, and high-speed steels.

van der Hoeven's organ (*Zool.*). In male *Nautiloidea*, a median body lying between the groups of tentacles and having its surface divided into folds.

van der Waals' equation (*Phys.*). An equation of state which takes into account the effect of intermolecular attraction at high densities and the reduction in effective volume due to the actual volume of the molecules:

$$\left(P+\frac{a}{v^2}\right)\left(v-b\right)=RT,$$

a and *b* being constant for a particular gas. See **gas laws.**

van der Waals' forces (*Chem.*). Weak attractive forces between molecules or crystals.

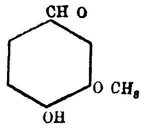
Vandyke pieces (*Plumb.*). The lead scraps remaining after the cutting out of a stepped flashing.

vane (*Build.*). A *weathercock* (q.v.).

vane (*Surv.*). A disc attachment to a levelling-staff; it provides a sliding target which the staffman can move into the line of sight of the level. See **target rod.**

vane (*Zool*). The web of a feather, composed of the barbs and barbules.

van'illin (*Chem*). 3-Methoxy-4-hydroxy-benzaldehyde, found in vanilla pods. It crystallises in white needles, m.p. 80° C., and has the formula:



vanner (*Mining*). A wide, travelling, shaking rubber belt, for the concentration (dressing) of ores.

vanning (*Mining*). The estimating of the content of an ore by washing on a flat shovel.

van 't Hoff factor (*Chem.*). The ratio of the number of dissolved particles (ions and undissociated molecules) actually present in a solution to the number there would be if no dissociation occurred.

van 't Hoff's law (*Chem.*). The osmotic pressure of a dilute solution is equal to the pressure which the dissolved substance would exert if it were in the gaseous state and occupied the same volume as the solution at the same temperature.

van 't Hoff's reaction isochore (*Chem.*). For a reversible reaction taking place at constant volume,

$$\frac{d\log_e K}{dT}=\frac{\Delta U}{RT^2},$$

where K is the equilibrium constant, T is the absolute temperature, R is the gas constant, ΔU is the heat absorbed in the complete reaction.

van 't Hoff's reaction isotherm (*Chem.*). For a reversible reaction taking place at constant temperature,

$$-\Delta A=RT\log K-RT\Sigma n\log_e c,$$

where $-\Delta A$ is the decrease in free energy, R the gas constant, T the absolute temperature, K the equilibrium constant, and $\Sigma n\log_e c$ is of the same form as $\log_e K$, but with the equilibrium concentrations replaced by the initial values.

vapog'raphy (*Photog.*). An effect obtained by the action of vapours on sensitive photographic materials.

vaporim'eter (*Chem.*). An apparatus in which the volatility of oils is estimated by heating them in a current of air.

vaporisation (*Chem.*). The conversion of a liquid or a solid into a vapour.

vaporising oil (*Fuels*). See **kerosene.**

vapour (*Phys.*). A gas which is at a temperature below its critical temperature and can therefore be liquefied by a suitable reduction in pressure.

vapour lock (*Eng.*). (Of a volatile fluid in a pipe) the formation of vapour in a petrol feed-pipe to a carburettor due to undue heating of the pipe, resulting in an interruption of flow.

vapour pressure (*Phys.*). The pressure exerted by a vapour, either by itself or in a mixture of gases. The term is often taken to mean saturated vapour pressure, which is the vapour pressure of a vapour in contact with its liquid form. The saturated vapour pressure increases with rise of temperature. See **saturation of the air.**

Vaqueros formation, va-kā'rōs (*Geol.*). Strata of shallow-water origin and of Lower Miocene age. The formation includes the chief oil-bearing sands of the Coalinga district, California.

var (*Elec. Eng.*). See **reactive volt-amperes.**

varec (*Chem.*). The French name for *kelp* (q.v.).

variability (*Chem.*). The number of *degrees of freedom* (1, q.v.) of a system.

variable-area recording (*Cinema.*). Photographic sound-track recording for sound-films in which, in the print, the modulation appears as a blocked-out wave-form, so that a scanning light-slit, of sufficiently small dimension in the direction of the film and covering the whole of the track, is modulated, the transmitted light passing into a photo-electric cell for subsequent amplification and radiation. The variable-area sound-track is improved by using two or four cutting edges (blocked wave-forms), and squeezing the track (see **squeeze track**) to minimise ground-noise.

variable attenuator (*Elec. Comm.*). See **attenuator.**

variable condenser (*Elec. Eng*). A condenser whose capacity is continuously variable between wide limits.

variable coupling (*Elec. Eng.*). An electromagnetic coupling between two a.c. circuits in which the mutual inductance is continuously variable between wide limits.

variable-density recording (*Cinema.*). The form of photographic record on film in which the area of sound-track under the area of the image of the scanning slit is of constant density, which varies along the length of the sound-track. This represents the modulation that is imposed on the transmitted beam of light which is received into the photo-electric cell, and, after amplification, is converted into radiated sound-waves.

variable inductance (*Elec. Eng*). An inductive coil whose self-inductance is continuously variable between wide limits.

variable mu valve (*Thermionics*). A valve in which the form of the grid is such as to permit change of the mutual conductance by variation of the grid bias. Also called MULTIMU VALVE.

variable-ratio transformer (*Elec. Eng.*). A transformer whose voltage ratio can be varied by altering the number of active turns in either the primary or the secondary winding.

variable resistance (*Elec. Eng.*). An alternative name for *rheostat.*

variable-speed drive (*Elec. Eng.*). An electric drive whose speed is continuously variable between wide limits.

variable-speed motor (*Elec. Eng.*). An electric motor whose speed is continuously variable between wide limits.

variable-speed scanning (*Television*). The system of scanning employed in a velocity modulation system.

variable stars (*Astron*). Those stars whose apparent magnitudes are not constant but vary over a range. There are three main classes: (1) Long-period variables, with periods from 50 to 600 days or more; (2) short-period variables, with periods from a few hours to 50 days, which include the Cepheids; (3) irregular variables, so called because no definite period seems assignable.

variable-voltage control (*Elec. Eng.*). A system of controlling speed by varying the voltage applied at the motor terminals.

variable-voltage generator (*Elec. Eng.*). A generator whose voltage is continuously variable between wide limits.

variance (*Chem.*). See **variability.**

variance (*Maths.*). The square of the *standard deviation* (q.v.), i.e. the average of the squares of the deviations of a number of observations of a quantity from their mean value, the quantity being termed a *variate.*

variant (*Biol.*). A specimen differing slightly in its characteristics from the type.

variation (*Astron.*). The name given to the fourth principal periodic term in the mathematical expression of the moon's motion, caused by the variation of the residual attraction of the sun on the earth-moon system during a synodic month; it has a maximum value of 39′ and a period of 14·77 days.

variation (*Biol.*). The differences between the offspring of a single mating: the differences between the individuals of a race, subspecies, or species: the differences between analogous groups of higher rank.

variation, magnetic variation (*Surv., etc*). See **declination.**

variations (*Build., Civ. Eng.*). See **extras.**

variation factor (*Illum.*). The ratio between the maximum and the minimum illumination along a street or roadway illuminated at intervals by overhead lamps.

variation order (*Civ. Eng.*). A document giving authority for some alteration in work being done under contract.

varicel′la (*Med*). See **chickenpox.**

var′icocele (*Med.*). A varicose condition of the plexus of veins which leave the testis to form the spermatic vein, forming at the upper part of the testis a swelling which feels like a mass of spaghetti.

var′icose (*Bot.*). Dilated.

varicose (*Med.*). Of the nature of, pertaining to, or affected by, a varix or varices: (of veins) abnormally dilated, lengthened, and tortuous.

variegated (*Bot., etc*). Marked irregularly with patches of diverse colour.

variegated copper ore (*Min.*). A popular name for *bornite* (q.v). So named from the characteristic tarnish that soon appears on the freshly fractured surface.

variety (*Biol*). A race: a stock or strain: a sport or mutant: a breed: a subspecies: a category of individuals within a species which differ in constant transmissible characteristics from the type but which can be traced back to the type by a complete series of gradations: a geographical or biological race. This term has been used in different senses by specialists in different groups.

vario coupler (*Radio*). A device comprising two inductance coils whose mutual inductance can be varied. It is used for variable inductive coupling between two circuits.

vari′ola (*Med.*). See **smallpox.**

variola minor (*Med.*). See **alastrim.**

variola (*Vet.*). See **pox.** For *swine variola* see **swine pox.**

var′iolar′ioid, var′iolose (*Bot.*). Covered with a powdery coating or with very small tubercles.

var′iolite (*Geol.*). A fine-grained igneous rock of basic composition containing small more or less spherical bodies (*varioles*) consisting of minute radiating fibres of feldspar, comparable with the more perfect spherulites in acid igneous rocks. The term would be better used as an adjective, i.e. *variolitic* basalt, etc.

var′ioloid (*Med.*). A mild type of smallpox occurring in one who has been vaccinated.

variom′eter (*Radio*). A form of variable inductance comprising two coils connected in series and arranged one inside the other, the inner coil being capable of rotation so as to vary the mutual inductance between them.

var′iscite (*Min.*). A soft-green hydrated phosphate of aluminium ($AlPO_4{\cdot}2H_2O$) occurring as nodular masses in Utah, U.S.A.

Varistor (*Elec. Comm.*). A resistance, consisting of compressed silicon carbide (thyrite, atmite), which has a markedly reduced resistance when the applied voltage is increased. Used to protect communication circuits against damage consequent on high-voltage surges arising from lightning or from induction from high-tension lines under fault conditions.

varix (*Med.*). Varicose vein; a vein that is abnormally dilated, lengthened, and tortuous.—*pl.* **varices.**

Varley loop test (*Elec. Eng.*). A method of determining the position of a cable fault, in which resistance measurements are made with a resistance bridge, first, so that the fault forms one junction of the bridge, and, secondly, so that the conductor resistance of the cable is measured directly.

varnish (*Paint.*). A solution of a resin or resinous gum in spirits or oil applied as an extra glossy coat on a painted surface, which it serves to protect.—(*Diel.*) See **oil varnishes, bitumen varnishes, enamel.**—(*Photog.*) See **crystal varnish.**

varnished (*Bot.*). Said of a surface which appears to be covered by a thin shining film.

varnished insulation (*Diel.*). Varnished cotton, silk, and cambric which are much used for insulating wires and flexes.

varve clays (*Geol.*). Distinctly and finely stratified clays of glacial origin, deposited in lakes during the retreat stage of glaciation. The stratification is a seasonal banding, and its study has enabled Baron de Geer to work out the chronology of the Pleistocene Ice Age.

vas (*Zool.*). A vessel, duct, or tube carrying fluid.—*pl.* **vasa.**—*adj.* **va'sal.**

vas de'ferens (*Zool.*). A duct leading from the testis to the ejaculatory organ, the urinogenital canal, the cloaca, or the exterior.

vasa efferen'tia (*Zool.*). A series of small ducts by which the semen is conveyed from the testis to the vas deferens.

vasa recta (*Zool.*). In the Mammalian kidney, groups of small arteries and veins alternating with groups of uriniferous tubules in the part of the medulla nearest to the cortex.

vasa vasorum (*Zool.*). In Vertebrates, small blood-vessels ramifying in the external coats of the larger arteries and veins.

vascular (*Bot., Zool.*). Pertaining to vessels which convey fluids or provide for the circulation of fluids: provided with vessels for the circulation of fluids.

vascular anastomosis (*Bot.*). A small transversely directed vascular bundle, acting as a link between the main vascular bundles of a stem or root.

vascular area (*Zool.*). See **area vasculosa.**

vascular bundle, vascular strand (*Bot.*). A strand of conducting tissue, consisting of xylem and phloem, sometimes separated by cambium; sclerenchymatous supporting tissue may also be present.

vascular cryptogam (*Bot.*). A non-flowering plant which has vascular tissue. Ferns are the most familiar of these.

vascular ray (*Bot.*). A sheet of cells, usually mostly parenchymatous, lying radially in a stem or root, appearing in cross-section as a narrow radial streak, in radial longitudinal section as a plate of cells; the ray lies partly in the xylem and partly in the phloem, and serves to conduct solutions horizontally in the stem or root. Often called a MEDULLARY RAY.

vascular-ray initial (*Bot.*). A cell of the cambium which divides to give daughter cells which are converted into the cells forming a vascular ray.

vascular system (*Zool.*). The organs responsible for the circulation of blood and lymph, collectively.

vascular tissue (*Bot.*). Xylem and phloem.

vascu'liform (*Bot.*). Shaped like a little pot.

vasec'tomy (*Surg.*). Excision of the vas deferens, or of part of it.

Vaseline (*Chem.*). Trade-name for high-boiling residues obtained from the distillation of petroleum.

vasicen'tric (*Bot.*). See **paratracheal.**

vasifac'tive (*Zool.*). See **vasoformative.**

vas'iform tracheide (*Bot.*). A wide tracheide capable of conducting water.

vasoconstric'tor (*Zool.*). (Of certain autonomic nerves) causing constriction of the arteries.

vasodila'tor (*Zool.*). (Of certain autonomic nerves) causing expansion of the arteries.

vaso-ep'ididymos'tomy (*Surg.*). The operation of anastomosing the vas deferens to the upper part of the epididymis, forming a communication between the two; performed for the treatment of sterility in the male.

vasofor'mative (*Zool.*). Pertaining to the formation of blood or blood-vessels.

vasoformative cells (*Zool.*). See **angioblast.**

vasogan'glion (*Zool.*). See **red gland.**

vasohyperton'ic (*Zool.*). See **vasoconstrictor.**

vasohypoton'ic (*Zool.*). See **vasodilator.**

vasoinhibitory, vā-zō-in-hib'— (*Zool.*). See **vasodilator.**

vasoligation (*Surg.*). See **vasoligature.**

vasolig'ature (*Surg.*). Ligature of the vas deferens, as in *Steinach's operation* (q.v.).

vasomo'tor (*Zool.*). Causing constriction or expansion of the arteries; as certain nerves of the autonomic nervous system.

vat dyestuffs (*Chem.*). A series of insoluble dyestuffs that can be reduced to their water-soluble leuco-compounds, which are oxidised by exposure to the air, thus producing the dyestuff direct on the fibre.

Vater's corpuscles, fah'ter (*Zool.*). See **Pacinian corpuscles.**

vault (*Build.*). (1) An arched roof or ceiling.—(2) A room or passage covered by an arched ceiling.—(3) An underground room.

vault light (*Build.*). A form of *pavement light* (q.v.).

vector. A straight line of a definite length drawn from a given point in a given direction. A vector may represent a quantity, such as a velocity, which has both magnitude and direction. Such a quantity is called a *vector quantity.* Vectors may be added according to the rules given under *polygon of forces.*

vector (*Bot.*). Any agent which transmits a virus disease from one host plant to another; insects are the usual agents.

vector potential (*Radio*). A vector quantity occurring in electromagnetic field theory, whose component along any axis at any point is equal to $\Sigma\frac{i.dl}{r}$, where $i.dl$ is a current element parallel to the axis at a distance r from a point, the summation extending throughout all space.

vector product (*Elec. Eng.*). A vector normal to the plane of two vectors, of magnitude equal to the product of the magnitudes of the two vectors. Not used in electrical engineering. See **scalar product.**

vector quantity (*Elec. Eng.*). A quantity, such as the intensity of an electric or magnetic field, which has direction as well as magnitude. Represented graphically and mathematically as a line the direction of which represents the direction of the quantity and the length of which represents the magnitude in terms of a unit vector. Graphical vectors (and in the form $a+jb$ for algebraical manipulation) are greatly used in calculating alternating currents. See **scalar product.**

vector ratio (*Elec. Comm., Elec. Eng., Radio*). The ratio between two alternating quantities, e.g. currents, in which both relative amplitudes and phases are expressed in the form of vectors.

vee gutter (*Build.*). A gutter of V-shape, as required, for example, along the valley of an M-roof.

vee joint (*Join.*). A joint between *matched boards* (q.v.) which have been chamfered along their edges on the same side to present a vee depression at their junction.

vee notch (*Civ. Eng.*). A notch plate having a triangular notch cut in it, used for the measurement of small discharges.

vee roof (*Build.*). A roof formed by two lean-to roofs meeting to enclose a valley.

vee thread (*Eng., etc.*). A screw-thread in which the thread profile is V-shaped (as for the common Whitworth thread), as distinct from other forms, e.g. square thread.

veering (*Meteor.*). A change in the direction of the arrival of the wind in a clockwise direction. Cf. *backing*.

vees (*Mining*). Soft earth occurring on the sides of a fault or dyke.

Veevie (*Paint.*). Trade-name for a paint solvent.

vegetable oils (*Chem.*). Oils obtained from plants, seeds, etc. Cf. *mineral oils*.

vegetable pole (*Zool.*). The lower portion or pole of an ovum in which cleavage is slow owing to the presence of yolk. Cf. *animal pole*.

vegetation (*Bot.*). The whole of the plants in a given area.

vegetative cone (*Bot.*). The apical meristem of a stem.

vegetative functions (*Zool.*). The autonomic or involuntary functions; as digestion, circulation.

vegetative multiplication (*Bot.*). Increase in the number of plants by the production of portions of the plant body which root and become detached from the parent.

vegetative nervous system (*Med.*). Sympathetic nervous system.

vegetative reproduction (*Zool.*). Propagation by budding.

vehicle (*Paint.*). The liquid substance which when mixed with a pigment forms a paint.

vehicle battery (*Elec. Eng.*). A battery of heavy-duty-type secondary cells, which forms the source of electrical energy in self-contained electric road vehicles.

veil, velum (*Bot.*). (1) An evanescent membrane over an apothecium.—(2) A sheath of hypha forming a complete membrane over a young fruit body of an agaric.—(3) The calyptra of a moss.

veil (*Zool.*). See **velum.**

vein (*Bot.*). One of the smaller strands of conducting tissue in a leaf.

vein (*Geol.*). An irregular minor intrusion, differing from sills, dykes, cone-sheets, etc. in its relation to the rocks which it penetrates. The term is also applied to bodies of quartz similarly related to the country rock (vein-quartz) which is mineralised in mineral veins.

vein (*Zool.*). A vessel conveying blood back to the heart from the various organs of the body: a wing nervure.—*adj.* **venous.**

vein islet (*Bot.*). A very small patch of photosynthetic cells in a leaf, more or less surrounded by a small vein.

vein stuff (*Mining*). The minerals occurring in veins of fissures.

vela'men (*Bot.*). A multilayered sheath of dead empty cells occurring on the surfaces of some aerial roots; the air-filled cells give it a silvery appearance.—*pl.* **velam'ina.**

vela'rium (*Zool.*). In scyphozoan medusae, the thin flexible marginal region of the umbrella with its fringe of tentacles; it is distinguished from a true *velum* (q.v.) of *Hydrozoa* by its containing endoderm canals.

Vela'ta (*Zool.*). An order of *Asteroidea* in which the dorsal surface of the animal is concealed by a membrane composed of webs of skin stretched between diverging groups of spines united at the base with one another; the tube-feet terminate in suckers, and pedicellariae are lacking; mainly deep-water forms.

veldt sore (*Med.*). Barcoo rot. A chronic ulcerated sore of the exposed hairy parts of the body occurring in those living in hot, dry, sandy, or desert country; thought to be due to a deficiency in diet.

veldtschoen, felt'skoon (*Boots and Shoes*). A sandal-like form of shoe in which the upper is attached directly to the sole by a row of stitches near the edge. Also called STITCHDOWN SHOES.

ve'liger (*Zool.*). The secondary larval stage of most *Mollusca*, developing from the trochophore and characterised by the possession of a velum.

velocity (*Mech.*). Rate of change of position or rate of displacement, expressed in feet (or centimetres) per second. Velocity is a vector quantity, i.e. for its complete specification, its direction as well as its magnitude must be stated.

velocity amplitude (*Acous.*). On a gramophone record, the r.m.s. or peak lateral velocity of the sinuous track when the disc is rotating at its correct speed. This equals the product of the frequency, in radians per second, of the note recorded on the track and the amplitude of the excursion of the track as measured in cm. along a radius of the disc.

velocity constant (*Chem.*). The speed of a chemical reaction, in gram-molecules of change per litre per second, when the active masses of all the reactants are unity.

velocity function (*Astron.*). One of the three functions sought in the statistical investigation of the stars. It seeks to express the distributions of their velocities in space. The other two are the luminosity function and density function.

velocity head (*Hyd.*). The energy possessed per unit weight of a fluid, due to its velocity. If at a given point the velocity is v feet per second, the velocity head at this point is $\frac{v^2}{2g}$, g being the acceleration due to gravity in feet per second per second. Also called KINETIC HEAD.

velocity microphone (*Acous.*). See **pressure-gradient microphone.**

velocity-modulated electron stream (*Thermionics*). An electron space-current which is bunched by periodically accelerating and retarding its electrons while passing them through a buncher, such as the rhumbatron in the klystron oscillator, and thereby imparts to them modulated energy. See **klystron.**

velocity modulation (*Television*). A system of television in which the gradation of light and shade in the reproduced picture is effected by variation of the velocity of the scanning spot across the surface of the screen, the intensity of illumination of the spot being constant. Cf. *intensity modulation*.

velocity of approach (*Hyd.*). The velocity of the liquid at the point from which the head above the sill is measured, in the case of flow over a weir or notch-plate. It may be appreciable if the cross-sectional area of the liquid in the approach channel is small.

velocity of light (*Phys.*). A universal constant denoted by c, equal to $(2{\cdot}99796 \pm 0{\cdot}00004) \times 10^{10}$ cm. per sec. *in vacuo*. This is the result obtained finally by Michelson, as the mean of several very accurate determinations, by a rotating mirror method, over distances up to 260 km.

velocity of propagation (*Elec. Eng.*). The velocity with which a surge travels along a line or cable; it is numerically equal to the *velocity of light* (q.v.).

velocity, particle (*Acous.*). See **particle velocity.**

velocity ratio (*Mech.*). The ratio of the distance moved through by the point of application of the effort to the corresponding distance for the load in a machine. The ratio of the *mechanical advantage* (q.v.) to the velocity ratio is termed the efficiency of the machine. See **machine.**

velour, vel-oor′ (*Textiles*). A woollen cloth with a fine dense pile, cropped level. The name is often applied to woollen cloths finished with a soft thick pile

Velox boiler (*Eng.*). A forced-circulation boiler in which very high rates of heat release and heat transfer are obtained by the use of a supercharged furnace and high gas velocities, resulting in exceptionally low *unit weight* (q.v.) and high efficiency.

ve′lum (*Bot.*). See **veil.**

velum (*Zool.*). A veil-like structure, as the *velum pendulum* or posterior part of the soft palate in higher Mammals: in some *Ciliophora*, a delicate membrane bordering the oral cavity: in *Porifera*, a membrane constricting the lumen of an incurrent or excurrent canal: in hydrozoan medusae, an annular shelf projecting inwards from the margin of the umbrella: in *Rotifera*, the trochal disc: in some Bees, a membrane attached to the inner side of the cubital spur: in *Mollusca*, the ciliated locomotor organ of the veliger larva: in *Cephalochorda*, the perforated membrane separating the buccal cavity from the pharynx.—*adjs.* **ve′lar, ve′late.**

velum partiale, par-shi-ā′le (*Bot.*). See **partial veil.**

velum universa′le (*Bot.*). See **universal veil.**

velu′tinous (*Bot*). Having a velvety surface.

velvet (*Textiles*) A fabric with a dense short pile of silk; the pile is first formed in loops, which are cut with a trevette. The cheaper velvets are made in a power loom.

velvet (*Zool.*). The tissue layers covering a growing antler, consisting of periosteum, skin, and hair.

velvet pile (*Textiles*). A surface covering of projecting threads upon a foundation structure, formed by an extra warp lifted over wires so that loops are formed. The loops are cut when the wires are withdrawn.

velveteen′ (*Textiles*). A cotton cloth with a weft face, the floats of weft being afterwards cut to produce a pile: an imitation of velvet.

ve′na. The Latin equivalent of *vein.*

vena contracta (*Hyd.*). (Of a jet of fluid discharged by an orifice) the point of minimum cross-sectional area at which the converging streamlines become parallel.

venae cavae (*Zool*). The caval veins; in higher Vertebrates, three large main veins conveying blood from the body to the right auricle of the heart.

venation (*Bot., Zool.*). The arrangement of the veins or nervures: by extension, the veins themselves considered as a whole.

vendavales, —vah′läs (*Meteor.*). South-west winds blowing in the Straits of Gibraltar.

veneer′ (*Timber*). Timber in the form of a thin layer of uniform thickness; it is generally cut from timber of fine appearance, the veneer being glued to a less expensive material and appearing on the surface.

veneered construction (*Build.*). A mode of construction in which a thin external layer of marble slabs, or other facing material, is applied to the steel or reinforced concrete framework.

venesec′tion (*Med.*). Letting of blood from a vein as a remedial measure, e.g. in heart failure: cutting or opening of a vein.

Venestra (*Build.*). Trade-name for a form of plywood.

Venetian arch (*Arch.*). (1) A *Queen Anne arch* (q.v.).—(2) A pointed arch in which the extrados and the intrados are not parallel.

Venetian blind (*Build.*). An inside blind composed of horizontal wooden slats strung on cords and capable of adjustment to admit or exclude light.

Venetian glass (*Glass*). A style of glass having an excessive amount of decoration, usually on a very light and delicate foundation. It was developed by the Venetian glassworkers in Murano.

Venetian mosaic (*Build*). See **terrazzo.**

Venetian shutters (*Build.*). See **jalousies.**

Venetian window (*Join*). A window having two mullions dividing the window space into three compartments, usually a large centre light and two narrow side lights.

venomous (*Zool.*). Provided with poison-secreting glands.

venosclero′sis (*Med.*). Hardening of a vein due to thickening of its walls.

ve′nose (*Bot.*). Having raised anastomosing ridges on the surface, looking like veins.

venous system (*Zool.*). That part of the circulatory system responsible for the conveyance of blood from the organs of the body to the heart.

vent (*Zool.*). The aperture of the anus or cloaca in Vertebrates.

vent gleet (*Vet.*). An infectious disease of fowls, characterised by inflammation of the cloaca and transmitted by coitus.

vent pipe (*San. Eng*). A small escape pipe which carries off foul gases from a sanitary fixture and leads into the vent stack.

vent stack (*San. Eng*). A vertical pipe carried up from the highest point in a system of house drains to a level clear of all windows and opening skylights; it provides an escape for foul gases from drains and sanitary fixtures.

vent, volcanic (*Geol.*). The pipe which connects the crater with the source of magma below; it ultimately becomes choked with agglomerate or volcanic ash, or with consolidated lava.

vent wires (*Moulding*). Wires ranging from $\frac{1}{16}$ to $\frac{1}{4}$ in. diameter, used for making vent holes in the rammed sand of a mould or core.

venter (*Bot.*). The dilated basal part of an archegonium, containing one egg.

venter (*Zool*). A protuberance: a median swelling: the abdomen in Vertebrates: the ventral surface of the abdomen.

ven′tifacts (*Geol.*). A general name for pebbles shaped by wind under (usually) desert conditions. As they may have more than three sides, the original term *dreikanter* (q.v.) is a misnomer.

ventil (*Acous.*). A key for disabling a section of an organ which has become faulty during playing, so that the included stops cannot be drawn. The most usual fault is a *cipher*, which is the persistent emission of a note because of the non-release of some part of the actuating mechanism.

ventilated commutator (*Elec. Eng.*). A commutator whose segments are provided with ventilating ducts for the passage of cooling air.

ventilated motor (*Elec. Eng.*). An electric motor provided with ventilating channels for the circulation of cooling air.

ventilating bead (*Join.*). A *deep bead* (q.v.).

ventilating duct (*Elec. Eng.*). A channel in the iron core of an electrical machine or transformer for the circulation of cooling air or oil.

ventilating fan (*Elec. Eng.*). An electrically driven fan whose function is to force cooling air through the ventilating ducts of an electrical machine.

ventilating plant (*Elec. Eng.*). Electrically driven fans and their attendant apparatus, designed for specific ventilating purposes.

ventilating tissue (*Bot.*). The sum total of the intercellular spaces in a plant, by means of which air circulates in the plant body.

ventilation (*Build.*, *etc.*). The process of replacement of vitiated air by fresh air.

ventilator (*Build.*). A device employed in order to promote and maintain ventilation.

venting (*Moulding*). The process of making holes through the rammed sand of a mould or core in order to allow gases to escape during pouring and so avoid blown castings. See **vent wires, wax vent.**

ventral (*Bot*.). (1) Anterior or in front.—(2) Uppermost (of the upper face of a leaf).—(3) Nearest to the axis.

ventral (*Zool.*). Pertaining to that aspect of a bilaterally symmetrical animal which is normally turned towards the ground.

ventral canal cell (*Bot.*). An unwalled cell, non-functional, which lies in the venter of the archegonium above the egg, of which it is the sister cell.

ventral suture (*Bot.*). The presumed line of junction of the edges of the infolded carpel.

ventral trace (*Bot.*). One of the two laterally placed vascular strands often present in the wall of a carpel.

ventri-. Prefix. See **ventro-.**

ven'tricle, ventric'ulus (*Zool.*). A chamber or cavity, especially the cavities of the Vertebrate brain and the main contractile chamber or chambers of the heart (in Vertebrates or Invertebrates).—*adj.* **ventric'ular.**

ven'tricose (*Bot*, *Zool.*). (1) Swollen in the middle.—(2) Having an inflated bulge to one side.

ventric'ulog'raphy (*Med.*). Radiography of the brain after the cerebrospinal fluid in the lateral ventricles has been replaced by air.

ven'trifixa'tion (*Surg.*). The operation of stitching the uterus to the anterior wall of the abdomen, for the treatment of retroversion of the uterus.

ven'trisuspen'sion (*Surg*). An operation for replacing the retroverted uterus by transplanting the round ligaments of the uterus into the anterior abdominal wall in such a way that they exert a strong pull on the uterus.

ventro-, ventri- (Latin *venter*, belly). A prefix used in the construction of compound terms; e g. *ventrolateral*, situated at the side of the ventral region.

ventrofixation (*Surg.*). See **ventrifixation.**

ventrosuspension (*Surg.*). See **ventrisuspension.**

Ventu'ri flume (*Civ. Eng*). A flume which is constricted at one section with convergent upstream and divergent downstream walls, the difference in water-level at the constriction and at a point in the full channel upstream affording a means of measuring the rate of flow. See **flume.**

Venturi meter (or **tube**) (*Hyd.*). An apparatus for recording rates of flow through closed pipes; it consists of a constriction inserted in the line of piping, together with means for measuring the loss of head over the convergent part of the constriction.

Venus (*Astron.*). The second planet in the solar system in order of distance from the sun, and the brightest of all the planets; its mass is about 0·82 that of the earth, it has no satellite, and its sidereal period is 225 days.

veranda (*Build.*). A covered external *balcony* (q.v.) along the outside of a building.

veranil'lo (*Meteor.*). The short period of fine weather which ends the rainy reason in the tropical countries of America.

veran'o (*Meteor.*). The dry season in the tropical countries of America.

ver'atrine (*Chem.*). (1) Crystalline veratrine is the same as *cevadine* (q.v.).—(2) A commercial term for a mixture of alkaloid bases obtained from the *Veratrum* genus.

verbigera'tion, ver-bij— (*Med.*). The persistent repetition of meaningless words and phrases.

ver'de antico, an-tē'ko (*Dec.*). A green patina formed on old bronze by oxidation; it is imitated artificially by pickling.

Verdet's constant, vār-dā (*Light*). The rotation of the plane of polarisation per cm. per unit magnetic field in the *Faraday effect* (q.v.). The value of the constant varies with temperature and is approximately proportional to the square of the wavelength of the light.

ver'digris (*Chem.*). The green basic copper carbonate formed on copper exposed to moist air.

verdite (*Min*). A green rock, consisting chiefly of green mica (fuchsite) and clayey matter, occurring as large boulders in the North Kaap River, South Africa; used as an ornamental stone.

verge (*Build.*). The edge of the roof covering projecting beyond the gable of a roof.

verge (*Horol*). The axis of a clock pallet, especially that of the verge escapement.

verge board (*Build.*). A *barge board* (q.v.).

verge escapement (*Horol.*). One of the earliest known escapements, now obsolete. The pallets are set at right-angles to the escape wheel (crown wheel) axis, and its action has a recoil.

verge tile (*Build.*). A tile which is purpose-made to a wider size than the normal, to assist in forming the bond at the end of a roof.

verge watch (*Horol.*). A watch with the verge escapement.

Veribest (*Build.*). Trade-name for a water-, acid- and fume-proof bituminous roofing-felt.

vermic'ular (*Bot*). Shaped like a worm.

vermiculation (*Masonry*). A variety of rustication, distinguished by worm-shaped sinkings in the face of the stone.

ver'micule (*Zool.*). A small worm-like structure or organism, as the motile phase of certain *Sporozoa.*

vermic'ulites (*Min.*). A group of hydrous silicates, closely related chemically to the chlorites, and occurring as decomposition products of the micas. When slowly heated they exfoliate and open into long worm-like threads. (Latin *vermiculari*, to breed worms.)

ver'miform (*Zool.*). Worm-like, as the *vermiform appendix*.

ver'mifuge (*Med.*) Having the power to expel worms from the intestines: any drug which has this power.

vermilion (*Chem.*). The red form of mercuric sulphide.

vermilionette (*Paint.*). A crimson paint made from red lead stained with eosine.

vermis (*Zool.*) In lower Vertebrates, the main portion of the cerebellum: in Mammals, the central lobe of the cerebellum.

vernal (*Bot.*). Of, or belonging to, spring.

vernal aspect (*Bot.*). The condition of a plant community in spring, characterised by some species being specially active at that time.

vernal equinox (*Astron.*). See **equinoxes.**

vernalisation (*Bot.*). The treatment of seeds, before they are sown, by wetting at a low temperature. This may hasten the subsequent flowering of the plant by enabling certain developmental stages to be completed before the seeds are sown.

vernation (*Bot.*). The manner in which the leaves are packed in a bud.

Verneuil process, ver-nê'ē (*Min.*). The technique invented by the French chemist Verneuil for the manufacture of synthetic corundum and spinel by fusing pure precipitated alumina, to which has been added a predetermined amount of the appropriate oxide for colouring, in an oxygen-coal-gas furnace.

vernier (*Instruments*). A small movable auxiliary scale, attached to and sliding in contact with a scale of graduation. It enables readings on the latter to be made to a fraction (usually a tenth) of a division.

vernier arm (*Surv.*). The part of an instrument carrying the vernier or verniers.

vernier condenser (*Elec. Eng.*). A variable condenser of small capacitance, connected in parallel with one of larger capacitance, and used for fine adjustment of condenser capacity or tuning.

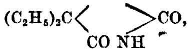
vernier time-signals. See **rhythmic time-signals.**

Vernon-Harcourt pentane lamp (*Illum.*). A lamp burning pentane vapour in an Argand burner; designed to give 10 candle-power under certain specified conditions; used as a standard in photometric work.

Vernon Shale (*Geol.*). A division of the Middle Silurian of the eastern U.S A.; it consists of red shales laid down under continental conditions as loess-like deposits, underlying the Syracuse Salt Series.

veroby'erite (*Min.*). See **morganite.**

ver'onal (*Chem.*). Diethylbarbituric acid,



$$(C_2H_5)_2C{<}\begin{matrix}CO\,NH\\ CO\,NH\end{matrix}{>}CO,$$

prepared by condensing diethylmalonic ester with urea in the presence of sodium ethoxide. It has soporific properties.

Veronese green (*Paint.*). See **viridian green.**

verru'ca (*Bot.*). A granular or wart-like outgrowth on a thallus.—(*Zool.*) A wart-like process; especially one of a number of wart-like processes situated around the base of certain kinds of alcyonarian polyp

verru'ciform (*Bot*, *Zool.*). Resembling a wart.

ver'rucose (*Bot*, *Zool.*). Said of a surface covered with wart-like upgrowths.—*dim.* **verru'culose.**

ver'rucous (*Bot., Zool.*). Studded with wart-like tubercles.

versatile (*Bot.*). (Of an anther) attached to the tip of the filament by a small area on its dorsal side, so that it turns freely in the wind, facilitating the dispersal of the pollen.—(*Zool.*) Capable of free movement, as the toes of birds when they may be turned forwards or backwards.

versed sine (*Civ. Eng.*). See **rise.**

versicol'orous (*Bot., Zool.*). Not all of the same colour: changing in colour with age.

ver'siform (*Bot.*). Said of organs of the same kind which are not all alike in shape, or which change in shape as they age.

version (*Med.*). The act of turning manually the foetus *in utero* in order to facilitate delivery.

verso (*Print., Typog.*). The left-hand page of an open book, bearing an even number.

Verson's cells (*Zool.*). Large cells of disputed function found in the testicular follicles of some male Insects (e.g. *Lepidoptera*).

vertebra (*Zool.*). One of the bony or cartilaginous skeletal elements of mesodermal origin which arise around the notochord and compose the backbone: in *Ophiuroidea*, one of the brachial ossicles.—*pl.* **vertebrae.**—*adjs.* **vertebral, vertebrate.**

vertebra prom'inens (*Zool*). The seventh cervical vertebra in some Mammals in which the neural spine is very large.

vertebrarte'rial canal (*Zool.*). The canal for the vertebral artery between the two heads of the rib and the vertebra in higher Vertebrates.

Vertebra'ta (*Zool.*). See **Craniata.**

vertex (*Build., Civ. Eng.*). See **crown.**

vertex (*Zool.*). In higher Vertebrates, the top of the head, the highest point of the skull: in Insects, the dorsal area of the head behind the epicranial suture.

vertical or **vertical effect** (*Radio*). The obsolete name for the cause of error in radio direction-finding which arises from the loops or spaced aerials acting as a simple vertical aerial. If the parts of the antenna are not exactly balanced to ground (earth), the consequent unbalanced current interacts with the desired current from the aerial, and may vitiate a clean zero signal; in any event, it gives rise to an erroneous bearing. See **antenna effect.**

vertical aerial photograph (*Surv.*). A photograph taken from the air, for purposes of aerial survey work, with the camera pointing directly at the ground so that the optical axis is vertical or nearly so.

vertical boiler (*Eng.*). A steam boiler having a vertical cylindrical shell and domed firebox, from which (generally) a bank of vertical flue tubes leads to the smoke box and chimney.

vertical circle (*Astron.*). A great circle which passes through the observer's zenith and cuts the horizon at right-angles; hence the term is applied to the great circles on which altitudes of heavenly bodies are measured.

vertical circle (*Surv.*). The graduated circular plate used for the measurement of vertical angles by theodolite.

vertical component (*Elec. Eng.*). The vertical component of the force experienced by unit magnetic pole as the result of the action of the earth's magnetic field. Cf. *horizontal component.*

vertical curve (*Surv.*). The curve, generally parabolic, which is introduced between two railway or highway gradients in order to provide a gradual change from one to the other.

vertical-draw-out metal-clad switchgear (*Elec. Eng.*). A form of metal-clad switchgear in which the circuit-breaker can be withdrawn for inspection or repair by being lowered away from the bus-bar chambers.

vertical engine (*Eng.*). Any engine in which the cylinders are arranged vertically above the crankshaft.

vertical escapement (*Horol.*). An escapement in which the axis of the balance is at right-angles to that of the escape wheel. In a verge watch the balance staff is vertical when the watch is in the laying position.

vertical frequency (*Television*). The frequency of the frame scanning voltage in a conventional television system in which the line scanning is horizontal.

vertical panning (*Cinema.*). In motion-picture production the operation of swinging the camera in a vertical plane during shooting.

vertical polarisation (*Radio*). The state of polarisation of an electromagnetic wave when the electric component lies in the vertical plane and the magnetic component in the horizontal plane, as in the wave emitted from a vertical antenna.

vertical recording (*Acous.*). The same as *contour recording.*

vertical scanning (*Television*). Scanning in which the individual lines are vertical, not horizontal (as is usual).

vertical shaft alternator (*Elec. Eng.*). A water-turbine driven alternator designed to operate with its shaft vertically above, and directly coupled to, the turbine shaft.

vertical spindle motor (*Elec. Eng.*). An electric motor specially designed to operate with its spindle in a vertical position.

vertical tiling (*Build.*). *Weather tiling* (q.v.).

ver'ticil (*Bot.*). See **whorl.**

verticillas'ter (*Bot.*). A kind of inflorescence found in dead nettles and related plants. It looks like a dense whorl of flowers, but is really a combination of two crowded dichasial cymes, one on each side of the stem.

ver'ticillate (*Bot.*). Arranged in whorls.

vertiginous, ver-tij'— (*Med.*). Giddy, dizzy: affected with, or pertaining to, vertigo.

ver'tigo, or —ti'go (*Med.*). Dizziness: a condition in which the person has the sensation of turning or falling, or of surrounding objects turning about himself. See also **Ménière's disease.**

Very light. A small flare fired from a pistol; used in a wide range of colours for purposes of illumination or signalling, especially in warfare.

vesi'ca (*Zool.*). The urinary bladder.

ves'icant (*Med.*). Causing blisters: any agent which does this.

ves'icle (*Bot.*). A thin-walled globular swelling, usually at the end of a hypha.—(*Med.*, *Zool.*) A small cavity containing fluid: a small sac-like space containing gas: one of the three primary cavities of the Vertebrate brain: a small bladder-like sac.

vesicle (*Geol.*). See under **vesicular structure.**

vesic'ula (*Zool.*). A vesicle.

vesicula semina'lis (*Zool.*). In many animals, a sac in which spermatozoa are stored during the completion of their development.

vesic'ular (*Bot.*, *Zool.*). Like, or pertaining to, a vesicle: like a bladder.

vesicular structure (*Geol.*). A character exhibited by many extrusive igneous rocks, in which the expansion of gases has given rise to more or less spherical cavities (vesicles). The latter may become filled with such minerals as silica (chalcedony, agate, quartz), zeolites, chlorite, calcite, etc. Dyke rocks also are occasionally vesicular.

vesiculi'tis (*Med.*). Inflammation of the vesiculae seminales.

vesic'ulose (*Bot.*). (1) Swollen like a bladder.—(2) Appearing as if made up of small bladders.

vespoid (*Zool.*). Wasp-like.

vessel (*Bot.*). A long water-conducting tube in the xylem, formed from a vertical row of cells by the more or less complete breakdown of the horizontal walls between the individual cells. When mature, the vessel has no living contents, and has thick lignified walls which are pitted in various ways. Also TRACHEA.

vessel (*Zool.*). A channel or duct with definitive walls, as one of the principal vessels through which the blood flows.

vessel element, —segment, —unit (*Bot.*). One of the cells which, with many others above and below it, forms a vessel.

vestibule (*Build.*). A small antechamber just inside the entrance to a building, or serving as an entrance room to a larger room.

vestibule (*Zool.*). A passage leading from one cavity to another or leading into a cavity from the exterior: in *Protozoa*, a depression in the ectoplasm at the base of which is the mouth: in *Entoprocta*, the space within the ring of tentacles: in a female Mammal, the space between the vulva and the junction of the vagina and the urethra (urinogenital sinus): in Birds, the posterior chamber of the cloaca: in Vertebrates generally, the cavity of the internal ear.—*adjs.* **vestib'ular, vestib'ulate.**

vestibuli'tis, acute (*Med.*). A condition characterised by slight fever, vertigo, vomiting, and ataxia, resulting in complete deafness; due to an inflammation of the labyrinth and cochlea of the inner ear.

vestigial, ves-tij'— (*Zool.*). A small or reduced structure: a functionless structure representing a useful organ of a lower form.—*n.* **vestige.**

ves'titure (*Bot.*, *Zool.*). A covering, e.g. of hairs, feathers, fur, or scales.

vesu'vianite (*Min.*). See **idocrase.**

vet'erinary. Relating to the science which treats of the diseases of domestic animals.

vexil'lar (*Bot.*). Relating to the vexillum.

vexil'lum (*Bot.*). See **standard.**—(*Zool.*) See **vane.**

V.F. (or **v-f**) **telegraphy.** Abbrev. for *voice-frequency telegraphy.*

V.I. (*Elec. Comm.*). Abbrev. for *volume indicator.*

Via Lactea (*Astron.*). The Milky Way (see **Galaxy**).

viable (*Bot.*, *Zool.*). Capable of living and developing normally.

viaduct (*Civ. Eng.*). A structure which carries a road or railway across a wide and deep valley; it consists of a series of small-span bridges in line, supported on intermediate piers.

viam'eter (*Surv.*). A *perambulator* (q.v.).

vibrac'ula, vibracula'ria (*Zool.*). Long, bristle-like structures, found in certain polyzoan colonies, which represent modified zooids.

vi'bratile membrane (*Zool.*) In *Protozoa*, a sheet-like extension of the ectoplasm which performs rippling movements, as in some *Mastigophora* and *Ciliophora.*

vibrating-reed instrument (*Elec. Eng.*). An instrument for measuring frequency, consisting of a row of steel reeds each having a different natural frequency; these are in the field of an electromagnet excited by the current whose frequency it is desired to measure. The reed which is in resonance with the field vibrates strongly and is easily distinguished from the rest.

vibrating-reed rectifier (*Elec. Eng.*). A rectifier in which a vibrating steel reed acts as a commutator, the reed being made to vibrate synchronously with the a.c. supply by means of an electromagnet.

vibration dampers (*Eng.*). Devices fitted to an engine crankshaft in order to suppress or minimise stresses resulting from torsional vibration at critical speeds. See **dynamic damper, frictional damper.**

vibration galvanometer (*Elec. Eng.*). A galvanometer whose movement is undamped, so that, when operating with alternating current, the vibrations of the moving system can be translated on to a screen by a mirror fixed to the movement.

vibrator (*Cinema*). The electromechanical device, consisting of two stretched wires in a magnetic field and carrying a mirror, which deflects a beam of light from the exciter lamp in making the photographic sound-record on the location of the sound-track. Essentially the same as the *Duddell oscillograph unit.*

vibrator (*Elec. Eng.*). A type of phase advancer employing an a.c. armature free to oscillate in a unidirectional magnetic field. Cf. *Kapp vibrator.*

vibrator (*Horol.*). An instrument for checking the time of vibration of a balance and its spring. It consists of a vertical arm to which the free end of the spring is clipped and a master balance and spring in a container with a glass cover in the base. The master balance is vibrated, and the vibrations of the balance to be tested are compared with it.

vibrator roller (*Print.*). A roller which supplies the necessary quantity of ink from the ductor to the ink-table.

vibris'sa (*Zool.*). (1) In Mammals, one of the stiff tactile hairs borne on the sides of the snout and about the eyes.—(2) In *Diptera*, one of the stout cephalic bristles placed close to the sides of the epistoma.—(3) One of the vaneless rictal feathers of certain Birds, e.g. Flycatchers.—*pl.* **vibris'sae.**

vibrotro'pism (*Zool.*). Reaction or response of an animal to the stimulus of vibratory disturbance of its surroundings.

Vicat needle (*Civ. Eng.*). An apparatus which tests the setting-time of a cement specimen by measuring the effect produced by a specially shaped loaded needle which is pressed against the surface of the specimen.

vice, vise (*Carp.*). A *solid newel* (q.v.) **stair.**

vicinal, vis'— (*Chem.*). Substituted on adjacent carbon atoms, e.g. on the 1,2,3,4 atoms in a naphthalene nucleus.

vicinal faces (*Min.*). Facets modifying normal crystal faces, but themselves abnormal, as their indices cannot be expressed in small whole numbers; they usually lie nearly in the plane of the face they modify.

Vickers diamond pyramid hardness test (*Met.*). A method of determining the hardness of metals by indenting them with a diamond pyramid under a specified load and measuring the size of the impression produced.

Vickers-Maxim gun (*Small Arms*). A machine-gun used in the British army.

vidal black (*Chem.*). See **sulphide dyestuffs.**

video frequency (*Television*). A term corresponding to audio frequency in the case of telephonic transmission; namely, any one of the range of modulating frequencies present in a television picture signal. In the case of 400 line 25 frame transmission, the range of frequencies extends from zero to approximately two million cycles per second.

video signal (*Television*). See **picture signal,** also **negative—** **positive—**

vidian nerve (*Zool.*). In Vertebrates, a nerve of the head formed by the union of the deep petrosal nerve and the palatine nerve which runs to the spheno-palatine ganglion.

Vienna white (*Paint*). A paint base composed of pure white lead, imported from Austria in small cubes. Also called CREMNITZ WHITE, KREMNITZ WHITE, KREMS WHITE.

Vierendeel girder, fĕ'ren-dāl (*Struct.*). A girder formed of upper and lower booms connected rigidly by upright members but not braced by diagonal members, the rigidity of the girder being secured by rigidity at the joints.

Vieussens' valve, vū'senz (*Zool.*). In the Vertebrate brain, a transverse fold formed by the isthmus together with the anterior wall of the cerebellum which dips into the fourth ventricle: the anterior medullary velum.

view, angle (*Cinema.*). See **angle shot.**

view, angle of (*Photog.*). The same as *angle of lens.*

view-finder (*Photog.*). An attachment to a camera for ascertaining the field of view about to be registered on the emulsion.

See **brilliant—** **direct-vision—**

viewing room (*Cinema.*). A small projection theatre in a studio, for viewing rushes and completed films during the process of editing.

vignetting, vēn-yet'—(*Photog.*). In making a negative of an object, the fading-off of the background round the principal part of the object, such as a head. Vignetting is usually effected by interposing, either between the object and the lens or between the lens and the sensitive surface, a serrated diaphragm of suitable dimensions.

Vignoles rail, vin-yōlz' (*Rail.*). The flat-bottomed type of rail in general use in America and some other countries.

villi'tis (*Vet.*). Inflammation of the coronet of the horse.

villose, villous (*Bot.*). Covered with loose, long, weak hairs.

villus (*Bot.*). A thin branching outgrowth from the stem of a moss.—(*Zool.*) A hair-like or finger-shaped process, such as the absorptive processes of the Vertebrate intestine: the vascular processes of the Mammalian placenta which fit into the crypts of the uterine wall.—*adjs.* **villous, villiform.**

Vincent's angina (*Med.*). See **fusospirillosis.**

vinc'ulum (*Zool.*). A narrow tendinous band.

vinegar (*Chem.*). The product of the alcoholic and acetic fermentation of fruit juices, e.g. grape juice, cider, etc., or of malt extracts. Vinegar consists of an aqueous solution of acetic acid (3-6%), mineral salts, and traces of esters.

vi'nous (*Bot.*). Of the colour of red wine.

vi'nyl group (*Chem.*). The unsaturated monovalent radical $CH_2{\cdot}CH-$.

vinyl resins (*Plastics*). Thermoplastic resins formed by the co-polymerisation of vinyl chloride, $CH_2\,CHCl$, and vinyl acetate, $CH_3{\cdot}COOCH.CH_2$. They are odourless and tasteless, and resist moisture, dilute acids, and dilute alkalies. The liquid forms are valuable for protective coatings for foods and chemicals.*

vi'olane (*Min.*). A massive deep-blue form of the pyroxene *diopside*, exploited as an ornamental stone at San Marcel, Piedmont, Italy.

vires'cence (*Bot.*). An abnormal green condition, sometimes accompanied by the development of small, crowded leaf-like structures, due to attack by a parasite or other disease.

virgate (*Bot.*). Long, slender, and stiff, and not much branched.

Virgo (*Astron.*). Virgin. Sixth sign of the *Zodiac* (q.v.).

viridian green (*Paint.*). A transparent pigment, hydrated chromium sesquioxide. Also called VERONESE GREEN.

vir'ilism (*Med.*). The development of masculine characteristics, physical and mental, in the female, often due to hyperplasia of, or the presence of a tumour in, the cortex of the adrenal gland.

viro'sis (*Bot.*). A virus disease, as distinct from the virus causing it.

virtual slope (*Hyd.*). The slope showing the rate of loss of head due to resistance at any point in a system of fluid flow.

virtual image (*Phys.*). See **image.**

virtual value (*Elec. Eng.*). An alternative name for *root-mean-square value.*

vir'ulence (*Bot.*). The capacity of a parasite to cause disease.

vi'rus (*Med., etc.*). (1) A poison, such as snake venom.—(2) Any living micro-organism which causes disease.—(3) A term now generally used to denote filterable virus (cf. *filter-passer*), a living organism which passes through filters which retain bacteria, is invisible by ordinary microscopical methods, multiplies locally in the cells of the body, and forms inclusion bodies in the cells.

virus disease (*Bot., etc.*). A disease caused by a virus.

viscach'a (*Furs*). The dressed skin of the viscacha, a burrowing chinchilloid animal of the South American pampas; the fur is a mottled grey.

vis'ceral (*Med.*). Of, pertaining to, situated in, or affecting, a viscus.

visceral arch (*Zool.*). See **gill arch.**

visceral clefts (*Zool.*). The gill-clefts, especially the abortive gill-clefts of higher Vertebrates.

visceral lobe (*Zool.*). The nerve centre in the medulla oblongata of the Vertebrate brain, which is the seat of the sense of taste.

vis'cero- (Latin *viscera*, bowels). A prefix used in the construction of compound terms; e.g. *visceromotor*, bearing motor impulses to the viscera (of nerve fibres).

viscerocra'nium (*Zool.*). The jaws and visceral arches of a Vertebrate skull. Cf. *neurocranium.*

visceropto'sis (*Med.*). See **enteroptosis.**

viscid, vis'id (*Bot.*). Said of a surface which is glutinous, clammy, covered by a sticky secretion.

viscid disseminule (*Bot.*). A spore or seed which has a sticky surface, or bears sticky hairs, and is dispersed by adhering to the coat of an animal.

vis'cin (*Bot.*). The sticky substance present in the fruits of the mistletoe.

viscom'eter (*Phys.*). An instrument for measuring viscosity. Many types of viscometer employ *Poiseuille's formula* (q.v.) for the rate of flow of a viscous fluid through a capillary tube.

vis'cose (*Chem.*). The sodium salt of *cellulose xanthate* (q.v.), used in the manufacture of rayon.

viscose rayon (*Textiles*). *Rayon* (q.v.) in which the cellulose constituent is derived from purified wood pulp, sometimes mixed with cotton linters, the agents being caustic soda and carbon bisulphide.

See **acetate—** **cuprammonium—**

viscosity (*Phys*.). Internal friction due to molecular cohesion in fluids. The *coefficient of viscosity* (η) is the value of the tangential force per unit area which is necessary to maintain unit relative velocity between two parallel planes unit distance apart. Values of η in c g s. units are: water 0·01, glycerine 11, air 0·00018. Viscosity varies inversely with temperature.

viscountess (*Build*.). A slate size, 18 × 10 in.

viscous flow (*Hyd*.). A type of fluid flow in which there is a continuous steady motion of the particles, the motion at a fixed point always remaining constant. Also called STREAMLINE FLOW, LAMINAR FLOW, STEADY FLOW.

viscous hysteresis (*Elec. Eng*.). The phenomenon of time-lag between the intensity of magnetisation and the magnetising force producing it.

viscus (*Med., Zool*.). Any one of the organs situated within the chest and the abdomen: heart, lungs, liver, spleen, intestines, etc.—*pl.* **viscera.**

vise (*Eng., etc*.). A clamping device, usually consisting of two jaws which can be brought together by means of a screw, toggle, or lever, used for holding work that is to be operated on. Generally named after the trade in which it is used. See also **vice.**

visibility (*Meteor*.). Ability to observe distant objects through suspended water-droplets in the atmosphere. By international agreement the official scale of visibility varies from zero (dense fog, objects not distinguishable at 50 metres), through 4 (mist or haze, objects distinguishable between 1 and 2 km.), to 9 (excellent visibility, objects distinguishable at distances greater than 50 km.).

visibility (*Photog*.). The ratio of the luminous flux, in lumens, to the corresponding energy flux, in watts.

visibility curve (*Photog*.). The relation between visibility and wavelength. Owing to varying sensitivity of the eye, this curve indicates a maximum at 5550 A., which is a bright green.

visibility meter (*Meteor*.). A meter which attenuates visibility to a standardised value, and measures such visibility on a scale.

visible horizon (*Surv*.). The circle of contact with the earth of the cone of visual rays passing through the point of observation. Also called SENSIBLE HORIZON or APPARENT HORIZON.

visible radiation (*Illum*.). Radiation limited to the visible spectrum, i.e. to frequencies within the range of light.

visiogen′ic (*Television*). Suitable, artistically, for television transmission.

vision (*Photog*.). See **molecular—** **recurrent—**

vision modulation (*Television*). The modulation of the carrier effected by the picture signal, as distinct from that reserved for the synchronising impulses.

vision, persistence of (*Cinema*.). See **persistence of vision.**

visual fatigue (*Photog*.). Loss in visual sensitivity due to prolonged perception of distorted images, particularly of cinematographic images on a screen.

visual purple (*Zool*.). See **rhodopsin.**

Vita glass (*Build*.). Trade-name for a glass which transmits ultra-violet light and is much used for window-panes.

vital stain (*Bot., Zool*.). A stain which can be used on living cells without killing them.

vi′tamins (*Chem., Med*.). Organic substances required, in relatively small amounts, for the proper functioning of the animal organism. They (or in some cases their immediate precursors) must be present in the food. Lack causes certain deficiency diseases, curable by administration of the appropriate vitamin; partial lack may cause minor disturbances or less well-defined ill-health. The total number is not yet known. Some are known only from the effects of deprivation, but several have been isolated, and most of these have been synthesised. Some vitamins have a valuable therapeutic action when given in relatively large doses. As they were discovered, vitamins were distinguished by letters (A, B, C, etc.), but these temporary designations are being replaced by names as their chemical nature is determined. There are two main groups:—*fat-soluble* (i.e. associated with fats, soluble in fats and the usual fat solvents) which contain only carbon, hydrogen, and oxygen; and *water-soluble* most of which contain nitrogen. Several of the latter group are associated with enzymes concerned in oxidation-reduction processes.

vitamin A. A fat-soluble vitamin. It is an almost colourless viscous oil, volatile in superheated steam or in a very high vacuum, but destroyed by oxidation when heated at ordinary pressure.*

vitamin B_1 (*aneurin, thiamin*). A somewhat heat-labile water-soluble vitamin, complete deprivation of which causes beri-beri, while partial lack results in peripheral neuritis and cardiac abnormalities.*

vitamin B_2 complex. A group of water-soluble vitamins originally distinguished from B_1 by their greater heat-stability. Yeast, liver, milk, eggs, and certain vegetables are good sources.*

vitamin C (*ascorbic acid*). A white crystalline substance, stable when dry but very easily oxidised in solution, especially in neutral or alkaline solution; the oxidation is greatly accelerated by traces of copper.*

vitamin D. The fat-soluble, antirachitic vitamin which probably acts by regulating the absorption of calcium and phosphate from the intestine.*

vitamin E (*tocopherol*). A fat-soluble, antisterility vitamin.*

Vitaphone (*Cinema*.). The Warner system of sound-film, which used slow-speed gramophone discs operating synchronously with the projection of the motion-picture.

vitella′rium (*Zool*.). A yolk-forming gland.

vitellig′enous (*Zool*.). Yolk-secreting or producing.

vitel′lin (*Chem*.). A phosphoprotein present in the yolk of the egg.

vitelline (*Bot., Zool*.). Egg-yellow: pertaining to yolk.

vitelline membrane (*Zool*.). A protective membrane formed around a fertilised ovum to prevent the entry of further sperms.

vitel′lophags (*Zool*.). In some *Arthropoda*, isolated yolk-consuming cells which play a part in the formation of the hypoblast.

vitili′go (*Med*.). See **leucodermia.**

vit′rain (*Coals*). A separable constituent of bright coal, of vitreous appearance; said to impart coking properties to the coal.

vitrel′lae (*Zool*.). The cells which secrete the crystalline cone in an ommatidium.

Vitreosil (*Chem*.). Trade-name for vitreous silica, used for apparatus which is subject to large temperature variations, because of its extremely low coefficient of expansion.

vitreous electricity (*Elec. Eng*.). An obsolete name for positive electricity, since vitreous bodies, such as glass, become positively charged by the action on them of friction. Cf. *resinous electricity*.

vitreous humour (*Zool*.). The jelly-like substance filling the posterior chamber of the Vertebrate eye, between the lens and the retina.

vitriol, blue (*Min.*). See **blue vitriol.**

vitriol, green (*Min.*). See **green vitriol.**

vitriol, oil of (*Chem.*). Sulphuric acid.

vitriol, white (*Min.*). See **white vitriol.**

vitroclas'tic structure (*Geol.*). The characteristic structure of volcanic ashes which have been produced by the disruption of highly vesicular glassy rocks, most of the component fragments thus having concave outlines.

vitta (*Bot.*). (1) A stripe.—(2) A thin, elongated cavity containing oil, present in the pericarps of some fruits.

vittate (*Bot.*). Bearing longitudinal ridges or stripes.

vivip'arous *or* —păr'us (*Bot.*). (1) Producing bulbils or young plants in place of flowers.—(2) Said of a seed which begins to germinate before it is detached from the parent plant.

viviparous (*Zool.*). Giving birth to living young which have already reached an advanced stage of development; cf. *oviparous.*—*n.* **vivipar'ity.**

vivipary (*Bot.*). (1) The production of buds and young plants instead of, and in place of, flowers.—(2) The production of seeds which begin to germinate before they are set free from the parent.

vocal cords (*Zool.*). In air-breathing Vertebrates, folds of the lining membrane of the larynx by the vibration of the edges of which, under the influence of the breath, the voice is produced.

Vodas (*Elec. Comm.*). The contraction for the *voice-operated device for anti-singing* which is incorporated in all radio telephone circuits to ensure stability and absence of oscillation (singing) because of feed-back between the transmitters and receivers or inexactitude of terminating balances. In each direction the voice-currents operate relays, which block the return circuit and open the forward circuit, suitable delay-networks being incorporated so that the speech is not clipped by the operation of the relays.

Voder (*Acous.*). The contraction for *voice operation demonstration equipment*, whereby, by means of valve oscillators and filter circuits, electronically generated sounds can be reproduced through a loudspeaker in imitation of natural sounds (especially speech-sounds). Operated by keyboard.

Vogad (*Elec. Comm.*). The contraction for *voice-operated gain adjustor*, an arrangement of thermionic valves for adjusting automatically the gain of an amplifier under the control of the speech or music currents being amplified. See **A.V.C.**

vo'gesite (*Geol.*). A hornblende-lamprophyre, the other essential constituent being orthoclase. Cf. *spessartite.*

Vogt loudspeaker (*Acous.*). An electrostatically driven loudspeaker operating on the push-pull system, the stretched diaphragm being located between two damping grilles which connect the displaced air with the outer air.

voice-frequency (*Elec. Comm.*). The description of a frequency which lies within the range of frequencies normally considered sufficient for telephonic purposes. Cf. *audio-frequency.*

voice-frequency relay (*Teleg.*). A relay, incorporating a tuned reed, which is selectively operated by voice-frequency current, as in ringing on a long-distance telephone line. In *voice-frequency telegraphy*, the incoming currents are filtered, rectified by a valve, and then operate a normal polarised d.c. relay.

voice-frequency telegraphy (*Teleg.*). A system using interrupted carrier frequencies in the audio-frequency range for the conveyance of *telegraphic* signals over normal *telephone* circuits.

voiced sound (*Acous.*). In speech, an elemental sound in which the component frequencies are exact multiples of a fundamental frequency which is determined by the tension of the oscillating muscles in the larynx.

voicing (*Acous.*). The art of adjusting the volume, pitch, and timbre of organ pipes so that they operate together in an organ.

void waxing (*Cables*). Occurs at random anywhere in the dielectric, irregular in size and shape, and is free from carbon and treeing.

voids (*Civ. Eng.*). The spaces between the separate particles in a mass of granular material, such as an aggregate for concrete.

Voigt loudspeaker (*Acous.*). A moving-coil loudspeaker in which a large open diaphragm terminates the throat of a tractrix horn.

volant (*Zool.*). Flying: pertaining to flight.

volatile alkali (*Chem.*). An old name for *ammonia.*

volatilisation (*Chem.*). See **vaporisation.**

volatility product (*Chem.*). The product of the equilibrium pressures of the gases formed by the dissociation of a solid or a liquid.

volcanic ash (*Geol.*). The typical product of explosive volcanic eruptions, consisting of comminuted rock and lava, the fragments varying widely in size and in composition, and including deposits of the finest dust, lapilli, and bombs. See also **agglomerate, pyroclastic rocks, tuff.**

volcanic muds and sands (*Geol.*). The products of explosive volcanic eruptions (volcanic ash) which have been deposited under water and have consequently been sorted and stratified, thus showing some of the characters of normal sediments, into which they grade.

volcanic neck (*Geol.*). See **neck (volcanic).**

volcanic vent (*Geol.*). See **vent (volcanic).**

volca'no (*Geol.*). A centre of volcanic eruption, having the form typically of a conical hill or mountain, built of ashes and/or lava-flows, penetrated irregularly by dykes and veins of igneous rocks, with a central crater from which a pipe leads downwards to the source of magma beneath. Volcanoes may be active (periodically), dormant, or extinct; the eruptions may involve violent explosions (e.g. Krakatoa) or the relatively quiet outpouring of lava, particularly in those cases where the lava is basaltic (e.g. Hawaii).

Volkmann's canals, folk'man (*Zool.*). Canals carrying blood-vessels which traverse the periosteal lamellae of a bone to join the Haversian canals.

Volkmann's contracture (*Med.*). A contracture of the flexor muscles of the forearm due to the pressure of splints or tight bandages used in the treatment of fracture. It causes obstruction to the veins, so that the muscles swell, become hard, and then undergo fibrosis.

volsel'la forceps (*Surg.*). Forceps whose blades have pronged ends.

volt (*Elec.*). The practical unit of electromotive force, equal to 10^8 absolute units.

volt-ampere (*Elec. Eng.*). The unit of apparent power; equal to the product of voltage and current.

volt-ampere-hour meter (*Elec. Eng.*). An integrating meter for recording the volt-ampere-hours which pass in a circuit. Usually calibrated in kilo-volt-ampere-hours (kVAh).

volt-box (*Elec. Eng.*). An alternative name for a *voltage divider.*

volt-line (*Elec. Eng.*). A unit of magnetic flux equal to 10^8 maxwells.

voltage (*Elec.*). The value of an electromotive force or potential difference, expressed in volts.

voltage amplification factor (*Thermionics*). See **amplification factor.**

voltage amplifier (*Radio*). An amplifier whose function is to increase the voltage of the applied signal, without necessarily increasing its power. The output impedance must therefore be high.

voltage between lines (*Elec. Eng.*). The voltage between any two of the line wires in a single- or three-phase system; between the two lines of the same phase in a two-phase system; between any two lines which are consecutive as regards phase sequence in a symmetrical six-phase system. Also called LINE VOLTAGE, VOLTAGE BETWEEN PHASES, VOLTAGE OF THE SYSTEM.

voltage circuit (*Elec. Eng.*). The circuit of an instrument or relay which is connected across the lines of the circuit under test, and which therefore carries a current proportional to the voltage of this circuit. Also called PRESSURE CIRCUIT, SHUNT CIRCUIT.

voltage coefficient (*Elec. Eng.*). The constant by which the product of the armature speed in revolutions per minute, the flux in volt-lines, and the number of armature conductors in series must be multiplied in order to obtain the e.m.f. of a d.c. generator.

voltage divider (*Elec. Eng*). A high resistance provided with a tapping, which may be either fixed or adjustable, so as to obtain a voltage that is a fraction of the total voltage applied across the resistance. Also called POTENTIAL DIVIDER, VOLT-BOX.

voltage doubling (*Elec. Comm.*). The rise in voltage to double its value when any wave, travelling along a line, arrives at a high impedance or an open circuit and is thereby completely reflected.

voltage drop (*Elec. Eng.*). An alternative name for *potential difference*.

voltage-fed antenna (*Radio*). An antenna which is fed with power from a transmission line at a point of high impedance, where, through resonance, there is a voltage loop in the stationary-wave system.

voltage gradient (*Elec. Eng.*). The difference in potential per unit length of a conductor, or per unit thickness of an insulating medium.

voltage multiplier (*Elec. Eng*). A resistance in series with a voltmeter, enabling it to be used on a range higher than normal.

voltage ratio (*Elec. Eng.*). An alternative name for *transformation ratio*.

voltage regulator (*Elec. Eng.*). An apparatus for varying the output voltage of a generator.

voltage resonance (*Elec. Comm.*). The condition arising when the reactances of a condenser in shunt with an inductance become conjugate, so that when the frequency of an inducing current is varied the shunt voltage passes through a maximum.

voltage to neutral (*Elec. Eng.*). The voltage between any line and neutral of a three- or six-phase system. Also called PHASE VOLTAGE, STAR VOLTAGE, Y-VOLTAGE.

voltage transformer (*Elec. Eng.*). A small transformer of high insulation for connecting a voltmeter to a high-tension a.c. supply.

voltaic cell (*Elec. Eng.*). See **cell.**

voltaic electricity (*Elec. Eng.*). Current electricity, as opposed to static electricity.

voltaic pile (*Elec. Eng.*). A source of d.c. supply. It comprises a battery of primary cells in series, arranged in the form of a pile of discs, successive discs being of dissimilar metals separated by a pad soaked in the chemical agent.

voltam'eter (*Elec. Eng., etc.*). An instrument for measuring a current by means of the amount of metal deposited, or gas liberated, from an electrolyte in a given time due to the passage of the current.

vol'tinism (*Zool.*). Breeding rhythm: brood frequency. See **univoltine, bivoltine.**

voltmeter (*Elec. Eng.*). An instrument for measuring electromotive force directly, calibrated in volts.

voluble (*Bot.*). Twining.

volume (*Acous.*). A general term comprehending the general loudness of sounds, or the magnitudes of currents which give rise to them. Volume is measured by the occasional peak values of the amplitude, when integrated over a short period, corresponding to the time-constant of the ear. See **volume-indicator, VU.**

volume compression and expansion (*Elec. Comm.*). The automatic compression of the volume range in any transmission, but particularly in speech for radio-telephone transmission, so that the envelope of the wave-form is transmitted at a higher average level with respect to interfering noise-levels. After expansion at the receiving end, the resulting transmission is freer from noise. See **compandor.**

volume control (*Elec. Comm.*). The manually operated potentiometer which is used to regulate the transmission-levels in a communication system.

volume governor (*Gas Fittings*). A gas governor which operates so as to supply gas at a constant volumetric rate of flow.

volume indicator (*Elec. Comm*). A voltage-measuring device which, when placed across a communication channel carrying current for later conversion into sounds, gives a relative estimation of the apparent loudness of these reproduced sounds. The standard type of volume indicator used a bridging transformer and an anode-bend rectifying thermionic valve, but indicators having a metal-oxide rectifier are now in use, the indicating meter and associated circuit having in each case a time-constant which results in the indication being an integration over a short period, 0 2 second, of the varying voltage wave-form applied to it. In these volume indicators frequency-weighting networks are not usually used. Abbrev. **V.I.** See **VU.**

volume range (*Acous*). The difference between the maximum amplitude and the minimum useful amplitude of a wave-form in an original sound, e g. of an orchestra, expressed in decibels. In speech, it is generally taken to be 15-20 decibels, and for full orchestra 60-70 decibels.

volume resistivity (*Elec. Eng.*). An alternative name for *specific resistance*.

volumetric analysis (*Chem.*). A form of chemical analysis using standard solutions for the estimation of the particular constituent present in solution.

volumetric efficiency (*Eng*). In an I.C. engine or air compressor, the ratio of the weight of air actually induced per unit time to the weight which would fill the swept volume at N.T.P.

volumetric heat (*Phys., etc.*). See **molal specific heat.**

voluntary (*Zool.*). Under the control of the will.

voluntary contraction (*Zool.*). Reflex contraction of skeletal muscle.

voluntary muscle (*Zool.*). See **striated muscle.**

voluntary waste (*Build.*). Dilapidations resulting from the action of a tenant.

vol'utine granules (*Cyt.*). Granular cytoplasmic inclusions which stain intensely with basic dyes; believed to contribute to the formation of chromatin.

volva (*Bot.*). A sheath of hypha enclosing the whole of the fruit body of some agarics, becoming ruptured as the fruit body enlarges, and sometimes remaining as a cup or pouch round the base of the pileus.

volvate (*Bot.*). Possessing a volva.

Volvoci'na (*Zool.*). An order of *Phytomastigina*, comprising forms with, generally, two flagella; green or colourless; usually with a cellulose cuticle; having no gullet or transverse groove; forming food-reserves of starch; many species form colonies.

vol'vulus (*Med.*). Torsion of an abdominal viscus, especially of a loop of bowel, causing internal obstruction.

vomer (*Zool.*). A paired membrane bone forming part of the cranial floor in the nasal region of the Vertebrate skull; believed not to be homologous in all groups.—*adj.* **vo'merine.**

vom'ero- (Latin *vomer*, ploughshare). A prefix used in the construction of compound terms; e.g. *vomeronasal*, pertaining to the vomers and the nasal cavity.

Von Ebner's glands (*Zool.*). The serous glands of the tongue in Mammals.

Von Economo's disease (*Med.*). The disease called by Von Economo *lethargic encephalitis*, popularly known as *sleepy sickness*. See **epidemic encephalitis.**

Von Gudden's atrophy (*Zool.*). Secondary atrophy caused by disuse of nerve cells in the same physiological path as a damaged cell which has failed to regenerate.

Von Gudden's commissure (*Zool.*). A tract of fibres in the Mammalian brain connecting the posterior corpora quadrigemina.

Von Gudden's tract (or **bundle**) (*Zool.*). A tract of fibres in the Mammalian brain, passing from the corpora mammillaria to the tegmentum of the mid-brain.

Von Reck'linghausen's disease (*Med.*). See **molluscum fibrosum**; also **fibrocystic disease** (2).

vortex street (*Aero.*). A regular arrangement of vortices in parallel rows; e.g. those springing from the wing-tips of an aeroplane and extending down-stream behind it.

vortex, trailing (*Aero.*). The vortex passing from the main surfaces of an aeroplane and extending over the tail and behind it.

Voss machine (*Elec. Eng.*). See **Toepler machine.**

voussoir, voo-swar' (*Civ. Eng.*). See **arch-stone.**

vowel articulation (*Acous.*). See **articulation.**

V.P. (*San. Eng.*). Abbrev. for *vent pipe.*

V.S. (*Chem.*). Abbrev. for *volumetric solution.*

V.T.B. curve (*Cables*). Voltage/time–to–breakdown curve, i.e. a curve connecting the time and voltage for breakdown in this time. See **short-time breakdown voltage** and **asymptotic breakdown voltage.**

VU (*Elec. Comm.*). The number of *volume units* above or below zero power-level (decibels above or below one milliwatt) indicated by the standardised volume-indicator when measuring a fluctuation modulation in a communication circuit, e.g. in telephony or broadcasting.

vug (*Mining*). A cavity in rock or a lode, usually lined with crystals.

Vulcan (*Astron.*). See **intramercurial planet.**

Vulcan coupling (*Eng.*). A hydraulic shaft coupling, of the Föttinger type, used for connecting marine Diesel engines to the propeller shaft in order to avoid torsional vibration troubles. See **Föttinger coupling.**

vulcanisation of rubber (*Chem.*). The treatment of rubber with sulphur or sulphur compounds, resulting in a change in the physical properties of the rubber. Sulphur is absorbed by the rubber, and the process can be carried out either by heating raw rubber with sulphur at a temperature between 135° and 160° C., or by treating rubber sheets in the cold with a solution of S_2Cl_2. To increase the velocity of vulcanisation so-called *accelerators* (q.v.) may be used.

vulcanised fibre. A fibre obtained by treating paper pulp with zinc chloride solution. It consists of amyloid 90%, the remainder being water with some slight trace of insoluble salts. Used for low-voltage insulation. Leatheroid is an example.

vulcanites (*Geol.*). A general name for igneous rocks of fine grain-size, normally occurring as lava flows, and thus in direct contrast with *plutonites* (q.v.).

vul'pinite (*Min.*). A granular, scaly form of the mineral anhydrite, occurring at Vulpino, Lombardy, where it is cut and polished for ornamental purposes.

vul'sinite (*Geol.*). A variety of trachyandesite containing phenocrysts of andesine bordered with sanidine, together with mica, hornblende, and, rarely, olivine, embedded in a groundmass consisting essentially of sanidine microliths.

vultex (*Rubber*). See under **latex.**

vulva (*Zool.*). The external genital opening of a female Mammal.—*adj.* **vulviform.**

vulvi'tis (*Med.*). Inflammation of the vulva.

vulvo- (Latin *vulva*, vulva). A prefix used in the construction of compound terms; e.g. *vulvovaginal*, pertaining to the vulva and the vagina.

vulvovagini'tis (*Med.*). Inflammation of both the vulva and the vagina.

w (*Civ. Eng.*). Symbol for *load per foot run* or for *weight per cubic foot.*

W (*Chem.*). The symbol for *tungsten.*

W (*Civ. Eng.*). Symbol for *total load.*

W (*Elec. Eng.*). Symbol for *electrical energy.*

Wackenroder's solution, vack'— (*Chem.*). A concentrated solution of sulphurous acid into which hydrogen sulphide is passed at 0° C.

wad (*Min.*). Bog manganese, hydrated oxide of manganese. See **asbolane.**

Wadhurst Clay (*Geol.*). A subdivision of the Hastings Beds in the Wealden Series, comprising clays, often shaly, with stone bands, such as the Tilgate Stone, at intervals; deposited under deltaic conditions, and occurring in the Weald, notably near Wadhurst.

Wagner earth, vahg'ner (*Elec. Comm.*). A bridge using an additional pair of ratio-arms. The earth connexion to the bridge is removed to a point on these ratio-arms, with the possibility of effecting a perfect balance, free from error.

wagon retarder (*Eng.*). See **retarder.**

wagon vault (*Build.*). See **barrel vault.**

wagtail (*Join.*). A *parting slip* (q.v.).

wainscot, wainscoting (*Join.*). A wooden lining, usually panelled, applied to interior walls.

wainscot oak (*Join.*). Selected oak, cut radially to display the silver grain; much used for panelling.

wainscoting cap (*Join.*). A moulding surmounting a given piece of wainscoting.

waist. A narrowed-down, constricted part of an object; e.g. the middle of the length of a *slate cramp* (q.v.).

Waldegg valve-gear, val'— (*Eng.*). More commonly known as *Walschaert's valve-gear* (q.v.).

Walden inversion, val'— (*Chem.*). The transformation of certain optically active substances into their stereo-isomeric derivatives by chemical reactions; sometimes a complete cycle is involved, e.g.

$$\begin{tikzcd}
l\text{-chlorosuccinic acid} \arrow[r, "\text{(moist Ag}_2\text{O)}"'] & l\text{-malic acid} \arrow[d, "(\text{PCl}_5)"] \\
d\text{-malic acid} \arrow[u, "(\text{PCl}_5)"'] & d\text{-chlorosuccinic acid} \arrow[l, "\text{(moist Ag}_2\text{O)}"]
\end{tikzcd}$$

wale (*Civ. Eng.*). A horizontal timber used to bind together piles driven in a row.

wale (*Hosiery*). A ridge which is formed vertically in knitted fabrics.

walings (*Civ. Eng.*). Rough planks which run horizontally in front of the poling boards used in timbering trenches. The struts wedging the timbers apart on both sides are placed between the walings.

Walker phase-advancer (*Elec. Eng.*). A type of rotary phase-advancer, comprising a generator with three-phase star-connected armature, commutator, and three field poles, the latter being in series with the armature circuit and the slip rings of the induction motor to be compensated.

walking beam (*Mining*). The rocking beam used for actuating the cable in cable-drilling for oil.

walking line (*Build.*). An imaginary line, always 18 in. from the centre line of the handrail, used in setting out winders for a stair, the width of the winder measured on this line being made approximately the same as the going of the fliers.

wall (*Build.*). A construction, usually of brick or stone, put up to enclose space such as a room, and often supporting loading from floors and a roof above.

wall-board (*Build.*). See **building-board.**

wall box (*Build.*). A cast-iron support built into a wall to carry the end of a timber and allow for its ventilation.

wall hanger (*Build.*). A cast-iron or pressed-steel support partly built into a wall to carry the end of a structural timber, which itself is not to be built into the wall.

wall hook (*Build.*). An L-shaped nail used as a means of attachment to a wall.

wall insulator (*Elec. Eng.*). An insulator specifically designed to enable a conductor at high potential to earth to pass through a brick or concrete wall.

wall-paper (*Build.*). Decorative paper applied as a covering to the plastered wall surfaces of a room.

wall plate (*Build.*). (1) The vertical member in a system of raking shores, held against the wall by hooks driven into the mortar joints, and providing support for the heads of the shores.—(2) The timber or rolled-steel member built into or upon a wall as support for the ends of floor joists or other bearers.

wall plates (*Mining*). (1) The side-pieces of a timber frame in a rectangular shaft.—(2) End-pieces, end-plates.

wall plug (*Elec. Eng.*). A plug-in device for connecting a flexible conductor to a circuit terminal in the form of a wall socket. See **two-pin plug, three-pin plug.**

wall-sided (*Ship Constr.*). A term signifying absence of tumble-home, and indicating that the maximum breadth is maintained to deck-level.

wall socket (*Elec. Eng.*). A circuit terminal in the form of a receptacle into which a plug is inserted in order to make a connexion to the circuit. The device is insulated and mounted on the wall of a room or building.

wall string (*Carp.*). A string, generally a housed string, positioned against a wall and supporting the inner ends of the steps.

wall tie (*Build.*). A galvanised iron piece splayed in two limbs at each end; built into the two parts of a cavity wall, thus serving to bond them together.

Wallace's line (*Zool.*). An imaginary line passing through the Malay Archipelago and dividing the Oriental faunal region from the Australasian region.

Walle'rian degeneration (*Zool.*). Disintegration of the myelin sheath of the distal part of a crushed or severed nerve fibre.

Wallfortis (*Build.*). Trade-name of a waterproofing agent, in liquid form, for application to walls.

walling (*Civ. Eng.*). A general term for masonry walls.

Wal'schaert's valve-gear (*Eng.*). A valve-gear of the radial type used in some steam locomotives. The valve is driven through a 'combination lever' whose oscillation is the resultant of sine and cosine components of the piston motion, derived from connexions with the engine crosshead and with an eccentric or return crank at 90° to the main crank. Sometimes called the WALDEGG VALVE-GEAR.

wander plug (*Elec. Eng.*). A plug contact device for connecting a flexible conductor to one of several alternative sockets forming terminals of different circuits (e.g. tappings on a battery or small transformer).

wandering cells (*Zool.*). Migratory amoeboid cells; leucocytes.

wane (*Timber*). A defect in converted timber; some of the original rounded surface of the tree is left along an edge.

war neurosis (*Psychol.*). A preferable synonym for *shell-shock*. The term was originally used (war of 1914-18) for all types of nervous conditions resulting from war experiences, especially those caused by a bursting shell, which might result in (*a*) a condition of physical shock or concussion to the nervous system, (*b*) the precipitation of a psychoneurosis in a pre-disposed individual, (*c*) a combination of these conditions. In its original sense, shell-shock was given only a physical or neurological meaning.

warble (*Leather*). A small skin tumour of horses and cattle caused by bot-fly (*Hypoderma bovis*) which deposits its eggs in the fetlocks of cattle. The larvae reach the back of the animal and form chrysalises immediately beneath the skin, through which they emerge. Skins so damaged are of less value as leather.

warble tone (*Acous.*). A single-frequency electric current for testing microphones and loudspeakers. The frequency is varied between deliberate limits several times per second, so that the stationary-wave pattern in the testing enclosure is constantly moving and does not give rise to errors in sound measurements.

warbler (*Radio*). A rotating condenser or other device for rapidly varying the carrier frequency of a transmitter using the warbling carrier system.

warbling carrier system (*Radio*). A method of increasing the degree of secrecy obtainable with a radiotelephone system using inversion. It consists of rapid variation of the carrier frequency of the transmitter over a range of a few hundred cycles, so that the inverted speech transmitted through space cannot be readily re-inverted by heterodyning, as is otherwise the case.

Ward-Leonard control (*Elec. Eng.*). A method of speed control for large d.c. motors, employing a variable-voltage generator to supply the motor armature, and driven by a shunt motor.

Ward-Leonard-Ilgner system (*Elec. Eng.*). A modification of the Ward-Leonard system of speed-control, in which a flywheel is included on the motor generator shaft to smooth out peak loads, which would otherwise be taken from the supply.

warm-blooded (*Zool.*). Said of animals which have the bodily temperature constantly maintained at a point usually above the environmental temperature, of which it is independent; idiothermous. Cf. *cold-blooded*.

warm front (*Meteor.*). The leading edge of a mass of advancing warm air as it rises over colder air. There is usually heavy rain in advance of the warm front.

Warminster Beds (*Geol.*). Usually referred to the Upper Greensand, these consist of about 18 ft. of fossiliferous glauconitic sands with chert and cherty sandstone composed largely of sponge spicules, and occur typically just below the Chalk in the Vale of Warminster, Wilts, England.

warning (*Horol.*). In a striking clock, the partial unlocking of the striking train, just before the hour.

warning coloration (*Zool.*). See **aposematic coloration.**

warning piece (*Horol.*). In the striking work, a projection on the lifting piece which projects through a slot in the dial plate, and against which a pin on the warning wheel butts, to hold up the train. Exactly at the hour the warning piece drops clear of the pin and frees the train.

warning pipe (*Plumb.*). An overflow pipe fitted to cisterns, etc. to give warning of a defective valve.

warning wheel (*Horol.*). The last wheel in a striking train, which is held up by the warning piece during warning.

warp (*Timber*). Permanent distortion of a timber from its true form, due to causes such as exposure to heat or moisture.

warp (*Weaving*). The collection of threads spread out on a loom beam, which, when unwound and passed through the reed, run lengthwise in the woven fabric. In lace manufacture the warp comes from the warp beam, and from independent beams. See **balled warp, bobbin, chain warp, shed, shedding.**

warp loom fabric (*Hosiery*). A knitted fabric formed entirely from warp threads, which are made to interloop.

warp machine (*Textiles*). A straight-bar lace frame with bearded needles, in which individual threads pass to individual needles to form the fabric.

warp satin (*Textiles*). A term applied to a satin texture merely to emphasise the fact that it is a true satin (i.e. with a warp face).

warp stop motion (*Weaving*). A device which automatically stops a loom when a warp thread is broken.

warper's brasses (*Textiles*). A series of brass plates in a lace machine, with holes arranged in rows through which the warp threads pass.

warping (*Acous.*). Departure from flatness in a gramophone record, usually caused by excessive temperature during storage; obviated by storing vertically under moderate pressure in rigid racks.

warping (*Timber*). See **warp.**

warping mill (*Textiles*). (1) A cylindrical cage in which threads from jack bobbins are wound to fixed lengths, for use in the lace machine.—(2) A wooden reel of large diameter, vertical or horizontal, upon which threads are wound during the making of a warp.

warping woof (*Textiles*). See **bartrees.**

Warren girder (*Struct.*). A form of girder consisting of horizontal upper and lower members, connected by members inclined alternately in opposite directions.

Warren Hill Series (*Geol.*). A group of volcanic rocks of Pre-Cambrian age occurring in the Malvern Hills, England, and probably to be correlated with the Uriconian of Shropshire, which they closely resemble.

wart (*Bot.*). A small blunt-topped rounded upgrowth.

wart (*Med.*). A tumour of the skin formed by overgrowth of the prickle-cell layer, with or without hyperkeratosis; due to infection with a filter-passer. See also **verruca.**

warted (*Bot.*). Said of a surface bearing small blunt outgrowths: tuberculate.

wash (*Civ. Eng.*). A thin coat of water-colour paint applied to part of a drawing as an indication of the nature of the material to be used for the part represented, particular colours conventionally indicating particular materials.

wash board (*Build.*). A *skirting board* (q.v.).

wash dirt (*Mining*). The material rejected or discarded in the process of washing an alluvial deposit for gold.

wash-in, wash-out (*Aero.*). Increase (*wash-in*) or decrease (*wash-out*) in the angle of incidence, i.e. the angle between the chord of a wing (or aerofoil) and the wind relative to the aeroplane, in approaching the wing-tip along the camber.

wash leather (*Leather*). See **chamois leather.**

wash-out (*Acous.*). The elimination of a record on a magnetic tape or wire by saturating it magnetically with a relatively high direct current in one of the recording coils, thus permitting further records to be made.

wash-out valve (*Civ. Eng.*). A valve inserted in a pipe-line at the bottom of a valley, in order to enable a particular length of the pipe to be emptied as required.

washable leather (*Gloves*). A leather produced by tanning the skins with a mixture of formaldehyde and alkaline salts. The product is white leather, which can be dyed to any shade.

washed clay (*Build.*). See **malm.**

washer (*Build., Eng.*). An annular piece, usually flat, used under a nut to distribute pressure, or between jointing surfaces to make a tight joint.

washing (*Photog.*). The essential process of removing soluble salts from emulsions, particularly hypo after fixing silver images, residual hypo corroding the image after a time.

Wash'ita Series (*Geol.*). The highest of the three subdivisions of the Comanchean of the southern U.S.A. and Mexico. See also **Fredericksburg Series, Kiowa Shales.**

Wassermann's reaction, vahs'er-man (*Med.*). A test of the blood-serum (or of the cerebrospinal fluid) to determine whether the person from whom it is drawn is infected with syphilis. This condition is indicated by the presence of syphilitic antibodies in the serum.

waste (*Civ. Eng.*). See **spoil.**

waste light factor (*Illum.*). A factor used in the design of floodlighting installations to allow for the light which, although emitted along the beam from the projector, does not fall on the area to be illuminated.

waste pipe (*San. Eng.*). A pipe carrying the discharge from a sanitary fitting to a drain.

waste preventer (*San. Eng.*). A type of cistern used for flushing a water-closet; a fixed quantity of water is released for the purpose by pulling a chain or depressing a lever.

waste weir (*Civ. Eng.*). The weir provided in reservoir construction to discharge all surplus water flowing into the reservoir in flood-time, so as to prevent the water-level from rising above the limit allowed for in designing the dam.

waster (*Build.*). A facing-brick having some defect which renders it unsuitable for facing work, although it may be quite suitable for other building purposes.

wasting (*Masonry*). The operation of removing stone from a block by blows with a pick, prior to squaring and dressing.

watch (*Horol.*). A portable timekeeper for wear in the pocket, on the wrist, or on a fob.—POCKET WATCH, a watch for wear in the pocket.—WATERPROOF WATCH, a watch provided with a special case which prevents the entry of moisture.

watch movement (*Horol.*). The *movement* (q.v.) of a watch.

Watchet Beds (*Geol.*). A series of oyster-bearing marls of restricted distribution, named from the type-locality in Somerset, England, where they occur as the highest division of the Rhaetic Series.

water (*Chem., Phys.*). A colourless, odourless, tasteless liquid, m.p. 0° C., b.p. 100° C. It is formed when hydrogen burns in oxygen, and is therefore hydrogen oxide, H_2O, the liquid probably containing associated molecules, H_4O_2, H_6O_3, etc.; on electrolysis it yields two volumes of hydrogen and one of oxygen. It forms a large proportion of the earth's surface, occurs in all living organisms, and combines with many salts as water of crystallisation. At 0° C. the density is 0·9999 gm. per c.c.; and at 100° C., 0·9584 gm. per c.c. Water has its maximum density of 1·0000 gm. per c.c. at a temperature of 4° C. This fact has an important bearing on the freezing of ponds and lakes in winter, since the water at 4° C. sinks to the bottom and ice at 0° C. forms on the surface.

water (*Jewel.*). The transparency or lustre of a precious stone or a pearl.

water balance (*Bot.*). The ratio between the water taken in by a plant and the water lost by it.

water ballast (*Ships*). Water carried by a ship to balance or redress change of draught due to consumption of fuel, provisions, or to discharge of cargo: also, water carried for purposes of stability.

water bar (*Build.*). A galvanised iron bar set in the joint between the wood and stone sills of a window, to prevent penetration of water. Also called WEATHER BAR.

water blast (*Mining*). (1) A sudden escape of confined air due to water pressure, e.g. in rise workings.—(2) A water-actuated ventilating device.

water bloom, water flowers (*Bot.*). Large masses of algae, chiefly *Myxophyceae*, which sometimes develop very suddenly in bodies of fresh water.

waterbound macadam (*Civ. Eng.*). A road surfacing formed of broken stone, well rolled and covered with a thin layer of hoggin, which is watered in and binds the stones together.

waterbrash (*Med.*). A sudden gush into the mouth of a tasteless watery secretion from the salivary glands; often a symptom of duodenal ulcer.

water calyx (*Bot.*). A calyx, in the form of a closed sac, into which hydathodes secrete much water, so that the other parts of the flower continue their development without risk of damage from dryness.

water-carriage system (*San. Eng.*). The system of disposing of waste matter from buildings by water-closets, etc., involving the use of water to carry away the waste matter. Cf. *conservancy system.*

water-cement ratio (*Civ. Eng.*). The relative proportions of water and cement used in a given concrete mix.

water-checked (*Build.*). Said of a casement the stiles and mullions of which have grooves cut in the meeting edges in order to prevent rain from getting through.

water-chrysolite (*Min.*). See **bottle-stone.**

water closet (*San. Eng.*). A closet which is connected to a water-supply system so that the excreta may be carried away by flushing.

water colours (*Paint.*). Pigments soluble in water but often ground up in a gummy medium.

water-cooled engine (*I.C. Engs.*). An engine cooled by the circulation of water through jackets, which are usually cast integral with the cylinder block; all large engines are of this type.

water-cooled motor (*Elec. Eng.*). A motor employing water as a cooling medium, the water circulating through appropriate cooling channels or jackets.

water-cooled resistance (*Elec. Eng.*). A resistance kept cool by immersion in water, which circulates in channels provided for the purpose.

water-cooled transformer (*Elec. Eng.*). A transformer in which the oil is kept cool by means of water circulating in pipes immersed in the oil.

water-cooled valve. A thermionic vacuum tube in which the heat generated by the electronic bombardment of the anode is carried away by water circulating around or through it. In the former case the anode is made an integral part of the envelope.

water culture (*Bot.*). An experimental means of determining the mineral requirements of a plant; the plant is grown with its roots dipping into solutions of known composition.

water development (*Photog.*). The transference of an emulsion from a normal developing bath to a water bath after partial development, so as to reduce final contrast without increasing the maximum density; the development continues in those parts where the density is low, the high densities having used up all the locally absorbed developer.

water equivalent (*Heat*). The product of the specific heat of a body and its mass. It is the mass of water requiring the same quantity of heat to raise its temperature by the same amount as the body. Also known as the THERMAL CAPACITY of the body.

water flowers (*Bot.*). See **water bloom.**

water gas. See **blue water gas, carburetted water gas, semi-water gas.**

water-gauge (*Eng.*). A vertical or inclined protected glass tube connected, at its upper and lower ends respectively, to the steam and water spaces of a boiler, for showing the height of the water-level.

water-gauge (*Mining*). An instrument for measuring the difference in pressure produced by a ventilating fan or air current.

water-glass (*Chem.*). A concentrated and viscous solution of sodium or potassium silicate in water. It is used as an adhesive, as a binder, as a protective coating in waterproofing cement, as a preservative for eggs, and in the bleaching and cleaning of fabrics.

water-inch. A *miner's inch* (q.v.).

water-jet driving (*Civ. Eng.*). A process of pile driving often adopted when the piles have to be sunk into alluvial deposits; a pressure water-jet is used to displace the earth around the point of the pile.

water-level (*Surv.*). A rudimentary instrument for establishing a horizontal line of sight. It consists of a U-shaped tube containing water, the free surfaces of which in each limb lie in the same horizontal line.

water lime (*Build., Civ. Eng.*). *Hydraulic cement* (q.v.).

water lines (*Ship Constr.*). The intersection of the various waterplanes with the ship's form.

water lodge (*Mining*). An underground reservoir.

waterlogged (*Civ. Eng.*). A term applied to ground which is saturated with water.

watermark (*Paper*). Lettering or a design impressed into the paper during manufacture by means of the dandy roll or a projecting wire on the mould. Added as a trade-mark, or to give distinction to a paper.

water of capillarity (*Build.*). The moisture drawn up by capillary action from the soil into the walls of a building.

water of crystallisation (or **hydration**) (*Chem.*). The water present in hydrated compounds. These compounds when crystallised from solution in water retain a definite amount of water; e.g. copper sulphate, $CuSO_4{\cdot}5H_2O$.

water paint (*Paint.*). A trade term for a washable distemper.

water plane (*Ship Constr.*). A horizontal section through a ship's hull. Usually named by measurement from the base line, but sometimes from the load water plane.

water pore (*Bot.*). See **hydathode.**—(*Zool.*) A madreporite.

water-power station (*Elec. Eng.*). An alternative name for *hydro-electric power station.*

waterproof paper (*Paper*). Paper which has been impregnated with pitch or bitumen to make it waterproof; often lined with hessian or other coarse material.

waterproofing. The process of rendering surfaces or materials impervious to water.—(*Textiles*) Waterproofing can be effected (1) by the deposition of metallic salts or insoluble soaps, which process renders fabrics rainproof but does not interfere with the ventilating properties; (2) by impregnation with oils; (3) by coating with rubber or varnish. The latter processes prevent the transmission of air.

water recovery (*Aero.*). The recovery, principally by condensation, of the water in the exhaust gases of an aero engine. Used in airships for ballast purposes, as a partial set-off against the loss of weight due to the consumption of fuel during flight.

water resistance (*Elec. Eng.*). A resistance formed by two electrodes immersed in a weak saline solution.

water rheostat (*Elec. Eng.*). A water resistance in which one of the electrodes is movable into and out of the conducting solution, thus varying the ohmic value of the resistance.

water-rib tile (*Build.*). A purpose-made tile having a projecting rib that serves to prevent entry of rain or snow.

water sapphire (*Min.*). See **saphir d'eau.**

water seal (*San. Eng.*). See **seal.**

watershed (*Civ. Eng.*). The line of separation between adjacent catchment areas.

waterspout (*Meteor.*). A *tornado* (q.v.).

water stain (*Build.*). A stain for wood, consisting of colouring matter dissolved in water.

water stoma (*Bot.*). The opening through which water is discharged from a hydathode.

Waterstones (*Geol.*). The term applied by Prof. Hull to the higher part of the Keuper Sandstone of the English Midlands, consisting of irregularly bedded red and grey sandstones with curious markings on the bedding planes, resembling 'watered' silk. The name does not refer to the water-bearing qualities of the rocks, which are not exceptional.

water-storage tissue (*Bot.*). A group of large and often thin-walled cells inside a plant, in which water is stored and from which it is withdrawn in times of drought.

water-table (*Build.*). See **canting strip.**

water-table (*Geol.*). The surface below which fissures and pores in the strata are saturated with water. It roughly conforms to the configuration of the ground, but is smoother. Where the water-table rises above ground-level a body of standing water exists.

watertight fitting (*Elec. Eng.*). An electric-light fitting designed to exclude water under certain prescribed conditions. Cf. *weatherproof fitting.*

water tower (*Civ. Eng.*). A tower containing tanks in which water is stored, built at or near the summit of an area of high ground in cases where the ordinary water pressure would be inadequate for distribution to consumers in the area.

water-tube boiler (*Eng.*). A boiler consisting of a large number of closely spaced water-tubes connected to one or more drums, which act as water pockets and steam separators, giving rapid water circulation and quick steaming. See **Babcock and Wilcox boiler, forced-circulation boilers, Stirling boiler, Yarrow boiler.**

water turbine (*Eng.*). A prime-mover in which a wheel or runner carrying curved vanes is supplied with water directed by a number of stationary guide vanes; usually direct-coupled to large alternators.

See **Francis—**
Kaplan—
mixed-flow (or American)—
propeller-type—
Pelton wheel.

water twist (*Spinning*). Rather more than the usual amount of twist; a ring yarn has usually $4\sqrt{\text{counts}}$ as the turns per inch, but for water twist $4{\cdot}25\sqrt{\text{counts}}$ are usual.

water-vascular system (*Zool.*). In *Echino-*

dermata, a system of coelomic canals, associated with the tube-feet, in which water circulates: in *Platyhelminthes*, the excretory system.

water vesicle (*Bot.*). A much enlarged epidermal cell which serves for the storage of water.

water wave (*Acous.*). An optical effect on the surface of a gramophone record, caused by periodic alteration of the recording stylus with reference to the surface of the record, which varies the depth of cut.

water wheels (*Eng.*). Large wheels carrying, round the periphery, buckets or shrouded vanes, on which water is caused to act, either by falling under gravity or by virtue of its kinetic energy
See **breast wheel** **Pelton wheel**
overshot do. **undershot** do.

Waterex (*Build.*). Trade-name for a waterproofing agent in liquid form.

Watling Shales (*Geol.*). The basal member of the Eastern Longmyndian Series, of Pre-Cambrian age, occurring in the eastern part of the Longmynd in South Shropshire; they consist of green shales (with occasional purple mudstones), with rare calcareous bands.

watt (*Elec. Eng.*). The unit of electric power; equal to a rate of working of 10^7 ergs, or 1 joule, per second. 1 H P.=746 watts.

watt-hour (*Elec. Eng.*). The unit of electrical energy, being the work done by 1 watt acting for 1 hour, and thus equal to 3600 joules or $3{\cdot}6 \times 10^{10}$ ergs. See **work.**

watt-hour efficiency (*Elec. Eng.*). The ratio of the amount of energy available during the discharge of an accumulator to the amount of energy put in during charge. Cf. *ampere-hour efficiency.*

watt-hour meter (*Elec. Eng.*). See **energy meter.**

wattmeter (*Elec. Eng.*). An instrument containing a series (*current*) and a shunt (*voltage*) coil whose combined torque produces a deflection of the needle that is a direct measure of the circuit power in watts.

wattmeter method (*Elec. Eng.*). A method of testing the electrical quality of iron specimens by measuring the power loss with a.c. magnetisation.

Watt governor (*Eng.*). A simple *pendulum governor* (q.v.) in which a pair of links are pivoted to the vertical spindle and terminate in heavy balls. Shorter links are pivoted to the mid-points of the first, and to the sleeve operating the engine throttle.

wattful current (*Elec. Eng.*). An alternative name for the active component of an alternating current.

wattle and dab (*Build.*). A type of wall construction in which wicker work is interlaced about a rough timber framework and the whole covered with plaster.

wattless component (*Elec. Eng.*). See **reactive component.**

wattless current (*Elec. Eng.*). An alternative name for the reactive component of an alternating current.

Wauco'bian (*Geol.*). A thick series of strata referred to the Lower Cambrian of western N. America (Waucoba Springs, California). Also known as the GEORGIAN SERIES (Georgia, Vermont) in an eastern area extending from Boston to Newfoundland.

Waulsor'tian, vŏl—(*Geol.*). A reef-knoll facies of the Lower Carboniferous of Belgium, resembling that of the Mid-Pennine region of England.

wave (*Elec. Eng.*). The spatial form of an electrical oscillation or disturbance, whether transient or maintained, propagated along a conductor with a maximum velocity equal to that of light.—(*Radio*) A disturbance propagated through a dielectric or free space, having the nature of a travelling magnetic field accompanied by an electric field at right-angles to it. The velocity of propagation in free space is 186,000 miles or 300 million metres per second.

wave (*Phys.*). A row of particles, each executing similar vibrations, and each being slightly out of phase with the preceding one, constitutes a *progressive wave.* A *transverse wave* (e.g. a wave on the surface of water) is one in which the particle vibrations are at right-angles to the row; a *longitudinal wave* (e g. sound-wave) is formed when the vibrations are parallel to the row. See **sine wave, wavelength, stationary waves.**

wave antenna (*Radio*). A form of directional receiving antenna comprising a long wire running horizontally in the direction of arrival of the incoming waves, at a small distance above the ground. The receiver is connected to one end, and the other end is connected to earth through a terminating resistance. Also called BEVERAGE ANTENNA.

waveband (*Radio*). A range of wavelengths which is occupied by transmissions of a particular type; e.g. the *medium waveband* (from 200 to 550 metres) used for broadcasting.

wave detector (*Radio*). A name formerly applied to a detector of the high-frequency currents which a wave produces in an antenna.

wave filter (*Elec. Eng.*). A combination of inductance and capacitance connected in an a.c. circuit in such a manner as to suppress the harmonics in a distorted current wave, thus leaving a sinusoidal current of fundamental frequency. Cf. *resonant shunt, smoothing equipment.*

wave-form, wave-shape (*Elec. Eng.*). The trace of an alternating current or voltage, or of a transient disturbance.—(*Elec. Comm.*) The time variation of a signal in a communication circuit, either for current or voltage. If cyclic and repeated indefinitely, the wave-form is referred to as a *steady-state.* If varying without cyclic repetition, the wave-form is *transient.*

wave-formed mouth (*Vet.*). See **mouth (wave-formed).**

wave-front (*Acous.*). The surface which is the locus of all molecules having motion in identical phases in a propagating sound-wave, the direction of propagation being perpendicular to this.

wave-front (*Elec. Eng.*). The leading portion of an advancing wave; e.g. a voltage surge propagated along a transmission line.

wavelength (*Elec. Eng.*). The distance between two similar and successive points on an alternating wave, e.g. between successive maxima or minima; equal to the velocity of propagation divided by the frequency of the alternations.—(*Radio*) The distance, measured radially from the source, between two successive points in free space at which an electromagnetic wave has the same phase. It is numerically equal, in metres, to 300,000 divided by the frequency in kilocycles. See **wave.**

wavelength constant (*Elec. Comm.*). That part of the propagation constant referring to the retardation in phase of an alternating current in passing along unit length, one mile, of a transmission line. Also called PHASE CONSTANT.

wavelength of light (*Light*). Light consists of electromagnetic waves in a medium known as the ether, which is supposed to fill all space whether 'empty' (a vacuum) or occupied by matter. The wavelength of visible light varies from 3900 to 7600 Ångström units (Å.U.). See **spectrum, Ångström unit.**

wavemeter (*Radio*). An instrument for measuring wavelengths either directly or (as is more usual) indirectly, by means of their frequency.

See **absorption—** **heterodyne—**

wave-shape (*Elec. Eng.*). See **wave-form.**

wave train (*Radio*). See **train of waves.**

wavetrap (*Radio*). A parallel resonant circuit tuned to the frequency of an interfering transmitter, and inserted in series with the antenna circuit of a receiver, to reject such interference.

wave velocity (*Radio*). See **phase velocity.**

wave-winding (*Elec. Eng.*). A type of armature winding in which there are only two parallel circuits through the armature, irrespective of the number of poles.

waved, wavy (*Bot.*). See **undulate.**

wa'vellite (*Min.*). Orthorhombic hydrated phosphate of aluminium, occurring rarely in prismatic crystals, but commonly in flattened globular aggregates, showing a strongly developed internal radiating structure. Named after Dr. Wavell, who discovered the mineral in the Culm cherty shales near Barnstaple.

Waverly Group (*Geol.*). The general name for the Lower Mississippian of Ohio; equivalent to the Osage-Kinderhook Group of the Mississippi valley.

waving groin (*Build.*). A groin which is not straight in plan

wax (*Chem.*). Waxes are amorphous masses, usually consisting of esters of monohydric alcohols of the higher homologues; e.g. *beeswax* is the melissyl ester of palmitic acid, $C_{30}H_{61}O{\cdot}CO{\cdot}C_{15}H_{31}$. See also **cable wax.**

wax pocket (*Zool.*). In Bees, a ventral abdominal pouch which secretes wax.

wax recorder (*Acous.*). The machine on which wax blanks are rotated during the cutting of a sinuous track, which is the registration of the component frequencies in the currents applied to the recording head. See **disc recording.**

wax shaving (*Acous.*). See **shaving.**

wax stew (*Acous.*). Undesired reproduced sounds arising from the original wax blank, from which records have been pressed.

wax test, magenta (*Cables*). See **magenta wax test.**

wax vent (*Moulding*). A pliable wax taper with a cotton core, placed in intricate cores during moulding. This wax melts when the core is dried, leaving a clear hole for the escape of gases.

wax wall (*Mining*). A wall of clay built round the gob or goaf, to prevent the entry of air or egress of gas.

waxed leather (*Leather*). Leather finished with a high wax polish on the flesh side.

waxing (*Cinema.*). The thin layer of wax which is placed on the edges of positive release prints, on the emulsion side, to form lubrication when the film is being projected.

waxing (*Cables*).

See **bush—** **strand space—**
gap— **void—**
strand—

waxy flexibility (*Med.*). See **flexibilitas cerea.**

ways (*Eng., etc.*). (1) The machined surfaces of the top of a lathe bed on which the carriage and tailstock slide; sometimes called SHEARS.—(2) The framework of timbers on which a ship slides when being launched.

weak coupling (*Elec. Eng.*). An inductive coupling in which the mutual inductance between two circuits is small; more generally known as LOOSE COUPLING. Cf. *tight coupling*.

weak electrolyte (*Chem.*). An *electrolyte* (2, q.v.) which is only slightly ionised in moderately concentrated solutions.

weak negative (*Photog.*). A negative which has a density lower than normal.

Wealden Series (*Geol.*). A series some 2300 ft. thick, comprising the Hastings Beds below and the Weald Clay above, deposited under deltaic conditions in S.E. England; approximately equivalent to the marine Neocomian stage of the Cretaceous System.

wear, needle (*Acous.*). See **needle wear.**

wearing depth (*Elec. Eng.*). The permissible amount of radial wear on a commutator, prior to renewing the segments.

weather bar (*Build.*). See **water bar.**

weather-board (*Join.*). A board used with others for covering sheds and similar structures; fixed horizontally.

weather check (*Build.*). A *drip* (q.v.): a groove cut in a surface which is in close contact with another, in order to prevent rain from getting through.

weathercock (*Build.*). A pivoted and often ornamental finial which is turned by the force of the wind and indicates the quarter from which it is blowing.

weathercock instability (*Aero.*). That form of lateral instability which causes an aircraft to develop a combination of side-slipping and yawing, even when kept on an even keel by the pilot. It causes the machine to follow a path successively pointing in directions alternately on either side of its intended direction.

weather fillet (*Build.*). See **cement fillet.**

weather map (*Meteor.*). A map on which are marked synchronous observations of atmospheric pressure, temperature, strength, and direction of the wind, the state of the weather, cloud, and visibility. Weather maps (also known as SYNOPTIC CHARTS) are used as a basis for forecasting.

weather moulding (*Build.*). A *dripstone* (q.v.).

weatherproof fitting (*Illum.*). An electric-light fitting having an enclosure which excludes rain, snow, and external splashings. Also called SPLASHPROOF FITTING.

weather slating (*Build.*). *Slate hanging* (q.v.).

weather strip (*Join.*). See **door strip.**

weather-struck (*Build.*). A term applied to mortar joints finished by the method of *weathered pointing* (q.v.).

weather tiling (*Build.*). Tiles hung vertically to the face of walls, in order to protect them against wet and to help maintain an even temperature within the building. Also called TILE HANGING.

weathered pointing (*Build.*). The method of pointing in which, in order to throw the rain off the horizontal joints, the mortar is sloped inwards, either from the lower edge of the upper brick, or the upper edge of the lower brick, the latter method being preferred by bricklayers. Also called STRUCK-JOINT POINTING.

weathering (*Build.*). The deliberate slope at which an approximately horizontal surface is built or laid so that it may be able to throw off the rain. See **coping.**

weathering (*Geol.*). The processes of disintegration and decomposition effected in minerals and rocks as a consequence of exposure to the atmosphere and to the action of frost, rain, and insolation. These effects are partly mechanical, partly chemical, and for their continuation depend upon the removal, by transportation, of the products of weathering. *Denudation* (q.v.) involves both weathering and transportation.

weathering (*Mining*). The submitting of ore to continued exposure to the atmosphere; most beneficial with some ores, harmful with others and with coal.

weatherom'eter (*Paint.*). An instrument used to determine the weather-resisting properties of paints; cycles of artificial conditions are provided to approximate as closely as possible to natural weathering conditions.

weaver's warp (or **web**) (*Textiles*). See **warp.**

weaving (*Textiles*). The interlacing of two sets of threads to form a fabric. See **loom, reed, shuttle, warp, weft.**

web (*Build.*). One of the panels of a rib-and-panel vault.

web (*Struct.*). The relatively slender vertical part or parts of an I-beam or built-up girder such as a box girder separating the two flanges.

web (*Zool.*). The mesh of silk threads produced by Spiders, some Insects, and other forms; the vexillum of a feather; the membrane connecting the toes in aquatic Vertebrates, such as the Otter.

web machine (*Print.*). A printing machine in which the paper is fed from a continuous roll.

webbed (*Zool.*). Having the toes connected by membrane, as in Frogs, Penguins, Otters.

weber, vā'ber *or* wē'ber (*Elec. Eng.*). The proposed unit of magnetic reluctance, equal to the ratio of gilberts to maxwells.

Weber dynamometer, vā'ber (*Elec. Eng.*). An early form of dynamometer, having a fixed coil within which a small moving-coil is suspended by a bifilar suspension.

Weber-Fechner law of hearing (*Acous.*). This states that a just perceptible increase in the stimulus (intensity of sound) bears a constant ratio to the total stimulus. This law would indicate a logarithmic law for a scale of loudness, but the permissibility of the integration leading to this scale is now discredited. See **phon.**

Weber photometer (*Elec. Eng.*). A transportable photometer in which a direct comparison is made between the brightness of two screens, one illuminated by the unknown light-source and the other by a standard lamp.

Webe'rian apparatus (*Zool.*). In *Ostariophysi*, a complex apparatus of disputed function, but believed to be receptive of vibrations; it consists of a set of ossicles connecting an anterior division of the air-bladder with the perilymph cavities of the internal ear.

Weberian ossicles (*Zool.*). In *Ostariophysi*, a chain of small bones united by a ligament which put the internal ear in direct communication with the air-bladder.

websterite (*Geol.*). A coarse-grained ultramafic igneous rock, consisting essentially of both ortho- and clino-pyroxenes: a diallage-hypersthene-pyroxenite.

wedge bones (*Zool.*). In some Lizards, as Sphenodon and Gecko, small wedge-shaped intercentra formed by the ossification of the ventral portions of the intervertebral discs.

wedge contact (*Elec. Eng.*). A contact consisting of two fingers between which a wedge-shaped contact on the moving element is forced; used for circuit-breakers, etc.

wedge filter or **wedge** (*Photog.*). An adjustable light-attenuating device, made of material of a uniform grey translucence, the varying loss in light being obtained by the varying thickness of path. See **neutral wedge filter.**

wedge photometer (*Elec. Eng.*). A type of photometer in which the illumination of the two sides of a wedge is directly compared.

wedge spectrogram (*Photog.*). A spectrogram taken with a neutral wedge with its varying thickness parallel to the slit of the spectrometer. The resultant photographic image indicates, by the height of the density contours, the differential colour sensitivity of the emulsion.

wedging crib, —curb, —ring (*Mining*). A segmented steel ring on which shaft tubbing is built up and wedged in place.

weed (*Bot.*). A plant growing where it is not wanted by man; a potato growing in a bed of geraniums would be a weed.

weed (*Vet.*). See **lymphangitis (epizootic).**

weephole (*Civ. Eng.*). A pipe laid through an earth retaining wall, with a slope from back to front to allow of the escape of collected water.

weft, woof, pick, shot, shoot (*Textiles*). The threads across the width of a fabric are called the *weft* (formerly *woof*); a single one of these is called a *pick*, or, less frequently, a *shot* (or *shoot*) of weft.

weft fork (*Textiles*). A portion of the loom stop motion which acts when the weft breaks or runs out. It consists of a short lever, forked at one end, hooked at the other, the fulcrum being in the centre.

Wegener's hypothesis, vā'gen-er (*Geol.*). The theory of *continental drift* (q.v.).

wehrlite, vār'līt (*Geol.*). A name, now little used, for ultramafic igneous rocks of coarse grain, consisting essentially of diallage and olivine, i.e. diallage-peridotite.

weight. The gravitational force acting on a body. It may be expressed in absolute units of force (*dynes* or *poundals*) or in gravitational units (*pounds-weight* or *grams-weight*), the latter being numerically equal to the mass of the body in lbs. or gms.

weight (*Aero.*). GROSS WEIGHT, the total or maximum weight of an aircraft as used by the designer for strength and performance calculations. In British practice the maximum authorised weight shown on the Certificate of Airworthiness. Colloquially, ALL-UP WEIGHT.—TARE WEIGHT, the weight of an aircraft complete in flying condition, including water in engine radiators if necessary. Not including fuel, oil, crew, equipment not necessary for flight (such as parachutes), or paying load.

weights. Standardised masses used for comparison with unknown masses, balances of various grades of sensitivity and sensibility being employed. For high-grade analysis, weights are often plated with noble metal to ensure that diminution of mass with time, through corrosion, is minimised. Such weights should not be touched by hand.

weight coefficient (*Elec. Eng.*). The ratio of the weight of an electrical machine to its rated output.

weighting (*Textiles*). The operation of adding sizing material, such as china clay, or weighting material, such as metallic salts, to yarn or cloth in order to increase the weight.

weighting observations (*Surv.*). The operation of assigning factors or 'weights' to each of a number of observations to represent their relative liability to error under their individual conditions of measurement.

Weil's disease, vīl (*Med.*). See **spirochaetosis icterohaemorrhagica.**

Weil loudspeaker (*Acous.*). A loudspeaking receiver with an open diaphragm, tuned to operate over a restricted frequency range, so that a number, tuned to different ranges, are essential for normal use, e.g. in a cinema.

weir (*Civ. Eng.*). A dam placed across a river to raise its level in dry weather.

Weisbach triangle, vīz'bahh (*Surv.*). A method used in setting out works underground, in which the theodolite is deliberately set up off the line of the two hanging wires used to transfer direction from above-ground to below-ground, so that the triangle between the instrument and the wires may be solved to enable the setting-out to proceed.

welded joint (*Elec. Eng.*). A joint between two metals, e.g. tramway rails, made by electric welding.

welding (*Eng.*). (1) The joining of two iron or steel pieces by raising the temperature at the joint so that the metal becomes plastic and may be united by hammering or pressure. The welding temperature may be attained by external heating or by passing a heavy electric current through the butted joint (*resistance welding*).—(2) The joining of two pieces by striking an electric arc between a rod of similar metal and the butted pieces, metal being melted from the electrode into the joint (*arc welding*). See also **oxy-hydrogen welding.**

welding regulator (*Elec. Eng.*). A reactance by means of which the welding current may be varied in an a.c. welding set; it is variable by tappings controlled by a handwheel.

welding-rod (*Elec. Eng.*). Filler metal in the form of a wire or rod; used in electric welding when the electrode itself does not furnish the filler metal. Also called FILLER-ROD.

welding set (*Elec. Eng.*). The apparatus for electric arc welding, either a.c. or d.c., comprising a supply unit and a regulator, which may be combined or separate.

welding tests (*Eng.*). Rough tests to determine the suitability of iron and steel bar for welding, (*a*) by making a *bending test* (q.v.) on a welded joint, (*b*) by welding the bar into a link, which should stand being closed up without failure.

welding transformer (*Elec. Eng*). A transformer specially designed to supply one or more welding regulators.

Weldon's process (*Chem.*). A process for the manufacture of chlorine, using manganese dioxide and hydrochloric acid.

well (*Civ. Eng.*). A shaft sunk in the ground for the purpose of procuring a supply from underground waters, or for allowing surface waters to pass away into sub-surface strata.

See **deep—** **shallow—**

well foundation (*Civ. Eng.*). A type of foundation formed by sinking *monoliths* (q v.) to a firm stratum and filling in the open wells with concrete.

well-hole (*Build.*). The vertical opening enclosed between the outer ends of the flights in a winding stair.

well-conditioned (*Surv*). A term used to describe triangles of such a shape that the distortion resulting from errors made in measurement and in plotting is, or is nearly, a minimum; achieved in practice by making the triangles equilateral or approximately so.

Welsh groin (*Build.*). A groin formed by two intersecting cylindrical vaults of different rises. Also called an UNDERPITCH GROIN.

welt (*Boots and Shoes*). A strip of leather which is attached to the upper, and to the inner sole, by a horizontal stitch; it projects beyond the upper and forms the attachment for the sole.

welt (*Cotton Weaving*). (1) A cord or rib.—(2) A piqué fabric which has a transverse cord as its chief characteristic.

welt (*Plumb.*). A joint made between the edges of two lead sheets on the flat. Made by turning up each edge at right-angles to the flat surface, bringing the two turned-up parts together, doubling them over, and dressing them down flat. Also called a SEAM.

welted shoes (*Boots and Shoes*). Footwear in which the outer sole is stitched to a welt, which has been previously stitched to the upper and the inner sole.

Wendriner apparatus (*Gutta-percha, etc.*). An apparatus for testing the melting-point (softening point) of a sample of gutta-percha by heating it beneath 10 gm. of mercury; when mercury falls through, the temperature is noted.

Wenlock Beds (*Geol.*). One of the major series into which the Silurian System is divided, comprising a considerable thickness of shales, limestones, or grits, lying between the Llandovery Series below and the Ludlow Series above. Named from the Shropshire town of Wenlock, which is situated on the main outcrop.

Wenlock Limestone (*Geol.*). A massive bedded limestone, about 100 ft. thick, occurring in the Welsh Borderlands, and referred to the Silurian System. It is rich in brachiopods and trilobites and (in the so-called 'ball-stones') in corals forming reefs. The Wenlock Limestone extends eastwards to Dudley and westwards to the Church Stretton Valley.

Wenlock Shales (*Geol.*). A thick (1000-2000 ft.) series of marine shales, rich in small brachiopods, occurring in the Welsh Borderlands, in the Silurian System, between the Llandovery Series below and the Wenlock Limestone above; usually forming a belt of low ground, as at the foot of Wenlock Edge.

Werlhof's disease, verl'hōf (*Med.*). See **purpura haemorrhagica.**

wernerite (*Min.*). A *scapolite* (q.v.), of composition intermediate between meionite and marialite.

Werner's theory (*Chem.*). A method of formulation of complex inorganic compounds based on the assumption that saturated groups are held to the central atom by residual valencies. The total number of such groups and ordinary unsaturated radicals which surround the central atom to form an unionisable co-ordination complex is characteristic of the central atom.

Wertheim's operation, vert'him (*Surg.*). The operation of removing the uterus, the glandular tissue in the pelvis, and the upper part of the vagina, in the treatment of cancer of the cervix uteri.

Westbury Beds (*Geol.*). A series of thinly bedded pyritous black shales, containing a fauna of thin-shelled lamellibranchs (including *Pteria contorta*) belonging to the lower part of the Rhaetic Series. Named from Westbury-on-Severn, the type-locality. See also **Contorta Shales.**

westing (*Surv*). A west departure.

Westleton Beds (*Geol.*). A group of sandy shingles lying between the highest proved Pliocene deposits and the lowest proved Pleistocene beds, in Norfolk and Suffolk, with a known extension into North Essex, and inferentially correlated with certain high-level 'pebble gravels' in the London Basin. Named by Prestwich, who regarded them as the basal conglomerate of the Quaternary System.

Weston cell (*Chem.*). A standard cell with an e.m.f. of 1·0183 volt at 20° C. for an almost indefinite period. It consists of an amalgamated cadmium anode covered with crystals of cadmium sulphate, dipping into a saturated solution of the salt, and a mercury cathode covered with solid mercurous sulphate.

Weston film-speed (*Photog.*). A practical film-speed scale derived so that optimum development of the emulsion results in a suitable average density. The degrees of the scale are such that 16 Weston is twice as fast as 8 Weston (half-exposure) and half as fast as 32 Weston (double-exposure). See **f-number, speed, Weston-Scheiner film-speed.**

Weston-Scheiner film-speed, shī'ner (*Photog.*). A film-speed scale derived so that an increase of 3 in the scale means doubling the actual speed (halving exposure), the values for particular emulsions being selected to give, under optimum conditions of development, a suitable average density. See **Weston film-speed.**

Weston Flags (*Geol.*). A subdivision of the Llanvirn Series of Shropshire, some 500 ft. thick, lying above the Stapeley Volcanic Group and below the Betton Shales, with *Didymograptus murchisoni.*

wet and dry bulb hygrometer (*Meteor.*). A pair of similar thermometers mounted side by side, one having its bulb wrapped in a damp wick dipping into water. The rate of evaporation of water from the wick and the consequent cooling of the 'wet bulb' is dependent on the relative humidity of the air; the latter can be obtained by means of a table from readings of the two thermometers.

wet assay (*Met., etc.*). The use of the processes of solution, flotation, or other liquid means for the determination of a given constituent in ores, metallurgical residues and alloys. The general term 'assay' is usually applied only to materials containing precious metals, and certain base metals. See also **dry assay, scorification,** and **cupellation.**

wet collodion process (*Photog.*). A process employing a glass plate coated with iodised collodion, sensitised in silver nitrate solution, physically developed with a solution of ferrous sulphate and acetic acid in water. The whole procedure is carried out while the film is wet. Obsolete in ordinary photography, but largely used in photomechanical processes owing to its adaptability and the greater density obtainable. Ferrotype or tintype formerly used this process for positives on varnished metal.

wet dock (*Civ. Eng.*). A dock in which water is impounded at a suitable level by means of dock gates; entrance is generally effected by means of locks.

wet electrolytic condenser (*Elec. Comm.*). An electrolytic condenser in which the negative electrode is a solution of a salt, e.g. aluminium borate, which is suitable for maintaining the aluminium oxide film without spurious corrosion.

wet end (*Paper*). The part of a paper-making machine where water is extracted (wire, suction boxes, etc.), as distinct from the drying end, where moisture is evaporated by heated cylinders.

wet flashover voltage (*Elec. Eng.*). The voltage at which the air surrounding a clean wet insulator completely breaks down. Also called WET SPARKOVER VOLTAGE.

wet mix (*Build., Civ. Eng.*). A concrete *mix* (q.v.) having an excess of water in it.

wet-plate process (*Photog.*). Another name for the *wet collodion process* (q.v.).

wet raising (*Textiles*). A process of raising which produces a dress-face pile, as on beaver and box-cloth fabrics, the fabrics being kept in a wet state during the operations.

wet rot (*Build.*). A decay of timber which is due to chemical decomposition in the growing tree; it is sometimes set up in wood saturated with water and exposed to alternations of moisture and dryness.

wet sparkover voltage (*Elec. Eng.*). See **wet flashover voltage.**

wet spinning (*Linen*). The method of spinning used for fine counts, the roving being passed through a trough of hot water above the frame. This assists drafting by softening the gum, and aids in the production of a level smooth yarn.

wet steam (*Eng.*). A steam-water mixture, such as results from partial condensation on the cooling of dry saturated steam.

wettability (*Chem.*). The extent to which a solid is wetted by a liquid, measured by the force of adhesion between the solid and the liquid phases.

wetted perimeter (*Hyd.*). In a channel or pipe through which flow is taking place, the part of the perimeter with which the liquid is actually in contact is called the *wetted perimeter.*

wetting agent (*Acous.*). A substance, such as an acid, oil, or hydrocarbon, which is added to a heterogeneous mixture, such as binder and filler in gramophone-record manufacture, to facilitate the absorption or adhesion between the constituents.

wetting-down (*Print.*). The practice of damping paper for printing purposes. Now obsolete.

w.f. (*Typog.*). An abbrev. for *wrong fount.* It is written in the proof margin and the letter is underlined or struck through.

whalebone (*Zool.*). See **baleen.**

whaling glass (*Textiles*). A *counting glass* (q.v.).

wharf (*Civ. Eng.*). A *quay* (q.v.).

Wharfedale machine (*Typog.*). A printing machine of the cylindrical type.

Wharton's duct (*Zool.*). In Mammals, the duct of the submaxillary salivary gland.

Wharton's jelly (*Zool.*). In Mammals, jelly-like embryonic connective tissue occurring in the umbilical cord.

wheal (*Mining*). A Cornish name for a mine.

Wheatstone automatic (*Teleg.*). A telegraph system in which high-speed signals are transmitted from a slip, and received automatically on a slip, by mechanical means.

Wheatstone bridge (*Elec. Eng.*). An apparatus for measuring electrical resistance by the zero method, comprising two parallel resistance branches, each branch consisting of two resistances in series.

Wheatstone transmitter (*Teleg.*). A high-speed morse transmitter which is operated by a slip on which are perforated holes which represent the dots and dashes of the coding of the desired message. These holes are scanned by peckers, which, if permitted to pass through the slip, operate contacts to form the transmitted signal.

wheel base (*Eng.*). The distance between the leading and trailing axles of a vehicle.

wheel-cutting engine (*Horol.*). A machine for cutting the teeth of wheels.

wheel ore (*Min.*). An orthorhombic sulphide of lead, copper, and antimony, occurring commonly in wheel-shaped twins; the name *bournonite* is now more commonly used.

wheel organ (*Zool.*). In *Rotifera*, the ciliated disc: in *Cephalochorda*, a wheel-shaped ciliated organ, on the under surface of the oral hood, which creates a current of water flowing towards the mouth.

wheel-quartering machine (*Eng.*). A horizontal drilling machine having two opposed spindles at opposite ends of the bed; used to drill the crank-pin holes in both wheels on a locomotive coupled-axle simultaneously, and in precise angular relationship.

wheel stretcher (*Horol.*). A tool used for slightly increasing the diameter of a wheel. The wheel rim is passed between rollers under pressure, which slightly reduce the thickness but increase the width of the rim.

wheel window (*Build.*). A *rose window* (q.v.).

wheel wobble (*Automobiles*). A periodic angular oscillation of the front wheels, resulting generally from insufficient caster action or from backlash in the steering-gear.

wheeling step (*Build.*). A *winder* (q.v.).

whim (*Mining*). A vertical rope drum revolved by a horse; used for hoisting from shallow shafts.

whin or **whinstone** (*Geol.*). A popular term applied to doleritic intrusive igneous rock resembling that of the well-known Whin Sill.

Whin Sill (*Geol.*). A sheet of intrusive quartz-dolerite or quartz-basalt, unique in the British Isles, as it is exposed almost continuously for nearly 200 miles from the Farne Islands to Middleton-in-Teesdale.

whine (*Acous.*). The fluctuation in apparent loudness and pitch of a reproduced sound when the speed of the recording or reproducing machine is varying at a slow rate. See **wow.**

whip (*Mining*). A simple hoisting device consisting of a rope, to which an animal is directly attached, passing over a fixed pulley.

whipcords (*Textiles*). Fabrics with a bold steep warp twill, used chiefly for dresses, suitings, and coatings, particularly the last.

whipstitching or **whipping** (*Bind.*). See **overcasting.**

Whipple-Murphy truss (*Eng.*). A bridge truss having horizontal upper and lower chords connected by vertical and diagonal members, so that the panels resemble the letter N. Also called LINVILLE TRUSS, N-TRUSS, PRATT TRUSS.

whirling arm (*Aero.*). An apparatus for making certain experiments in aerodynamics, the model or instrument being carried round the circumference of a circle, at the end of an arm rotating in a horizontal plane.

whirlwind (*Meteor.*). A small rotating wind-storm which may extend upwards to a height of many hundred feet; a miniature cyclone.

whiskers (*Acous.*). A wow of high frequency; e.g. above about 200 fluctuations per second.

whistle box (*Cinema.*). A portable inductance, with or without a shunting condenser, for filtering the supply ripple in the electrical supply to arc lamps, which would otherwise emit noise.

white arsenic (*Chem.*). Commercially called ARSENIC. As_2O_3. Arsenic trioxide; the most important compound of arsenic. Obtained from the roasting of arsenical ores.

white bricks (*Build.*). *Gaults* (q.v.).

white cell (*Zool.*). See **leucocyte.**

White Cliff Sandstone (*Geol.*). A 2000-ft.-thick sandstone named from its outcrop in the Grand Cañon; a dune sand originally, of desert origin and of Jurassic age. Equivalent to the La Plata Sandstone of S.W. Colorado.

white coat (*Plast.*). The last or finishing coat of plaster.

white comb (*Vet.*). See **favus (avian).**

white copperas (*Min.*). Goslarite.

white damp (*Mining*). Carbon monoxide. Produced by the incomplete combustion of coal in a mine fire or by gas or dust explosions. Invisible; very poisonous.

white deal (*Timber*). A whitish soft wood obtained from the spruce fir, and commonly used for inferior constructional work. Also called WHITE WOOD.

White Dwarf (*Astron.*). The name given to any of a small class of stars outside the normal spectral sequence, because their luminosities are extremely low for their spectral type; their densities are so high that they are thought to be composed of highly ionised atoms.

white fibres (*Zool.*). Unbranched, inelastic fibres of connective tissue occurring in wavy bundles. Cf. *yellow fibres.*

white fibrocartilage (*Zool.*). A form of fibrocartilage in which white fibres predominate.

white glass (*Glass*). See **opal glass.**

white gold (*Met.*). *Gold* (q.v.) alloyed with nickel or palladium to give it a white colour.

white-heart malleable cast-iron (*Met.*). See **malleable cast-iron.**

white iron (*Met.*). Pig-iron or cast-iron in which all the carbon is present in the form of cementite (Fe_3C). White iron has a white crystalline fracture, and is hard and brittle.

white iron pyrite (*Min.*). See **marcasite.**

white lead (*Chem.*). Basic lead carbonate or lead hydroxycarbonate. Made by several processes of which the oldest and best known is the 'Dutch' or 'Stack' process. Used extensively as a paint pigment and for pottery glazes.

white lead ore (*Min.*). A decomposition product of *sphalerite* (q.v.). See **white vitriol.**

White-leaved Oak Shales (*Geol.*). Black shales, rich in trilobite remains, occurring in the district immediately west of the Malvern Hills; equivalent to the Dolgelley Beds of Cambrian age in North Wales.

white-leg (*Med.*). See **phlegmasia alba dolens.**

White Lias (*Geol.*). So named to distinguish it from the (true) Blue Lias above, this is a subdivision of the Rhaetic Series, consisting essentially of massive bedded light-coloured limestones, separated by partings of marl. The White Lias includes the 'Sun Bed.'

white light (*Phys.*). Light containing all wavelengths in the visible range at the same intensity. The term is used, however, to cover a wide range of intensity distribution in the spectrum. See **Wien's displacement law.**

white line (*Typog.*). A line of space.

white matter (*Zool.*). An area of the central nervous system, mainly composed of cell processes, and therefore light in colour.

white metal (*Met.*). (1) Intermediate product in converting copper matte to blister copper. Reached after the iron and some of the sulphur have been oxidised out, leaving copper-sulphide.—(2) Usually denotes tin-base alloy (over 50% tin) containing varying amounts of lead, copper, and antimony; used for bearings, domestic articles, and small castings; sometimes also applied to alloys in which lead is the principal metal; also called ANTI-FRICTION METAL.

white muscles (*Zool.*). In Vertebrates, muscles which do not perform long-continued actions and which are therefore poor in sarcoplasm and haemoglobin and of a light colour.

white nickel (*Min.*). A popular name for the cubic diarsenide of nickel, $NiAs_2$, the scientific name for which is *chloanthite* (q.v.).

white object (*Photog.*). An object which reflects all wavelengths of light impartially, and therefore, when illuminated with white light, appears to the eye to be hueless.

white-out (*Typog.*). To open out composed type-matter with spaces, in order to fill the allotted area or improve the appearance.

white rami (*Zool.*). In Vertebrates, the rami communicantes connecting the spinal cord with the sympathetic system.

white sapphire (*Min.*). More reasonably called WHITE CORUNDUM, is the colourless, pure variety of crystallised corundum, Al_2O_3, free from those small amounts of impurities which give colour to the varieties 'ruby' and 'sapphire'; when cut and polished, it makes an attractive gemstone. Also called LEUCOSAPPHIRE.

white scour (*Vet.*). Diarrhoea of suckling animals. See also **pyosepticaemia of sucklings.**

white spirit (*Paint.*). A petroleum distillate used as a substitute for turpentine in mixing paints, and in paint and varnish manufacture.

white vitriol (*Min.*). A popular name for *goslarite.* $ZnSO_4{\cdot}7H_2O$.

whitewash, whitening (*Paint.*). *Limewash* (q.v.).

white wood (*Timber*). See **white deal.**

whites (*Vet.*). Leucorrhoea of cows.

whiting. A pulverised chalk used in the manufacture of putty, whitewash, and distemper.

whitlow (*Med.*). See **paronychia.**

whitlow of the claw (*Vet.*). See **panaris.**

Whittery Shales (*Geol.*). A subdivision of the Caradocian Series of the Shelve area of Shropshire, comprising some 1000 ft. of marine shales, immediately succeeding the Whittery Ash.

Whitworth screw-thread (*Eng.*). See **British Standard Whitworth thread.**

whizzer (*Eng.*). A machine consisting of a perforated cylinder inside which loose material to be dried is flung outwards by revolving paddles, thus removing the water by centrifugal force. Also called HYDRO-EXTRACTOR.

whole bound (*Bind.*). See **full bound.**

whole-brick wall (*Build.*). A wall which is 9 in. thick, i.e. the length of a whole brick.

whole-circle bearing (*Surv.*). The horizontal angle measured from 0° to 360° clockwise, from true north to a given survey line.

whole-coiled winding (*Elec. Eng.*). An armature winding for an alternator having one armature coil per pole, the two sides of the coil being separated by a distance equal to the pole pitch.

whole timber (*Carp.*). A roughly squared timber of size greater than 6 × 6 in.

whooping cough (*Med.*). See **pertussis.**

whorl, whėrl (*Bot.*). A group of similar members arising from the same level on a stem, and forming a circular group around it.

whorl (*Zool.*). A single turn of a spirally coiled shell or other spiral structure.

whorled (*Bot.*). Arranged in a whorl.

W.I. (*Build., etc.*). Abbrev. for *wrought-iron.*

Wick Flagstone Group (*Geol.*). A subdivision of the Middle Old Red Sandstone (Caithness Flagstone Series) of northern Scotland, comprising some 5000 ft. of rapidly alternating black flags, dark limestones, pale sandstones, and greenish mudstones, containing fish remains. This Group lies between the Barren Group below and the Passage Beds into the Thurso Flag Group above.

wicket (*Build.*). A small door framed in a larger door.

Widal's test, vē′dal (*Med.*). A test for the presence of typhoid fever, blood-serum from a patient with this infection agglutinating (clumping) a suspension of typhoid bacilli (in a tube) towards the end of the first week of the disease.

wide-angle lens (*Photog.*). A lens, of necessarily short focal-length, with a wide angle of view (up to 100°); used for photographing buildings, etc.

wide-band amplifier (*Elec. Comm.*). A thermionic amplifier for wide ranges of frequencies, particularly when several channels occupying different fractions of the band are amplified together.

wide film (*Cinema.*). Film which is greater in width than the standard 35 mm. film; proposed for projecting a wider motion-picture without increase of granularity.

wide gauge (*Rail.*). See **broad gauge.**

Widmanstätten structure, vēd-man-stet′en (*Met.*). A general term for structures resulting from changes in solid alloys when one constituent forming from another crystallises along the crystallographic planes of the parent constituent.

Wien bridge, vēn (*Elec. Eng.*). An a.c. bridge for measuring dielectric losses. The capacitance to be tested and a standard condenser form two of the arms, and variable resistances form the other two.

Wien effect (*Chem.*). The increase in the conductivity of an electrolyte observed with very high voltage gradients.

Wien's displacement law (*Phys.*). The wavelength of the maximum radiation from a hot source is inversely proportional to the absolute temperature, being at about 4800 A.U. for 6000° A. If a curve is drawn to show the energy distribution in the spectrum of the radiation emitted by a black body at a given temperature, the same curve will give the distribution at any other temperature if the wavelength scale is changed in the inverse ratio of the temperatures. See **Stefan-Boltzmann law.**

wigans (*Cotton Weaving*). Plain grey cloths of medium or heavy type, used for boot linings, casement cloths, etc.

wig-wag (*Horol.*). A machine which gives an oscillatory motion to a polisher; used for polishing pivots, etc.

Wild-Barfield furnace (*Elec. Eng.*). A resistance furnace comprising wire-wound resistance elements; widely used for heat treatment processes.

wild track (*Cinema.*). A sound-track which is recorded independently of any photographic track or mute, but is destined to be used in editing a sound-film.

wild wall (*Cinema.*). A detachable or floating wall, suitable for inclusion in the camera angle; it is covered with sound-absorbing material.

Wilfley table (*Mining*). A reciprocating, transversely inclined, riffled table, for washing or concentrating crushed ore or sand.

wil′lemite (*Min.*). Orthosilicate of zinc, Zn_2SiO_4, occurring massive, granular, or in trigonal prismatic crystals, white when pure but commonly red, brown, or green through manganese or iron in small quantities. In New Jersey (Franklin Furnace) and elsewhere it occurs in sufficient quantity to be mined as an ore of lead. Noteworthy as exhibiting an intense bright-yellow fluorescence in ultra-violet light.

Willesden paper (*Build.*). A specially treated paper used as an underlining beneath slates on a roof; it serves to keep out the wet, and acts as a sound and heat insulator.

willey or **willow** (*Woollen*). A machine for shaking and opening wool. It has a large cylinder with outstanding pegs, similar pegs being also placed on the inside of the casing which encloses the cylinder.

Williot diagram (*Struct.*). A graphical construction for finding the deflection of a given point in a structural framework under load.

Willis's circle (*Zool.*). In Vertebrates, an arterial ring surrounding the hypophysis.

Willis's law (*Zool.*). See **age and area theory.**

willow (*Paper*). See **willowing machine.**—(*Textiles*) See **willey.**

willow leaves (*Astron.*). A term used by Nasmyth to denote certain markings on the sun's surface thought to resemble leaves of the willow tree; they are also known as GRANULES.

willowing machine (*Paper*). A revolving cylinder with fixed and free spikes which separates loose dirt from rags or other material.

willy-willy (*Meteor.*). A tropical revolving storm in Australia; a cyclone.

Wilson's disease (*Med.*). See **hepatolenticular degeneration.**

wilting (*Bot.*). The loss of rigidity in leaves and young stems following on marked loss of water from the plant; growth stops in wilted material.

wilting coefficient (*Bot.*). The percentage of moisture present in a soil when plants growing on that soil begin to wilt.

Wimshurst machine (*Elec. Eng.*). An electrical friction machine by which static electricity can be stored at relatively high potentials. It comprises two co-axial insulating discs revolving in opposite directions. Each disc carries metallic sectors which make contact with fixed collecting brushes.

winceyette (*Textiles*). A plain cotton cloth of light weight, raised slightly on both sides; used for pyjamas, nightgowns, or underwear.

winch (*Eng.*). A hand-power hoisting machine attached to a crane. It consists of a rope drum driven through reduction gearing by a crank handle: a similar mechanism driven by power.

wind (*Timber*). *Twist* (q.v.).

wind (*Meteor.*). Air in motion naturally; a current of air from a particular direction is generally named after that direction, e.g. *south* wind. Winds are due to the tendency of air to pass from a place of high pressure to one of lower pressure. *Trade winds* are constant and blow towards the thermal equator, being diverted westward by the eastward rotation of the earth. See **cyclone, monsoon, typhoon, whirlwind**; also **Beaufort scale.**

wind (*Elec. Eng.*). A stream of air arising at any sharply pointed electrical conductor charged to a high potential.

wind chest (*Acous.*). The box, containing air under pressure, upon which the ranks of pipes in an organ are mounted.

wind cone (*Aero.*). A sleeve floating from the top of a mast; its weight and drag are so proportioned that its angle with the ground gives a rough conception of the velocity of the wind, while its angle in a horizontal plane gives the wind direction.

wind dispersal (*Bot.*). The dispersal of spores, seeds, and fruits by the wind

wind-driven generator (*Elec. Eng.*). A generator driven by a prime-mover of the windmill type, or directly (in the case of aircraft) by an airscrew carried on the generator shaft.

windfilling (*Build.*). Another name for *beam-filling*, as it prevents wind from getting into the roof space.

wind gag (*Acous.*). A bag of thin cloth or silk placed over a microphone when the latter is used out of doors, to eliminate hissing noises due to wind.

windgall (*Vet.*). Distension of the cavity of the fetlock joint of the horse.

wind load (*Struct.*). The force acting on a structure due to the pressure of the wind upon it.

windmill. A familiar device for obtaining power from wind pressure. It consists usually of a number of oblique arms or vanes radiating from a central axis. Seldom used now, and then almost solely for water-pumping purposes.—(*Aero.*) Any device which is caused to rotate by reason of its being carried through the air, and so develops power. Often used to drive auxiliary machinery such as fuel pumps, wireless generators, etc. An engine propeller is said to *windmill* when it rotates by reason of the forward movement of an aeroplane after the engine power is stopped.

wind pollination (*Bot.*). The conveyance of pollen from anthers to stigmas by means of the wind; anemophily.

wind portal (*Civ. Eng.*). A portal which has special bracings to resist wind pressure.

wind pump (*Civ. Eng.*). A pump which is operated by the force of the wind rotating a multi-bladed propeller.

wind road (or **way**) (*Mining*). An underground passage used for ventilation.

wind rose (*Aero.*). A diagram indicating the frequency and strengths of winds in a definite locality for given periods of the year; used by pilots.

windsucking (*Vet.*). A vice acquired by certain horses of swallowing air when 'cribbing' or gripping an object with the incisor teeth.

wind T (*Aero.*). A T-shaped device displayed at aerodromes to indicate the direction of the surface wind. The leg of the T corresponds to the wind direction.

wind trunk (*Acous.*). The metal or wooden piping which distributes the air under pressure to the various wind chests in an organ.

wind tunnel (*Aero.*). An experimental apparatus for producing a uniform steady air-stream past a model for aerodynamic investigation work. Atmospheric pressure and compressed-air models. Types:—*Original N.P.L. type*, closed jet return flow; *Standard N.P.L. type*, closed jet non-return flow; *Göttingen type*, open jet return flow; *Eiffel type*, open jet non-return flow.

winder (*Build.*). A step, generally triangular in plan, used at a change in direction of the stair. See **kite winder.**

winder (*Mining*). An electrically driven winding engine for hoisting a cage or cages up a vertical mine-shaft.

winder (*Horol.*). A clock key: a key used for winding a key-wound watch.

winding (*Bot.*). A movement of a stem due to unequal rates of growth in successive longitudinal strips of the stem, causing the tip to describe a circle in space; if pronounced, the stem will twine around a support.

winding (*Elec. Eng.*). The system of insulated conductors forming the current-carrying element of a dynamo-electric machine or static transformer.

winding (*Textiles*). The coiling of a thread on a spindle or bobbin, in order to form a yarn package convenient to handle.

winding coefficient (*Elec. Eng.*). An alternative name for *winding factor.*

winding diagram (*Elec. Eng.*). A diagram showing in schematic form the arrangement and sequence of an armature winding and its circuit connexions.

winding drum (*Eng.*). An engine or motor-driven drum on to which a haulage rope is wound, as the wire rope of a mine cage. The drum may be cylindrical or conical, with a plain or a helically grooved surface for the rope.

winding engine (*Mining*). The engine which hoists a load up a shaft.

winding factor or **coefficient** (*Elec. Eng.*). A factor which takes account of the difference between the vector and arithmetic sums of the e.m.f.'s induced in a series of armature coils occupying successive positions round the periphery of the armature.

winding gear (*Elec. Eng.*). The mechanical gear associated with an electric winder.

winding pitch (*Elec. Eng.*). The distance, measured as the number of slots, separating an armature coil from its successor in the winding sequence.

winding plant (*Elec. Eng.*). The complex of apparatus constituting an electrically driven winder.

winding space (*Elec. Eng.*). The cross-sectional space available in an armature slot for the insertion of the insulated conductors.

winding square (*Horol.*). The square end of a barrel or fusee arbor on which the key fits for winding.

winding stair (*Build.*). A stair constructed around a solid or hollow newel.

winding strips (*Furn.*). Two pieces of wood with parallel edges, used for testing the parallelism of timber.

window (*Build.*). An opening in a wall to provide access for light or ventilation; sometimes used for purely ornamental purposes.

window (*Elec. Eng.*). The winding space of a transformer, i.e. the cross-sectional spaces between the limbs and yokes of a multi-core transformer.

window (*Geol.*). A closed outcrop of strata lying beneath a thrust plane and exposed by denudation. The strata above the thrust plane surround the 'window' on all sides.

window efficiency ratio (*Illum.*). See **daylight factor.**

window glass (*Glass*). *Sheet glass* (q.v.), usually of a definite quality, the poorer qualities of sheet being used for greenhouse glazing.

window lock (*Join.*). A *sash-fastener* (q.v.).

wing (*Bot.*). (1) One of the lateral petals of a flower of a pea and related plants.—(2) A flattened outgrowth from a fruit or a seed, increasing the area without greatly increasing the weight, and serving in wind dispersal.—(3) The downwardly continued base of a decurrent leaf.

wing (*Build.*). A section of a building projecting from the principal part of it.

wing (*Zool.*). Any broad flat expansion: an organ used for flight, as the fore limb in Birds and Bats, the membranous expansions of the mesothorax and metathorax in Insects.

wings (*Cinema., Theatres*). The sides of the stage remote from, and unseen by, the audience.

wing car (*Aero.*). See **car.**

wing compasses (*Carp.*). A form of *quadrant dividers* (q.v.).

wing coverts (*Zool.*). See **tectrices.**

wing loading (*Aero.*). The maximum flying weight of an aeroplane divided by the total area of the main planes, including the ailerons.

wing nut (*Eng.*). A nut with wings like those of a butterfly to enable it to be turned by thumb and fingers. Also called a FLY NUT or BUTTERFLY NUT.

wing radiator (*Aero.*). A liquid cooler for an aero engine in which the wing profile acts as the radiating surface, thus avoiding the head resistance of the more usual types of radiator.

wing rail (*Rail.*). A *check-rail* (q.v.).

wing shafts (*Ships*). The port and starboard propeller shafts of a triple- or quadruple-screw steamship.

wing-tip float (*Aero.*). A water-tight float which gives stability and buoyancy on the water; placed at the extremities of the wings of a seaplane, flying-boat, or amphibian.

wing valve (*Eng.*). A mitre-faced or conical-seated valve guided by three or four radial vanes or wings fitting inside the circular port.

wing wall (*Civ. Eng.*). A lateral wall built on an abutment and serving to retain earth in embankment.

winged (*Bot.*). (Of a stem) bearing the thin flattened bases of decurrent leaves: (of a fruit or seed) having a flattened appendage.

Winkler burette (*Chem.*). A form of burette employed for the analysis of gaseous mixtures containing a constituent soluble in water.

winning (*Mining*). The operation of (1) mining an ore, (2) opening up a new portion of a coal-seam.

winsey (*Textiles*). A cotton flannelette of good quality; or it may have a union or woollen weft. Plain weave.

Winslow's foramen (*Zool.*). A small opening by which the cavity of the bursa omentalis communicates with the rest of the abdominal cavity in Mammals.

winter annual (*Bot.*). A plant which lives for a short time, grows and sets seeds during the colder part of the year, dies, and is represented during summer only by the resting seeds.

winter egg (*Zool.*). In some fresh-water animals, a thick-shelled egg laid at the onset of the cold season which does not develop until the following warm season. Cf. *summer egg.*

winter green plants (*Bot.*). Small plants, especially woodland plants, which retain green leaves throughout the winter.

winter skins (*Furs*). The skins of animals caught in winter (*firsts*).

winter solstice (*Astron.*). See **solstices.**

Winter-Eichberg-Latour motor (*Elec. Eng.*). A single-phase a.c. motor of the compensated repulsion type; mainly used in electric traction.

winze (*Mining*). A shaft sunk from one level to another in a mine.

wipe (*Print.*). An excess of ink on the edge of a forme deposited by the rollers of a printing machine.

wipe-out (*Acous.*). The same as *wash-out.*

wipe-out (*Radio*). Interference of such intensity as to render impossible the reception of other signals.

wipe-out area (*Radio*). The area surrounding a radio transmitter where wipe-out occurs.

wiped joint (*Plumb.*). A joint formed between two lengths of lead pipe, one of which is opened out with a tampin while the other is tapered to fit into the first. Molten solder in a plastic condition is then wiped around the joint by hand with a moleskin or cloth pad.

wiper (*Auto. Teleph.*). In a uniselector or selector, the conducting arm which is rotated over a row of contacts and comes to rest on an outlet.

wiper (*Weaving*). A mechanism used to convert a rotating to a reciprocating motion. Also called CAM, TAPPET.

wiping gland (*Cables*). A projecting sleeve on a junction box, which is connected by a wiped joint to the lead sheath of a cable that enters the box.

wire (*Teleph.*). A continuous connexion through a system, particularly a telephone exchange, whether automatic or manual.

See **A—**
B—
jumper—
leading-out—
messenger—
negative—
P—
pilot—
positive—
private—
R—
release—
S—
T—
tie—
tip—

wire-bar (*Elec. Eng.*). See **electrolytic wire-bar.**

wire cloth (*Paper*). A continuous band of wire gauze with a mesh about 66 to the inch. The moulding unit of a paper-making machine.

wire comb (*Plast.*). A form of *scratcher* (q.v.).

wire-cut bricks (*Build.*). Bricks made by forcing the clay through a rectangular orifice, and cutting suitable lengths off the resulting bar of clay by pressing wires through the plastic mass, before burning.

wire-drawing (*Eng.*). (1) The process of reducing the diameter of rod or wire by pulling it through successively smaller holes in a hard steel die-block.—(2) The fall in pressure when a fluid is throttled by passing it through a small orifice or restricted valve-opening.

wire gauge (*Eng.*). Any system of designating the size of wires by means of numbers, which originally stood for the number of successive passes through the die-blocks necessary to produce a given diameter.

See **Birmingham— Brown and Sharp—**
British Standard—

wirephoto (*Elec. Comm.*). A photograph transmitted over a wire circuit by electrical means.

2-wire repeater (*Teleph.*). A repeater, or telephonic amplifier, for insertion into a two-wire circuit, for amplification of the line current in both directions.

4-wire repeater (*Teleph.*). A repeater, or telephonic amplifier, in which the two amplifiers, one for each direction of transmission, are entirely separate but mounted together for convenience.

wire rope (*Eng.*). Steel rope made by 'twisting' or 'laying' a number of strands over a central core, the strands themselves being formed by twisting together steel wires. See **Lang lay.**

wire scratcher (*Plast.*). See **scratcher.**

wire-stitching (*Bind.*). The securing of a section or inserted book by means of wire staples. See **saddle-stitching, stabbing.**

wire-wound armature (*Elec. Eng.*). An armature wound with insulated copper wire instead of with bar or strip.

wired glass (*Glass*). A form of sheet-glass produced by rolling wire mesh into the ribbon of glass so that it acts as a reinforcement and holds the fragments together in the event of the sheet being fractured.

wired wireless (*Radio*). The transmission of signals by means of electromagnetic waves guided by conductors, the frequencies being of the same order as those used for radio communication. Also called CARRIER TELEGRAPHY (or TELEPHONY).

wireless (*Radio*). An alternative name for *radio*, under which heading are to be sought compound terms, viz. *radio beacon*, *radio beam*, etc.

wiring point (*Elec. Eng*). A point in an interior wiring installation where an external connexion can be made to the electric circuit.

Wirsung's duct (*Zool.*). The ventral or main pancreatic duct of Mammals. Cf. *Santorini's duct*.

wishful-thinking (*Psychol.*). A type of thinking in which the individual substitutes the phantasy of the fulfilment of the wish for the actual achievement.

witches' broom (*Bot.*). A dense tuft of poorly developed branches formed on a woody plant attacked by a parasite (chiefly fungi and mites).

with′amite (*Min.*). A mineral belonging to the epidote group, named after Dr. Witham of Glencoe, where the mineral was discovered. Contains manganese and is allied to piedmontite.

withe (*Build.*). The partition wall between adjacent flues in a chimney stack. Also called MID-FEATHER.

withering (*Brew.*). A stage in the process of malting when the malt remains unturned for a period of about 24 hours, so that accumulation of heat dries the grain and arrests growth. See **steeping.**

withering persistent (*Bot*). Said of a leaf which dies and withers, but remains attached to the stem; a condition found in many herbaceous perennials.

with′erite (*Min.*). Barium carbonate, $BaCO_3$, crystallising in the orthorhombic system as yellowish or greyish-white complicated crystals of hexagonal appearance; also massive. Occurs with galena in the lead mines on Alston Moor and in large quantities near Hexham, Northumberland. Exploited as an important source of barium.

withers (*Vet.*). The region of the horse's back above the shoulders.

wobble crank (*Eng.*). A short-throw crank in which the pin, machined from and at an angle to the axis of the crankshaft, has been used to give an elliptical motion to a sleeve valve by a short connecting-rod and ball joint.

wobble plate (*Eng.*). See **swash plate.**

wobble-plate engine (*Eng.*). A multi-cylinder engine in which a wobble-plate or swash-plate mechanism replaces cranks and connecting-rods. The cylinders are arranged axially round the shaft, their pistons operating on the wobble-plate through sliding blocks. The arrangement is very compact but the mechanical efficiency is usually low.

wobble saw (*Carp.*). A *drunken saw* (q.v.).

Woburn Sands (*Geol.*). A group of brown to white sands, generally coarse in grain, of Lower Cretaceous age, extending from Leighton Buzzard north-eastward to Cambridge, and including the well-known Leighton Buzzard silver sand. Formerly worked for fuller's earth and for the phosphatic nodules used in the manufacture of fertilisers.

Wöhler test, vé′ler (*Met.*). A fatigue test in which one end of a specimen is held in a chuck and rotated in a ball-bearing placed on the other end. The ball-bearing carries a weight and, as the specimen rotates, the stress at each point on its surface passes through a cycle from a maximum in tension to a maximum in compression.

wolf (*Furs*). The dressed skin of one of the varieties of wolf. European wolves have fur of reddish hue, the N. American timber wolf is grey, the Florida wolf black, and the Arctic wolf white, with black-tipped tail.

wolf tooth (*Zool.*). In *Equidae*, a vestigial first upper premolar.

Wolf-Rayet star (*Astron.*). The name sometimes given to a class of star within the limits of spectral type O, showing bright bands superposed on a faint continuous background.

Wolffian body (*Zool.*). The *mesonephros* (q.v.).

Wolffian duct (*Zool.*). That part of the archinephric duct which drains the mesonephros.

Wolffian ridges (*Zool.*). Short longitudinally running ridges representing the limb-rudiments in many *Vertebrata.*

wolfram, woolf′ram (*Met.*). See **tungsten.**

wolf′ramite (*Min.*). Tungstate of iron and manganese $(FeMn)WO_4$, occurring as brownish-black monoclinic crystals, columnar aggregates, or granular masses in association with tin ores, as in Cornwall. An important ore of tungsten.

wolfs′bergite (*Min.*). See **chalcostibite.**

wollas′tonite (*Min.*). One of the pyroxenes of relatively simple composition, being silicate of calcium, $CaSiO_3$, crystallising in the monoclinic system and occurring in metamorphosed siliceous limestones. It is also represented in the more complicated pyroxenes, such as diopside and augite. Also called TABULAR SPAR.

wolverene or **glutton** (*Furs*). The dressed skin of the wolverene, a musteline carnivore of the northern forests of America.

Wommelsdorf machine (*Elec. Eng.*). A form of electrostatic generator, having alternate fixed and moving plates, and collectors in the form of steel wires dipping into grooves in the rims of the moving plates.

wood (*Bot.*). See **xylem.**

wood alcohol (*Chem.*). See **methyl alcohol.**

wood brick (*Build.*). A piece of wood the shape of a brick but larger by the amount of the mortar joints. It is bonded to surface brickwork in the course of building and is held in position by friction alone, its function being to provide a substance to which joinery such as skirtings may be nailed.

woodcut (*Print.*). An engraving cut on wood: an impression from it.

wood-evil (*Vet.*). Diarrhoea of herbivorous animals.

wood fibre (*Bot.*). A thick-walled, elongated, dead element found in wood; it is developed by the elongation and lignification of the wall of a single cell, but differs from a tracheide in its thicker wall and general inability to conduct water.

wood flour. A fine powder made from sawdust and wood waste; used as a filler in many industries, and in the manufacture of guncotton.

wood furniture (*Typog.*). Spacing material, or furniture, made of wood, as distinct from metal furniture.

wood laths (*Build.*). See **lathing.**

wood letters (*Typog.*). Large type-letters cut in wood; used in some poster work.

wood nog (*Build.*). See **nog.**

wood opal (*Min.*). A form of common opal which has replaced pieces of wood entombed as fossils in sediments, in some cases retaining the original structure.

wood parenchyma (*Bot.*). See **xylem parenchyma.**

wood paving blocks (*Civ. Eng.*). Blocks 3 in. wide by 5 in. deep by 8-9 in. long, made of creosoted soft woods; used for paving carriageways in cases where absence of noise is of the first importance.

wood pulp (*Paper*). Wood reduced to a pulp, either mechanically or by a chemical process. It is used in the manufacture of paper.

See **chemical—** **mechanical—**

wood ray (*Bot.*). See **xylem ray.**

wood ray parenchyma (*Bot.*). Parenchymatous cells in a xylem ray.

wood spirit (*Chem.*). Methanol or *methyl alcohol* (q.v.).

wood sugar (*Chem.*). *Xylose* (q.v.).

wood tar (*Chem.*). A product of the destructive distillation of wood, containing paraffins, naphthalene, phenols.

wood tin (*Min.*). A botryoidal or reniform variety of cassiterite which, when broken across, shows a concentric structure of radiating fibres, brown in colour and resembling wood.

wood vessel (*Bot.*). See **vessel.**

woodburytype (*Photog.*). A photo-mechanical process in which an exposed and developed bichromated film is forced into a metal plate by great pressure, and so forms a matrix for subsequent printing. Obsolete.

wooden-tongue (*Vet.*). Actinomycosis or actinobacillosis of the tongue of cattle.

Woodhouse Ashes (*Geol.*). A minor subdivision of the Maplewell Group of the Charnian Series of Pre-Cambrian rocks, occurring in the Charnwood Forest district of Leicestershire.

Woodruff key (*Eng.*). A key consisting of a segment of a disc, fitted in a shaft key-way milled by a cutter of the same radius, and a normal key-way in the hub.

woody tissues (*Bot.*). Tissues which are hard because of the presence of lignin in the cell walls.

woof (*Weaving*). See **weft.**

woofer (*Cinema.*). The moving-coil, open-diaphragm baffle loudspeaker which is designed to radiate low frequencies only, the remainder of the gamut being radiated from horn types of loudspeaker.

wool (*Bot.*). A tangled mass of long, soft whitish hairs on a plant.

wool (*Zool.*). A modification of hair in which the fibres are shorter, curled, and possess an imbricated surface. Specifically, the covering of a sheep. The fibres are composed of carbon, nitrogen, hydrogen, sulphur, and oxygen; they are covered with small scales. The length and diameter of the fibres varies according to breed; commercial wools vary in length from 1 to about 14 in., the majority being about 6 to 10 in. Diameter about 1/600 to 1/1600 in.

wool and silk dyeing (*Textiles*). The colouring of fibres, yarns, or fabrics of wool or silk both of which are of animal origin.

woolsorter's disease (*Med.*). An acute disease due to infection with the *Bacillus anthracis*, conveyed to Man by infected wool or hair of animals; characterised by fever, the appearance on the skin of vesicles which become covered with a black scab, and sometimes by infection of the lungs or of the intestines. See also **anthrax.**

Woolhope Limestone (*Geol.*). An impersistent limestone varying in thickness from 0 to 150 ft. occurring in the Silurian System of the inliers west of the main outcrop in the Welsh Borderlands; it lies between the Llandovery Series below and the Wenlock Shales above.

woolly (*Bot.*). See **lanate.**

Woolwich Beds (*Geol.*). A division of the so-called Lower London Tertiaries, of Eocene age, occurring in E. Kent, where they are marine, and westwards to beyond Woolwich, where they consist of clays, sands, and pebble beds deposited on the seaward side of a great delta in early Tertiary times. They are noteworthy for the occurrence of large numbers of brackish-water fossils and leaf beds.

work (*Elec. Eng.*). The energy of an electric current flowing under the influence of a potential difference expressed as the integral $\int v\,i\,dt$. If v is in volts, i is in amperes, and t is in seconds, the work done by the current is measured in joules. The practical unit is the *watt-hour*, which equals 3600 joules.

work (*Mech.*). Work is done when the point of application of a force moves along the line of action of the force. Units of work are defined under *erg* and *foot-pound.* See also **energy.**

work-and-turn (*Print.*). A term used to describe the process of printing a complete *section* (2, q.v.) of a book without changing the formes on the bed of the machine. Formes comprising the total number of pages in the section are laid down on the machine, and half the required copies are printed on one side of the paper, which is twice the size of the section. The sheets are then turned and the operation repeated, giving, when cut through the middle, two copies to each sheet of paper.

work bar (*Textiles*). See **facing bar.**

work-hardening (*Met.*). The increase in strength and hardness (i.e. resistance to deformation) produced by working metals. It is most pronounced in cold-working, and in the case of metals such as iron, copper, aluminium, and nickel. Lead, tin, and zinc are not appreciably hardened by cold-working, because they can recrystallise at room temperature.

work lead (*Met.*). See **base bullion.**

worker (*Textiles*). See **stripper and worker.**

worker (*Zool.*). In social Insects, one of a caste of sterile apterous individuals which do all the work of the colony.

working (*Teleph.*). The technique of routing calls over a telephonic system.

See **automatic tandem—**
call-indicator—
coded call-indicator—
non-coded call-indicator—
semi-automatic tandem—
straightforward junction—
tandem—

working aperture (*Photog.*). See **focal aperture.**

working chamber (*Civ. Eng.*). The compressed-air chamber at the base of a hollow caisson, being the part in which the work of excavation proceeds. See **air-lock.**

working depth (*Bot.*). The average distance reached by the general root system of a plant in the soil.

working edge (*Carp., Join.*). An edge of a piece of wood trued square with the working face to assist in truing the other surfaces square.

working face (*Carp., Join.*). That face of a piece of wood which is first trued and then used as a basis for truing the other surfaces. See **face mark.**

working flux (*Elec. Eng.*). That part of the total flux produced by the magnetic system of an electrical machine which links the armature winding; numerically equal to the difference between the total flux and the leakage flux.

working standard (*Elec. Eng.*). A standard for everyday use, calibrated against a *secondary standard.*

worm (*Zool.*). A term loosely used to indicate any elongate Invertebrate lacking appendages: as Flat-worms (*Platyhelminthes*), Round-worms (*Nematoda*), and Bristle-worms (*Chaetopoda*).

worm, worm gear, worm wheel (*Eng.*). A gear of high reduction ratio connecting shafts whose axes are at right-angles but do not intersect. It consists of a core carrying a single- or multi-start helical thread of special form (the *worm*), meshing in sliding contact with a concave face gear-wheel (the *worm wheel*).

worm-and-wheel steering gear (*Automobiles*). Steering gear in which the steering column carries a worm, in mesh with a worm wheel or sector, attached to the spindle of the drop arm.

worm (or screw) conveyor (*Eng.*). A conveyor in which loose material such as grain, meal, etc. is continuously propelled along a narrow trough by a revolving worm or helix mounted within it.

Wormian bones (*Zool.*). See **sutural bones.**

Wo'ronin's hypha (*Bot.*). A simplified form of archicarp formed by some *Ascomycetes*, consisting of a coiled somewhat thickened hypha.

wort, wėrt (*Bot.*). Malt extract much used as a medium for the culture of micro-organisms.—(*Brew.*) The liquor which is run off from the mash tun; the first running is termed ***sweet wort.*** When hops have been added to the wort, and both boiled, the liquor is termed ***hopped wort.*** See **beer, malt, hops, mash tun, sparging.**

Woulfe's bottles (*Chem.*). Tubulated glass bottles used for washing gases.

wound cork (*Bot.*). A layer of cork cambium and cork formed below and around wounds, which, if the wound is not too large, heals the damage and prevents the entry of parasites into the plant.

wound hormone (*Bot.*). A substance produced in wounded tissues which is able to influence the subsequent development of parts of the plant.

wound parasite (*Bot.*). A parasite which gains entry to the body of the plant by means of a wound.

wound tissue (*Bot.*). A pad of parenchymatous cells formed by the cambium after wounding; it may give rise to groups of meristematic cells from which roots and buds form.

wound rotor (*Elec. Eng.*). An alternative term for *slip-ring rotor.*

wovenboard (*Build.*). See **interwoven fencing.**

woven steel fabric (*Civ. Eng.*). A mechanically woven fabric of steel wires interlaced and welded at the intersections, used as a reinforcement in ferro-concrete construction.

wow (*Acous.*). Rhythmic or arrhythmic change in reproduced sound, fundamentally arising from fluctuation in speed of either reproducer or recorder. It is made more noticeable by the phenomenon of stationary waves in an enclosure, when the original sound, such as a musical chord, is steady for an appreciable time. Wow refers to slow changes, up to six per second. See **flutter, gargle, whiskers.**

wraithe (*Weaving*). See **raddle.**

wrapper plate (*Eng.*). (1) In a locomotive boiler, the plate bent round and riveted to the tube plate and back plate, forming the sides and crown of the fire box.—(2) The outer casing of the fire box.

Wratten filters (*Photog.*). Trade-name for a comprehensive series of colour filters made to specification.

wreath (*Join.*). The part of a continuous hand-rail curving in plan around the well-hole of a geometrical stair.

wreath filament (*Illum.*). The usual type of filament in large gas-filled electric lamps; the filament wire is festooned from a horizontal supporting spider.

wreathed string (*Carp.*). The continuous curved string around the well-hole of a wooden stair.

Wrekin Quartzite (*Geol.*). A quartzite consisting of wind-rounded quartz grains cemented by silica, forming the local base of the Cambrian System in Shropshire, where it occurs on the flanks of the Wrekin, the Caradoc, and Cardington Hills.

Wrisberg's nerve (*Zool.*). In higher Vertebrates, certain sensory fibres of the seventh cranial nerve.

wrist-drop (*Med.*). Paralysis of the extensor muscles of the hand and of the fingers.

wrist pins (*Eng.*). Pins carried by the big end of the master connecting-rod of a radial aero engine, forming the crank pins of the articulated or *link rods* (q.v.).

wristlet (*Horol.*). A watch for wearing on the wrist.

writer's cramp (*Med.*). A condition in which writing becomes irregular and difficult or even impossible owing to spasm of the muscles of the hand and forearm; an occupational neurosis, not the result of organic disease.

wrong fount (*Typog.*). See **w.f.**

wrought (*Carp.*). Said of timber the surfaces of which have been planed.

wrought grounds (*Join.*). Planed strips of wood used as *grounds* (q.v.) when the attached joinery will leave them partly exposed to view.

wrought-iron (*Met.*). Iron containing only a very small amount of other elements, but containing 1-3% by weight of slag in the form of particles elongated in one direction, giving the iron a characteristic grain. Is more rust-resistant than steel and welds more easily. Used for chains, hooks, bars, etc.

wryneck (*Med.*). See **torticollis.**

wul'fenite (*Min.*). Molybdate of lead, $PbMoO_4$, occurring commonly as yellow orthorhombic crystals in veins with other lead ores. Named after an Austrian mineralogist, Von Wulfen.

wurtzite (*Min.*). Sulphide of zinc, ZnS, of the same composition as sphalerite, but crystallising in the hexagonal system, in black hemimorphic, pyramidal crystals.

wye (*Plumb.*). A *branch pipe* (q.v.) having only one branch, which is not at right-angles to the main run.

wye level (*Surv.*). A type of level whose essential characteristic is the support of the telescope, which is similar to that of the wye theodolite.

wye theodolite (*Surv.*). A form of theodolite differing from the transit in that the telescope is not directly mounted on the trunnion axis but is supported on two Y-shaped forks, in which it may be reversed end-for-end in order to reverse the line of sight.

wythe (*Build.*). See **withe.**

X

x (*Chem.*). A symbol for *mol fraction*.

x-contact, x-spring (*Teleph.*). See **fly-spring.**

x-operation (*Teleph*). The partial operation of a relay by means of an x-spring or *fly-spring* (q.v.).

X (*Chem.*). (1) A general symbol for an electronegative atom or group, especially a halogen.—(2) An alternative symbol for *xenon*.

X (*Elec. Eng.*). A symbol for *reactance*.

Xs (*Radio*). Atmospherics.

XX (*Paper*). See **retree.**

X-back (*Photog.*). A conducting surface on the back of negative cinematograph film, to eliminate scratches arising from the discharge of electric charges, which are separated by friction on the celluloid. See **squeeze-track.**

X-body (*Bot.*). An inclusion in a plant cell suffering from a virus disease.

X-chromosome (*Cyt.*). A heterochromosome associated with sex-determination and sometimes occurring alone (unpaired).

X-generation (*Bot.*). The gametes.

X-plates (*Cathode Ray Tubes*). The pair of electrodes to which the horizontal deflecting voltage is applied. So called in accordance with the conventional Cartesian co-ordinate system.

X-tgd (*Build.*). Abbrev. for *cross-tongued*.

X-rays (*Phys.*). Electromagnetic waves of short wavelength (0·01 *to* 50 A.U.) which are produced when cathode rays impinge on matter. They may be detected photographically by fluorescence and by the ionisation they produce in gases. They are able to penetrate matter which is opaque to light; this makes them valuable for examining inaccessible regions of the body. See **K-series, Compton effect.** When X-rays fall on matter, secondary X-rays (*characteristic X-rays*) are emitted which contain monochromatic radiations that vary in wavelength according to the atoms from which they are scattered. See **Moseley's law, K-series, L-series.**

X-ray analysis of crystal structure. Max von Laue in 1921 showed that the planes of atoms in crystals act as a diffraction grating to X-rays, which are scattered by them and provide an accurate means of determining the details of the internal atomic structure. See **rotating crystal method** and **powder method.**

X-ray spectrum. A wavelength or frequency diagram in which a series of lines indicate by their positions the particular X-rays emitted by a body, as the result of cathode ray bombardment.

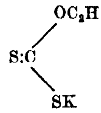
X-ray transformer. A special type of high-voltage transformer for use with X-ray tubes.

X-ray tube. An evacuated tube in which X-rays are emitted from a metal target, placed obliquely opposite to an incandescent cathode, whose rays impinge on the target.

xalostock′ite (*Min.*). A pale rose-pink grossularite which occurs embedded in white marble at Xalostock in Mexico.

xanth-, xantho- (Greek *xanthos*, yellow). A prefix used in the construction of compound terms; e.g. *xanthochroism* (q.v.).

xan′thates (*Chem.*). The salts of xanthic acid, $CS(OC_2H_5)SH$. Potassium xanthate,



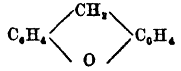
is obtained by the action of potassium ethoxide on carbon disulphide.

xanthation (*Rayon*). A process in the manufacture of viscose rayon; alkali cellulose is converted into cellulose xanthate by mixing it with carbon bisulphide.

xan′thein (*Bot.*). A yellow colouring matter sometimes present in cell sap; it is allied to xanthophyll.

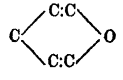
xanthelas′ma (*Med.*). A small yellow nodule occurring on the eyelid of an elderly person as a result of degeneration of muscle.

xanthene (*Chem.*). Diphenylene-methane oxide,



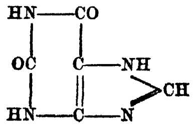
colourless plates, m.p. 98·5° C.

xanthene dyestuffs (*Chem.*). Dyestuffs which may be regarded as derivatives of xanthene containing the pyrone ring



They comprise the pyronines, derivatives of diphenylmethane, and the pthaleins, derivatives of triphenylmethane.

xanthine (*Chem.*). 2,6-Dihydroxy-purine, a white amorphous mass which is both basic and acidic, and can be obtained by the action of nitrous acid upon guanine. It has the formula:



xanthoch′roism (*Zool.*). A condition in which all skin pigments other than golden and yellow ones disappear; as in the Goldfish.

xanthochro′mia (*Med.*). Any yellowish discoloration, especially of the cerebrospinal fluid.

xanth′odont (*Zool.*). Having yellow teeth, as certain Rodents the incisors of which are stained a yellowish colour.

xantho′ma (*Med.*). A yellow tumour composed of fibrous tissue and of cells containing cholesterol ester, occurring on the skin (e.g. in diabetes) or on the sheaths of tendons, or in any tissue of the body (*xanthoma multiplex*).

xanth′ophore (*Zool.*). A cell occurring in the integument and containing a yellow pigment; as in Goldfish.

xanth'ophyll (*Bot., Zool.*). $C_{40}H_{56}O_2$. One of the two yellow pigments present in the normal chlorophyll mixture of green plants: a yellow pigment occurring in some *Phytomastigina.*

xanthopic'rite (*Chem.*). See **berberine.**

xanth'oplasts (*Zool.*). Yellow chromatophores found in some *Phytomastigina.*

xantho-protein reaction (*Chem.*). The reaction between albuminous matter and concentrated nitric acid, resulting in a yellow coloration on heating, often already in the cold. If NaOH is added to the reaction mixture, the solution turns reddish-brown; with ammonia an orange colour is obtained.

xanthop'sia (*Med.*). Yellow vision. The condition in which objects appear yellow to the observer, as in jaundice or after taking santonin.

xanthop'sin (*Zool.*). A pigment which occurs in the retinula elements of the eyes of certain night-flying Insects.

xanthosid'erite (*Min.*). A hydrated oxide of iron, $Fe_2O_3\,2H_2O$, occurring as fine yellow or brown needle-like crystals or as an ochre, in association with other oxidic iron ores; of limited distribution.

Xe (*Chem.*). The symbol for *xenon.*

xenar'thral (*Zool.*). Having additional facets for articulation on the dorsolumbar vertebrae.

xe'nia (*Bot.*). The effect of the pollen upon the characters of the young plant resulting from pollination.

xe'nocryst (*Geol.*). A single crystal or mineral grain which has been incorporated by magma during its uprise and which therefore occurs as an inclusion in igneous rocks, usually surrounded by reaction rims and more or less corroded by the magma. Cf. *xenolith.*

xe'nogamy (*Bot.*). Pollination of a flower from a flower of the same species but on another plant.

xe'nolith (*Geol.*). A fragment of rock of extraneous origin which has been incorporated in magma, either intrusive or extrusive, and occurs as an inclusion, often showing definite signs of modification by the magma. Xenoliths in granite used for ornamental purposes detract from the value of the stone.

xenome'nia (*Med.*). Vicarious menstruation. A condition in which, in the absence of normal menstruation, bleeding occurs at regular monthly intervals from other parts of the body (e.g. from the nose).

xenomor'phic (*Min.*). A textural term implying that the minerals in a rock do not show their own characteristic shapes, but are without regular form by reason of mutual interference.

xenomorphic granular texture (*Geol.*). See **granitoid texture.**

xe'non (*Chem.*). Symbol, Xe. A zero-valent element, one of the rare gases, present in the atmosphere in the proportion of 1:170,000,000 by volume. At. no. 54, at. wt. 131·3, m.p. $-140°$ C., b.p. $-106{\cdot}9°$ C., crit. temp. $+16{\cdot}6°$ C., density at N.T.P. 5·85 gms. per litre.

xenophy'a (*Zool.*). Elements of the shell or skeleton not secreted by the organism itself; foreign particles; as the shell of *Difflugia.* Cf *autophya.*

xenoplas'tic (*Zool.*). In experimental zoology, said of transplantation in which transplant and host belong to the young germs of different species or genera. Cf. *autoplastic, heteroplastic, homoioplastic.*

Xenopterygii, zen'op-ter-ij'i-i (*Zool.*). A small order of *Neopterygii* having a broad sucking disc between the pelvic fins and a smooth scaleless skin; marine forms found clinging to loose stones between tide-marks and feeding on worms and small Crustaceans. Cling-fishes.

xen'otime (*Min.*). Yttrium phosphate, YPO_4, often containing small quantities of cerium, erbium, and thorium, closely resembling zircon in crystal form and general appearance, and occurring in the same types of igneous rock, i.e. in granites and pegmatites as an accessory mineral. An important source of the rare elements named.

xer'arch succession (*Bot.*). A succession starting on land where conditions are very dry.

xe'ric (*Bot.*). See **xerophytic.**

xeric environment (*Bot.*). An environment in which the soil contains very little water, and where atmospheric conditions favour rapid loss of water from the plants.

xeroder'mia, xeroder'ma (*Med.*). See **ichthyosis.**

xerodermia (xeroderma) pigmento'sum (*Med.*). A disease of young children in which prolonged exposure to sunlight produces on the skin erythematous patches which later become pigmented, scaly, wart-like, and finally cancerous.

xeromor'phic (*Bot.*). Said of parts of a plant protected against excessive loss of water by thick cuticles, coatings of hairs, and similar structural characters.

xerophi'lous (*Bot.*). Tolerant of a droughty habitat.

xerophthal'mia (*Med.*). A dry lustreless condition of the conjunctiva with or without keratomalacia, due to deficiency of vitamin A in the diet.

xer'ophyte (*Bot.*). A plant able to inhabit places where the water supply is scanty, or where there is physiological drought.

xerophyt'ic (*Bot.*). Able to withstand drought.

xer'osere (*Bot.*). A succession beginning on dry land.

xero'sis (*Med.*). See **xerophthalmia.**

xerosto'mia (*Med.*). Excessive dryness of the mouth.

xiph'ihumera'lis (*Zool.*). In Vertebrates, a muscle leading from the humerus to the xiphoid cartilage.

xiphiplas'tron (*Zool.*). In *Chelonia,* one of the plates composing the plastron, lying posterior to the hypoplastron.

xiphister'num (*Zool.*). A posterior element of the sternum, usually cartilaginous.

xiphoid (*Zool.*). Sword-shaped. (Greek *xiphos,* sword.)

xiphoid cartilage (*Zool.*). The xiphisternum when it is cartilaginous.

xiphoid process (*Zool.*). The posterior portion of the sternum, the xiphisternum; so called after its shape in Man.

Xiphosu'ra (*Zool.*). The only order of *Delobranchiata,* having the prosoma covered by a characteristic semicircular carapace, the segments of the opisthosoma fused, the telson in the form of a long spine; burrowing forms occurring in coastal waters down to ten fathoms in the tropics and subtropics, feeding on shell-less molluscs and marine worms. King Crabs.

xy'lem (*Bot.*). Wood; usually consisting of vessels, fibres, and/or tracheides, all with lignified walls, together with some parenchyma having more or less lignified walls. Xylem is concerned with the conduction of aqueous solutions about the body of the plant, and with mechanical support.

xylem core (*Bot.*). A solid strand of xylem occupying the middle of the stele.

xylem mother cell (*Bot.*). A daughter cell cut off from a cell of the cambium which is later converted into a component of the xylem.

xylem parenchyma (*Bot.*). Parenchymatous cells occurring in xylem, apart from those present in the vascular rays.

xylem ray (*Bot.*). The portion of a vascular ray traversing the xylem.

xy'lenes (*Chem.*). $C_6H_4(CH_3)_2$, dimethyl-benzenes. There are three isomers which all occur in coal-tar but cannot be separated by fractional distillation:

o-xylene, m.p. −28° C., b.p. 142° C.; *m*-xylene, m.p. −53° C., b.p. 139° C.; *p*-xylene, m.p. +13° C., b.p. 138° C.

xy'lenols (*Chem.*). $(CH_3)_2 \cdot C_6H_3 \cdot OH$, monohydric phenols derived from xylenes: 1,2,3-xylenol (*adj. ortho*), m.p. 73° C., b.p. 213° C.; 1,3,4-xylenol (*asym. ortho*), m.p. 65° C., b.p. 222° C.; 1,2,5-xylenol (*para*), m.p. 75° C., b.p. 209° C.

xy'lic gap (*Bot.*). A gap in the xylem opposite a leaf base.

xy'lochrome (*Bot.*). A mixture of substances to which the colour of heart wood is due. It includes tannins, gums, and resins.

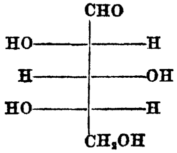
xylogenous, xylophilous (*Bot., Zool.*). Growing on wood: living on or in wood.

xylo'ma (*Bot.*). A sclerotium-like body which forms spores internally, and does not put out branches which develop into sporophores.

Xylonite (*Plastics*). A thermoplastic of the nitrocellulose type. See **celluloid.**

xylophagous (*Zool.*). Wood-eating.

xylose (*Chem.*). *l*-Xylose, known as WOOD SUGAR, is a pentose found in many plants. It has the following constitution:



It is a stereo-isomer of arabinose.

xylotomous (*Zool.*). Wood-boring; wood-cutting.

y-contacts, y-springs (*Teleph.*). The springs and contacts in a relay spring-set, in addition to an *x-contact* (q.v.).

Y (*Chem.*). The symbol for *yttrium.*

Y (*Elec. Eng.*). The symbol for ***admittance.***

Y-alloy (*Met.*). An aluminium base alloy of Duralumin type, containing copper 4%, magnesium 1·5%, silicon 0·7%, nickel 2%, iron 0·6%, and titanium 0·2%. It has properties similar to those of Duralumin.

Y-chromosome (*Zool.*). One of a pair of heterochromosomes associated with sex-determination. See also **X-chromosome.**

Y-connexion (*Elec. Eng.*). An alternative name for ***star connexion*** (q.v.).

Y-level (*Surv.*). See **wye level.**

Y-network (*Elec. Comm.*). An electrical network consisting of three impedances connected together at one end. Also called T-NETWORK or THREE-IMPEDANCE STAR NETWORK.

Y-plates (*Cathode Ray Tubes*). The pair of electrodes to which the voltage producing vertical deflection of the spot is applied. So called in accordance with the conventional Cartesian co-ordinate system.

Y-theodolite (*Surv.*). See **wye theodolite.**

Y-voltage (*Elec. Eng.*). See **voltage to neutral.**

Yankee machine (*Paper*). See **single cylinder machine.**

yapp (*Bind.*). A style of limp binding similar to divinity circuit binding, but having the flaps uncut at the back and corners.

yard. The British unit of length, legally fixed by a *line standard* (q.v.) of 'Baily's metal' (copper 16, tin 2½, zinc 1) at 62° F. deposited at the Standards Office, London. 1 yard = 0·9144 metre.

yard trap (*San. Eng.*). See **gulley trap.**

yardage (*Civ. Eng.*). The volume of excavation in cubic yards.

yarn counts (*Textiles*). See **counts of yarn.**

Yarrow boiler (*Eng.*). A marine water-tube boiler employing an upper steam drum connected by banks of inclined tubes to three lower water drums, between two of which superheating elements are arranged.

Yarside (Yarlside) Rhyolite (*Geol.*). This occurs between the Stile End Beds and the Applethwaite Beds in the Caradocian Series of the English Lake District.

yaryan (*Paper*). The name applied to an evaporation method employed in the recovery of soda from the liquor used in digesting raw materials.

yaw (*Aero.*). The angular motion of an aircraft in a horizontal plane about the normally vertical axis.

yaws (*Med.*). Framboesia; pian. A contagious tropical disease affecting dark-skinned races, due to infection with *Treponema pertenue*, and characterised by raspberry-like papules on the skin; as in syphilis, the bones and joints may later become infected.

yawing moment (*Aero.*). The component of the couple about the normally vertical axis acting on an aircraft in flight.

Yb (*Chem.*). The symbol for *ytterbium.*

year (*Astron.*). The civil or calendar year as used in ordinary life, consisting of a whole number of days, 365 in ordinary years, and 366 in leap years, and beginning with January 1.

See also

anomalistic year
eclipse do.
leap do.
sidereal year
tropical do.

yearling's wool (*Textiles*). See under **fleece wool.**

yeast (*Bot.*). Micro-organisms producing zymase, which induces the alcoholic fermentation of carbohydrates.

yellow cells (*Zool.*). In *Chaetopoda*, yellowish cells forming a layer investing the intestine and playing a rôle in connexion with nitrogenous excretion; chloragogen cells: minute symbiotic algae occurring in the extracapsular protoplasm of some *Radiolaria*: *xanthoplasts* (q.v.).

yellow copper ore (*Min.*). A little-used, popular name for the sulphide of copper and iron, *chalcopyrite.*

yellow fever (*Med.*). Yellow jack. An acute disease caused by infection with a filter-passer, conveyed to Man by the bite of the mosquito *Aëdes aegypti* (*Stegomyia fasciata*); characterised by high fever, acute nephritis, jaundice, and haemorrhages in the skin and from the stomach and bowels; it occurs in tropical America and West Africa.

yellow fibres (*Zool.*). Straight, branched elastic fibres occurring singly in areolar connective tissue. Cf. *white fibres.*

yellow fibrocartilage (*Zool.*). A form of fibrocartilage in which yellow fibres predominate.

Yellow Ground (*Geol.*). The upper, oxidised zone of the Blue Ground, a decomposed volcanic ash occurring in the diamond-bearing vents of South Africa.

yellow ochre (*Paint.*). See **ochre.**

yellow pine (*Timber*). A very soft, even-grained wood imported from Canada. Useful for joinery.

yellow quartz (*Min.*). See **citrine.**

yellow snow (*Bot.*). Snow coloured yellow by the growth on it of certain algae; sometimes observed in the Alps and in the Antarctic regions.

yellow spot (*Zool.*). Macula lutea; the small area at the centre of the retina in Vertebrates at which day vision is most distinct.

yellow tellurium (*Min.*). A synonym for *sylvanite.*

yellow vision (*Med.*). See **xanthopsia.**

yenite, yă′nit (*Min.*). A name rejected by continental mineralogists, because it commemorated the battle of Jena, 1806. The mineral is now known as *ilvaite* (q.v.).

Yeovil Sands (*Geol.*). A subdivision of the Upper Lias of Somersetshire, a diachronous formation which cuts down on to lower horizons when traced from the Dorset coast northwards to the Cotteswold Hills. See **Cotteswold Sands.**

Yewdale Breccia Group (*Geol.*). A division of the Borrowdale Volcanic Series occurring in the English Lake District, placed by Harker and Marr near the top of the series.

yield point (*Met.*). The stress at which a substantial amount of plastic deformation takes place under constant or reduced load. This sudden yielding is a characteristic of iron and annealed steels. In other metals plastic deformation begins gradually and its incidence is indicated by measuring the proof stress, which, however, is frequently called the yield point.

yielding attachment (*Horol.*). A method of attaching the outer end of a mainspring to its barrel. It permits of a more concentric uncoiling of the spring.

-yl (*Chem.*). A suffix denoting (1) a monovalent organic radical, (2) an electropositive inorganic radical which contains oxygen.

Yngel trawl (*Ocean.*). See **young-fish net.**

yohim'bine (*Chem.*). $C_{22}H_{28}O_3N_2+H_2O$, an alkaloid of unknown constitution, obtained from the bark of *Corynanthe johimbe*; colourless needles; m.p. 234° C.; soluble in alcohol and chloroform; slightly soluble in ether. It is poisonous, acts as an aphrodisiac, and also exerts a local anaesthetic action.

yoke (*Civ. Eng.*). Stout timbers bolted round the shuttering for a column to secure the parts together during the process of pouring and setting.

yoke (*Elec. Eng.*). That part of a magnetic circuit joining connecting-parts carrying magnetising windings, e.g. the field poles of an electrical machine, or the limbs of a transformer.

yoke suspension (*Elec. Eng.*). See **bar-suspension.**

yolk (*Zool.*). The nutritive non-living material contained by an ovum.

yolk gland (*Zool.*). See **vitellarium.**

yolk plug (*Zool.*). A mass of yolk-containing cells which partially occludes the blastopore in some *Amphibia*.

yolk sac (*Zool.*). The yolk-containing sac which is attached to the embryo by the yolk stalk in certain forms.

yolk stalk (*Zool.*). A short stalk by which the yolk sac is attached to the embryo and by which yolk substance may pass into the alimentary canal of the embryo.

Yoredale Series (*Geol.*). A rhythmic series, comprising limestones, shales, sandstones, and occasionally thin coals in the order named to a total thickness of 2000 ft. approximately, occurring in the North Pennines and northern England; in the main, of Lower Carboniferous age.

Yorkshire bond (*Build.*). *Monk bond* (q.v.).

young-fish net (*Ocean.*). A large tow-net the mouth of which is kept open by *otter boards* (q.v.), used for capturing small fishes at the surface or in mid-water.

Young-Helmholtz theory of colour vision (*Photog.*). The supposition that the eye contains three systems of colour perception, with maximum response to three primary colours. It is the theory adopted for the realisation of colour photography. There is little medical support for the theory, but the practice is justified by the physical possibility of matching practically every natural colour by the addition of contributions from three primary colours.

Young's modulus (*Phys*). The coefficient of elasticity of stretching. For a stretched wire, Young's modulus is the ratio of the stretching force per unit cross-sectional area to the elongation per unit length. The values of Young's modulus for metals are of the order 10^{12} dynes per sq. cm. See also **elasticity.**

youth form (*Bot.*). See **juvenile form.**

yperite, ĕ'per-it (*Chem.*). *Mustard gas* (q.v.).

yp'siloid cartilage (*Zool.*). In Salamanders with functional lungs, a cartilage attached to, but formed independently of, the pubis, furnishing attachment for muscles connected with respiration.

Yt (*Chem.*). An alternative symbol for *yttrium.*

ytter'bium (*Chem.*). Symbol, Yb. A metallic element, a member of the rare earth group. Oxide, Yb_2O_3, white, giving colourless salts. At. no. 70, at. wt. 173·5, m.p. of metal about 1800° C.

ytt'rium (*Chem.*). Alternative symbols, Y, Yt. A metallic element in the third group of the periodic system, usually classed with the rare earths. Oxide, Y_2O_3, white, giving colourless salts. At. no. 39, at. wt. 88-92, m.p. of metal 1250° C.

yttrocer'ite (*Min.*). A massive, granular or earthy mineral, essentially flouride of calcium, with the metals of the yttrium and cerium groups, commonly violet-blue in colour, and of rare occurrence.

yttrotan'talite (*Min.*). An orthorhombic mineral the name of which conveys the essential chemical composition, though niobium, cerium, yttrium, and calcium are present in varying amounts. At the type-locality, Ytterby (Sweden), it occurs in red feldspar.

yu-stone (*Min.*). Yu or yu-shih, the Chinese name for the highly prized jade of gemstone quality.

Z, ζ

z (*Chem.*). A symbol for the valency of an ion.

ζ (*Chem.*). A symbol for *electrokinetic potential.*

Z (*Chem.*). A symbol for (1) gram-equivalent weight; (2) number of molecular collisions per second; (3) atomic number.

Z (*Elec. Eng.*). The symbol for *impedance.*

zalamb′dodont (*Zool.*). Having molar teeth with V-shaped ridges, as some *Insectivora.*

zar′atite or **emerald nickel** (*Min.*). A hydrated basic nickel carbonate, occurring as emerald green stalactitic or mammillary masses encrusting crystals of chromite and magnetite at Unst (Shetland Islands) and elsewhere.

zawn (*Mining*). A cavern.

zax (*Tools*). A *sax* (q.v.).

Zechstein (*Geol.*). The higher of the two series into which the Permian System of Germany is divided. The whole of the English Permian of Durham and Yorkshire is probably of Zechstein age.

Zeeman effect (*Phys.*). The splitting of a spectrum line into several symmetrically disposed components, which occurs when the source of light is placed in a strong magnetic field. The components are polarised, the directions of polarisation and the appearance of the effect depending on the direction from which the source is viewed relative to the lines of force.

ze′in (*Chem.*). A prolamin obtained from maize.

Zeisel's method, zī′sel (*Chem.*). A method for the determination of methoxyl and ethoxyl groups in organic compounds, in which the substance is heated with hydriodic acid; the alkyl iodide thus formed is passed into an alcoholic solution of silver nitrate, and the resulting silver iodide weighed.

zenith (*Astron.*). The point on the celestial sphere vertically above the observer's head; one of the two poles of the horizon, the other being the nadir.

zenith distance (*Astron.*). The angular distance from the zenith of a heavenly body, measured as the arc of a vertical great circle: hence the complement of the altitude of the body.

zenith sector (*Astron.*). The name given to one of various kinds of similar instruments used, before the invention of the telescope, for measuring altitudes of stars; it consisted essentially of a graduated quadrant, fitted with a movable pointer for sighting the star.

zenith telescope (*Astron.*). An instrument similar to the meridian circle, but fitted with an extremely sensitive level and a declination micrometer; used to determine latitude, by observing the difference in zenith distance of two stars whose meridian transit is at a small and equal distance from the zenith, one north and one south; a special form, avoiding the necessity for a very accurate level, is the *Cookson zenith telescope,* which floats in mercury.

Zenker's degeneration (*Med.*). Hyaline degeneration of striped muscle, occurring, for example, in the abdominal muscles in typhoid fever.

ze′olites (*Min.*). A group of alumino-silicates of sodium, potassium, calcium, and barium, containing very loosely held water, which can be removed by heating and regained by exposure to a moist atmosphere, without destroying the crystal structure. They occur in geodes in igneous rocks, and in red clay, and include chabazite, natrolite, mesolite, stilbite, heulandite, harmotome, phillipsite, etc.

Zeomor′phi (*Zool.*). An order of marine *Neopterygii* having a laterally compressed body, spiny fin-rays, large protractile mouth, and truncate or rounded tail-fin; carnivorous. Boar-fishes, John Dories.

zeph′yr (*Meteor.*). Properly, a warm westerly wind blowing in the Mediterranean.

zepp antenna (*Radio*). A horizontal half-wavelength antenna fed from a resonant transmission line. The antenna is connected at one end to one wire of the transmission line and the transmitter or receiver is connected between the two wires, the length of the line being critical.

zero beat reception (*Radio*). A system of reception of radiotelephony in which a locally generated oscillation, having the same frequency as the incoming signal, is impressed simultaneously therewith on the detector. See **homodyne reception.**

zero clearing (*Radio*). The operation of any arrangement for balancing *antenna effect* (q.v.) so as to obtain the sharpest minimum signal in determining a radio-bearing with a rotating antenna or a radio goniometer.

zero-cut crystal (*Radio*). A quartz crystal cut at such an angle to the axes as to have a zero frequency/temperature coefficient. Used for accurate frequency standards.

zero frequency (*Elec. Comm.*). An alternative name for the direct-current component in a complicated transmission signal, such as a video signal. Abbrev. **z.f.**

zero method (*Elec. Eng.*). A method of measuring an electric circuit quantity in which the correct value is given when the current flowing through the indicating instrument is zero, e.g. there is no deflection in a galvanometer when a Wheatstone bridge is correctly adjusted.

zero phase-sequence (*Elec. Eng.*). A three-phase vector system in which all three vectors are equal in magnitude and are in phase with one another.

zero phase-sequence component (*Elec. Eng.*). One of three vectors forming a zero phase-sequence system, and one of three components into which any vector forming part of an unbalanced three-phase system can be resolved. Cf. *positive phase-sequence component, negative phase-sequence component.*

zero potential (*Elec. Eng.*). Earth potential in electric circuits; or the potentials of the cathode in multi-electrode valves.

zero power-level (*Elec. Comm.*). An arbitrary power-level for referring other power-levels to, either in decibels or nepers. Zero power-level was formerly 5·8 milli-watts in America, but is now one milli-watt as in Europe (C.C.I.F.), both at 600 ohms impedance level.

zero-type dynamometer (*Elec. Eng.*). A dynamometer in which the electrical forces are balanced by mechanical forces, in such a manner as to bring the indicating pointer back to zero, before a reading can be taken.

zero-valent (*Chem.*). Incapable of combining with other atoms.

zeu′gite (*Bot.*). A cell in which nuclear fusion occurs.

zeugopo′dium (*Zool.*). The second segment of a typical pentadactyl limb, lying between the stylopodium and the autopodium; antebrachium or crus; forearm or shank.

Zeuner valve diagram, zoi′ner (*Eng.*). See **valve diagram.**

z.f. (*Elec. Comm.*). Abbrev. for *zero frequency.*

ziberline (*Textiles*). A cloth with a merino warp and a weft of wool and camel hair; raised during finishing to obtain a lustrous pile. Cheaper varieties are made with a worsted or a cotton warp and a cashmere weft.

zigzag connexion (*Elec. Eng.*). A symmetrical three-phase star connexion of six windings, situated in pairs on three cores. Each leg of the star consists of two of the windings in series; these windings, being on different cores, have e.m.f.'s in them differing in phase by 120°. Used in transformers for eliminating **harmonics**, and in reactors for obtaining an artificial neutral.

zigzag leakage (*Elec. Eng.*). Magnetic leakage occurring along the zigzag path between stator and rotor teeth when a stator tooth is opposite to a rotor slot.

zinc (*Met.*). A white metallic element with a bluish tinge. Symbol, Zn. At. wt. 65·38, at. no. 30, sp. gr. at 20° C. 7·14, m.p. 419·4° C., specific electrical resistivity 6·0 microhms per cm. cub. Because of its resistance to atmospheric corrosion, zinc is used for protecting steel (see **galvanised iron, sherardising, spelter, spraying**). It is also used in the form of sheet and as a constituent in alloys (see **zinc alloys**).

zinc alloys (*Met.*). Zinc base alloys, containing aluminium 3-4%, copper 0-3·5%, and magnesium 0·02-0 1%, are used extensively for die-casting. This metal is also used extensively in brass, of which it is one of the essential constituents. Light aluminium zinc alloys are also used.

zinc blende (*Min.*). A much-used name for sphalerite, the common sulphide of zinc. See **blende.**

zinc bloom (*Min*). A popular name for the massive basic zinc carbonate, *hydrozincite* (q.v.).

zinc boxes (*Met.*). Troughs in which gold is precipitated from cyanide solutions by means of zinc shavings.

zinc chrome (*Paint.*). See **zinc yellow.**

zinc spinel (*Min.*). See **spinel.**

zinc white (*Paint.*). A fine white powder (zinc oxide) used as a non-poisonous, permanent pigment to form a base in paint manufacture.

zinc yellow (*Paint.*). A chromate of zinc pigment. Also called ZINC CHROME and CITRON YELLOW.

zincite (*Min.*). Oxide of zinc, crystallising in the hexagonal system and exhibiting polar symmetry; occurring rarely as crystals, usually as deep-red masses; an important ore of zinc, known also as RED OXIDE OF ZINC, SPARTALITE, and STERLINGITE.

zinco (*Print.*). A line block executed in zinc, i.e. the normal line block.

zincog'raphy. An engraving process in which zinc is covered with wax and etched. The name is sometimes applied to the lithographic process in which a zinc plate is used instead of stone.

zink'enite (*Min.*). A steel-grey mineral, essentially sulphide of lead and antimony, $PbSb_2S_4$, occurring in antimony-mines at Wolfsberg in the Harz Mountains, in Colorado, and in Arkansas as columnar orthorhombic crystals, sometimes exceptionally thin, forming fibrous masses.

zink'osite (*Min.*). Anhydrous zinc sulphate, occurring at a mine in the Sierra Almagrera (Spain).

zinn'waldite (*Min.*). A mica related in composition to lepidolite (i.e. containing lithium and potassium) but including iron as an essential constituent; occurring in association with tinstone ores at Zinnwald in the Erzgebirge, in Cornwall, and elsewhere.

zircon (*Min.*). A tetragonal mineral widely distributed in igneous and sedimentary rocks, and occurring in three forms differing in density and optical characters. It varies in colour from brown to green, blue, red, golden-yellow, while colourless zircons make particularly brilliant stones when cut and polished. In composition it is essentially silicate of zirconium, though green specimens contain amorphous silica and zirconia. A small amount of the rare element hafnium is present. See also **jacinth, jargon, hyacinth, Matura diamond, starlite, Ceylonese zircon.**

zirco'nia (*Chem.*). Zirconium oxide, ZrO_2, used as an opacifier in vitreous enamels, as a pigment, and as a refractory.

zirco'nium (*Chem.*). Symbol, Zr. A metallic element occurring in group IV of the periodic system, and in the sub-group Ti:Zr:Hf:Th. Has not been obtained quite pure. At. wt. 91·22, at. no. 40, m.p. about 1700° C.

Zn (*Chem.*). The symbol for *zinc*.

zoaea, zō-ē'a (*Zool.*). A larval stage of some *Malacostraca* in which the appendages of the head and the first two thoracic somites are well developed and the abdomen distinctly segmented, while the posterior thoracic region is only partially segmented and bears no appendages.

Zoantha'ria (*Zool.*). An order of *Anthozoa* the members of which may be solitary or colonial and possess either six or more than eight simple tentacles; a calcareous skeleton, if it occurs, is never formed of spicules and does not lie in the mesogloea (see **Alcyonaria**); there are two siphonoglyphs. Black Corals, Reef Corals, and Sea Anemones.

zoa'rium (*Zool.*). The zooids of a polyzoan colony, collectively.

Zo'bel filter (*Elec. Comm.*). An electric wave-filter designed according to procedures derived by Zobel.

zocle (*Arch.*). See **socle.**

Zo'diac (*Astron.*). A name, of Greek origin, given to the belt of stars, about 18° wide, through which the ecliptic passes centrally. The Zodiac forms the background of the motions of the sun, moon, and planets; it is divided into twelve equal parts of 30° called *Signs of the Zodiac*, named from the constellations that once corresponded to them but do so no longer; these, in their Latin form, are: Aries, Taurus, Gemini, Cancer, Leo, Virgo, Libra, Scorpio, Sagittarius, Capricornus, Aquarius, Pisces.

zodi'acal light (*Astron.*). A faint illumination of the sky, lenticular in form and elongated in the direction of the ecliptic on either side of the sun, fading away at about 90° from it; best seen after sunset or before sunrise in the tropics, where the ecliptic is steeply inclined to the horizon; it is possibly caused by minute particles reflecting sunlight.

zo'etrope, zo'echrome (*Photog.*). Early processes for colour cinematography, using rapidly repeated images of the selected colours in sequence on a screen, the synthesis arising from persistence of vision in the eye.

zoetrope. The ancient 'wheel of life,' by means of which images on the inside of a rotating cylinder are made visible through slots and provide an illusion of animated motion.

zo'id (*Bot.*). A zoospore.

zoid'iophi'lous (*Bot.*). Pollinated by animals.

zoid'ophore (*Zool.*). In *Haemosporidia*, a sporoblast derived from the oöcyte.

zo'isite (*Min.*). Hydrated alumino-silicate of calcium, crystallising in the orthorhombic system and occurring chiefly in metamorphic schists; also a constituent of so-called saussurite. Clinozoisite is of the same composition, but crystallises in the monoclinic system.

zona (*Med.*). See **herpes zoster.**

zona (*Zool.*). An area, patch, strip, or band; a zone.—*adjs.* **zonal, zonary, zonate.**

zona pellu'cida (*Zool.*). A thick transparent membrane surrounding the fully formed ovum in a Graafian follicle.

zona radia'ta (*Zool.*). The envelope of the Mammalian egg outside the vitelline membrane.

zonal index (*Geol.*). See **zone.**

zonary placentation (*Zool.*). The condition in which the villi are on a partial or complete girdle round the embryo, as in *Carnivora* and *Proboscidea.*

zo'nate (*Bot.*). Said of tetraspores formed in a row of four, and not in a tetrahedral group.

zonation (*Bot.*). (1) The formation of bands of different colour on the surface of a plant.—(2) The formation, by fungi in culture, of concentric bands different in colour, texture, abundance of sporulation, and so on.—(3) The occurrence of vegetation in well-marked bands, each band having its characteristic dominant species.—(4) A stage in the development of an oögonium, when the contents are arranged in two or more well-marked zones.

zone (*Bot.*). A band of colour, or of hairs, warts, or other surface feature.

zone (*Chem.*). A region of oriented molecules.

zone (*Geol.*). A subdivision of a stratigraphical series, comprising a group of strata characterised by a distinctive fauna or flora, and bearing the name of one fossil, called the **zonal index**; e.g. the *Dibunophyllum Zone*, a group of strata of variable lithology occurring high in the Lower Carboniferous Series and characterised by the rugose coral, *Dibunophyllum*.

zone of cementation (*Geol.*). That 'shell' of the earth's crust lying immediately below the zone of weathering, within which loose sediments are cemented by the addition of such minerals as calcite, introduced by percolating meteoric waters. See also **metasomatism.**

zone of faces (*Crystal.*). A number of faces, belonging to one or several forms, the normals to which lie in one plane (the *zone plane*) and whose edges of intersection are parallel to a line passing through the centre of the crystal (the *zone axis*).

zone of flow (*Geol.*). That 'earth shell' in which great directed pressure causes sediments and even rocks, particularly limestones and argillaceous rocks, to flow like pitch, with the consequent development of cleavage, foliation, and schistosity.

zone of vegetation (*Bot.*). A belt of plants having well-marked characters, occurring with other zones of different characters; the condition may often be observed in seaweeds and in the vegetation occupying the side of a mountain.

zone of weathering (*Geol.*). An 'earth shell' comprising the exposed surface and that part which, through porosity, fracturing, and jointing, is subject to the destructive action of the atmosphere, rain, and frost.

zone television (*Television*). A system of television in which different parts or zones of the image are scanned by separate devices and separately transmitted to the receiver, where they are re-combined.

zoning (*Aero.*). The specification of areas surrounding an aerodrome in which there is a known clearance above obstruction for the safe landing and taking-off of aeroplanes.—(*Town Planning*) The specification of the usage of areas, e.g. for residence, civic purposes, shopping, recreation, etc.

zoning (*Min.*). Concentric layering parallel to the periphery of a crystalline mineral, shown by colour banding in such minerals as tourmaline, and by differences of the optical reactions to polarised light in colourless minerals like feldspars; it is due to the successive deposition of layers of material differing slightly in composition.

zo'nula cilia'ris (*Zool.*). In the Vertebrate eye, a double fenestrated membrane connecting the ciliary process of the choroid with the capsule surrounding the lens.

zonule (*Zool.*). A small belt or zone, such as the zonula ciliaris of the Vertebrate eye.

zo'o- (Greek *zoon*, animal). A prefix used in the construction of compound terms; e.g. *zoogenesis*, the origin of animals.

zo'obiot'ic (*Biol.*). Parasitic on, or living in association with, an animal.

zo'ocaulon (*Zool.*). See **zoodendrium.**

zo'ochor'ous (*Bot.*). Said of spores or seeds dispersed by animals.

zo'ocyst (*Zool.*). See **sporocyst.**

zo'oden'drium (*Zool.*). The branched stalk connecting the members of the colony in certain colonial *Ciliophora.*

zooecium, zō-ē'shum (*Zool.*). The body-wall or enclosing chamber of a polyzoan individual.

zo'ogam'ete (*Zool.*). A motile gamete.

zoogamy, zo-og'— (*Zool.*). Sexual reproduction of animals.

zo'ogeog'raphy (*Zool.*). The study of animal distribution.

zo'ogloe'a (*Bot.*). A mucilaginous mass of bacteria embedded in slimy material derived from the swollen cell walls.

zo'ogo'nid (*Bot.*). See **zoospore.**

zoogonous, zō-og'—(*Zool.*). See **viviparous.**

zo'oid (*Zool.*). An individual forming part of a colony in *Protozoa* (*Volvocina*), *Coelenterata*, *Rhabdopleura*, *Urochorda*, and *Polyzoa*: in *Polychaeta*, a posterior sexual region formed by asexual reproduction; polyp; a polypide.

Zo'omastigi'na (*Zool.*). A subclass of *Mastigophora* comprising forms which lack chromatophores, generally practise holozoic nutrition, often have more than two flagella, and never have starch reserves.

zoom lens (*Photog.*). A lens in which the components can be adjusted continuously to provide a varying angle of view, while maintaining focus. See **magnascope.**

zooming (*Aero.*). The act of utilising the stored energy of the forward motion of an aircraft in order to gain height when flying. Hence ZOOM-BOMBING, the release of a bomb during a zooming manœuvre.

zoop (*Acous.*). A peculiar type of extraneous noise modulation, arising during sound-recording on wax blanks, and reproduced with the desired sounds.

zo'ophytes (*Zool.*). See **Hydrozoa.**

zo'oplank'ton (*Zool.*). Floating and drifting animal life.

zo'osporan'gium (*Bot.*). A sporangium in which zoospores are formed.

zo'ospore (*Bot.*). An asexual reproductive cell which can swim by means of flagella.

zoospore (*Zool.*). In *Protozoa*, an active germ produced by sporulation.

zootomy, zō-ot'—(*Zool.*). See **anatomy.**

Zorap'tera (*Zool.*). An order of small and usually wingless *Exopterygota* having short anal cerci comprising a single joint; they are agile, predaceous forms of social habit, living in small communities in rotting wood and in the nests of Termites; found in the tropics and subtropics.

zoster (*Med.*). See **herpes zoster.**

Zr (*Chem.*). The symbol for *zirconium.*

zu'nyite (*Min.*). A rare basic orthosilicate of aluminium, containing fluorine and chlorine; it occurs in minute cubic crystals at the Zuñi mine, Silverton, Colorado.

zurron (*Mining*). A rawhide sack used by men carrying ore. It holds about 150 lb.

zwitterion, tsvit'er-i-on (*Chem.*). An ion carrying both a positive and a negative charge.

zyg-, zy'go- (Greek *zygon*, yoke). A prefix used in the construction of compound terms; e.g. *zygobranchiate* (q.v.).

zygan'trum (*Zool.*). In Snakes and some Lizards, an additional vertebral articulation, consisting of a fossa on the posterior surface of the neural arch, into which fits the zygosphene.

zygapoph'yses (*Zool.*). Articular processes of the vertebrae of higher Vertebrates arising from the anterior and posterior sides of the neurapophyses.

zygobran'chiate (*Zool.*). Having paired, symmetrically placed gills.

zygocar'diac (*Zool.*). A term used to describe certain paired lateral ossicles in the gastric mill of *Crustacea*.

zygodac'tylous (*Zool.*). Said of Birds which have the first and fourth toes directed backwards, as Parrots.

zy'godont (*Zool.*). Having the cusps of the molar teeth united in pairs.

zygo'ma (*Zool.*). The bony arch of the side of the head in Mammals which bounds the lower side of the orbit.

zygomat'ic (*Zool.*). Pertaining to the zygoma. See also **jugal.**

zygomatic arch (*Zool.*). See **zygoma.**

zygomatic bone (*Zool.*). See **jugal.**

zygomat'ico- (Greek *zygoma*, yoke). A prefix used in the construction of compound terms in relation to the zygoma; e.g. *zygomaticotemporal*, pertaining to the temporal surface of the zygoma.

zygomor'phic, zygomor'phous (*Bot.*, *Zool.*). Divisible into half by one longitudinal plane only: bilaterally symmetrical.—*n.* **zy'gomorphy.**

Zygomyce'tes (*Bot.*). A subdivision of the *Phycomycetes*, including about 300 species, mostly saprophytes, but some parasitic in insects or on other fungi. There are no motile stages in the life-history, and sexual reproduction occurs by the union of multinucleate gametangia which seldom differ much in size and shape.

zygone'ma (*Cyt.*). The zygotene phase of meiosis.

zy'goneur'y (*Zool.*). In some *Gastropoda*, the condition of having the pallial nerves from the pleural ganglion passing direct to the ganglion of the visceral commissure of the same side, from which the mantle nerves of that side appear to originate. Cf. *dialyneury*.

zy'gophase (*Biol.*). The diploid portion of the life-history.

zy'gophore (*Bot.*). A mycelial branch bearing a gametangium in the *Zygomycetes*.

zy'gopleur'y (*Zool.*). Bilateral symmetry.

zygopo'dium (*Zool.*). That part of the fore limb in *Tetrapoda* between the brachium and the basipodium; forearm.

zygo'sis (*Zool.*). See **conjugation.**

zy'gosome (*Zool.*). See **mixochromosome.**

zy'gosphene (*Zool.*). In Snakes and some Lizards, an additional vertebral articulation, consisting of a process on the anterior surface of the neural arch, which fits into the zygantrum.

zy'gospore (*Bot.*). A thick-walled resting spore formed after the union of isogametes or of isogametangia.—(*Zool.*) See **zygote.**

zygospor'ophore (*Bot.*). The suspensor in the *Zygomycetes*.

zy'gote (*Bot.*, *Zool.*). The product of the union of two gametes: in Botany (by extension), the diploid plant developing from that product.

zy'gotene (*Cyt.*). The second stage of meiotic prophase, intervening between leptotene and pachytene, in which the chromatin threads approximate in pairs and become loops.

zygot'ic (*Bot.*, *Zool.*). Relating to, or belonging to, a zygote.

zygotic meiosis (*Cyt.*). Meiosis occurring at the first two divisions of the nucleus resulting from gametic union.

zygotic number (*Cyt.*). The diploid chromosome number.

zygot'onucleus (*Zool.*). A nucleus resulting from the union of two gametonuclei.

zy'mase (*Chem.*). An enzyme inducing the alcoholic fermentation of carbohydrates.

zy'mogen (*Bot.*, *Zool.*). A non-catalytic substance formed by plants and animals as a stage in the development of an enzyme; it is convertible into the active enzyme and a protein by the action of a kinase or zymoexcitor.

zymo'sis (*Med.*). Fermentation. The morbid process, thought to be analogous to fermentation, constituting a zymotic (infectious) disease.

zymot'ic (*Med.*). Of, pertaining to, or causing, an infectious disease: an infectious disease.

THE GREEK ALPHABET

The letters of the Greek alphabet, frequently used in technical terms, are given here for purposes of convenient reference.

Α	α	alpha	=	a	Ν	ν	nu	=	n
Β	β	bēta	=	b	Ξ	ξ	xi	=	x
Γ	γ	gamma	=	g	Ο	ο	omīcron	=	o
Δ	δ	delta	=	d	Π	π	pi	=	p
Ε	ϵ	epsīlon	=	e	Ρ	ρ	rho	=	rh, r
Ζ	ζ	zēta	=	z	Σ	σ ς	sigma	=	s
Η	η	ēta	=	ē	Τ	τ	tau	=	t
Θ	θ ϑ	thēta	=	th	Υ	υ	upsīlon	=	ü
Ι	ι	iōta	=	i	Φ	φ	phi	=	ph
Κ	κ	kappa	=	k	Χ	χ	chi	=	kh
Λ	λ	lambda	=	l	Ψ	ψ	psi	=	ps
Μ	μ	mu	=	m	Ω	ω	ōmega	=	ō

TABLE OF CHEMICAL ELEMENTS

Symbol	Name	Derived from	Valence No.	Atomic No.	Atomic Wt.	Specific Gr.	Melting or Fusing Pt. °C	Discovered by	Date
A	**Argon**	Greek, *argos*=inactive	0	18	39 944	Gas	−188	Rayleigh and Ramsay	1894
Ac	**Actinium**	Greek, *aktis*=ray	3	89	[227]	..	..	Debierne	1899
Ag	**Silver (argentum)**	Anglo-Saxon, *seolfor*	1	47	107·880	10·5	960	Prehistoric	..
Al	**Aluminium**	Latin, *alumen*=alum	3	13	26·97	2·58	658	Wöhler	1828
As	**Arsenic**	Latin, *arsenicum*	3 or 5	33	74·91	5·73	Volatile, 450	Schröder	1649
Au	**Gold (aurum)**	Anglo-Saxon, *gold*	1 or 3	79	197·2	19·3	1062	Prehistoric	..
B	**Boron**	Persian, *bûrah*	3	5	10·82	2·5	2300	Davy	1808
Ba	**Barium**	Greek, *barys*=heavy	2	56	137 36	3·75	850	Davy	1808
Be	**Beryllium**	Greek, *beryllion*=beryl	2	4	9·02	1·93	1281	Wöhler	1828
Bi	**Bismuth**	German (origin unknown)	3 or 5	83	209·00	9·80	268	Valentine	1450
Br	**Bromine**	Greek, *bromos*=stench	1 or 7	35	79 916	3·19	−7·3	Balard	1826
C	**Carbon**	Latin, *carbo*=charcoal	4	6	12 010	3·52	Infusible	Prehistoric	..
Ca	**Calcium**	Latin, *calx*=lime	2	20	40·08	1·58	851	Davy	1808
Cb	**Columbium (niobium)**	Columbia	5	41	92·91	8·4	1950	Hatchett	1801
Cd	**Cadmium**	Greek, *kadmeia*=calamine	1 or 2	48	112·41	8·64	320	Stromeyer	1817
Ce	**Cerium**	Planet Ceres	3 or 4	58	140·13	6·68	623	Berzelius	1803
Cl	**Chlorine**	Greek, *chloros*=green	1, 3, 5, 7	17	35·457	Gas	−102	Scheele	1774
Co	**Cobalt**	German, *Kobold*=goblin	2 or 3	27	58·94	8·6	1490	Brandt	1739
Cr	**Chromium**	Greek, *chroma*=colour	2, 3 or 6	24	52 01	6·5	1510	Vauquelin	1797
Cs	**Caesium**	Latin, *cæsium*=bluish-grey	1	55	132·91	1·88	26	Bunsen	1860
Cu	**Copper (cuprum)**	Cyprus	1 or 2	29	63·57	8·9	1083	Prehistoric	..
Dy	**Dysprosium**	Greek, *dysprositos*	3	66	162·46	..	..	Boisbaudran	1886
Er	**Erbium**	Ytterby, a Swedish town	3	68	167·2	4·8	..	Mosander	1843
Eu	**Europium**	Europe+*ium*	3	63	152 0	..	..	Demarcay	1896
F	**Fluorine**	Latin, *fluo*=flow	1	9	19·00	Gas	−223	Scheele	1771
Fe	**Iron (ferrum)**	Anglo-Saxon, *iren*	2 or 3	26	55·84	7·86	1525	Prehistoric	..
Ga	**Gallium**	Latin, *Gallia*=France	3	31	69·72	5·95	30	Boisbaudran	1875
Gd	**Gadolinium**	Gadolin, a Finnish chemist	3	64	156·9	..	..	Marignac	1880
Ge	**Germanium**	Latin, *Germania*=Germany	4	32	72·60	5·47	958	Winkler	1886
Gl	**Glucinum (beryllium)**	Greek, *glykys*=sweet	2	4	9·02	1·93	1281	Wöhler	1828
H	**Hydrogen**	Greek, *hydor*=water+*gen*	1	1	1·0081	Gas	−258	Cavendish	1766
He	**Helium**	Greek, *helios*=sun	0	2	4·003	Gas	−272	Ramsay	1895
Hf	**Hafnium**	*Hafnia*=Copenhagen	4	72	178·6	12·1	2500	Coster and Hevesey	1923
Hg	**Mercury (hydrargyrum)**	Mercury (myth)	1 or 2	80	200·61	13·596	−38·9	Prehistoric	..
Ho	**Holmium**	*Holmia*=Stockholm	3	67	163·5	..	..	Cleve	1879
I	**Iodine**	Greek, *iodes*=violet	1, 3, 5, 7	53	126·915	4·95	114	Courtois	1811
Il	**Illinium**	Illinois, U.S.A.	..	61	..	..	..	Harris, Yntema and Hopkins (?).	1926
In	**Indium**	Its indigo spectrum	3	49	114·76	7·4	155	Reich and Richter	1863

Ir	Iridium	Latin, *iris*=a rainbow	2 or 4	77	193·1	22·4	2375	Tennant	1803
K	Potassium (kalium)	English, *potash*	1	19	39·096	0·87	63	Davy	1807
Kr	Krypton	Greek, *kryptos*=hidden	0	36	83·7	Gas	−169	Ramsay and Travers	1898
La	Lanthanum	Greek, *lanthanō*=conceal	3	57	138·92	6·1	810	Mosander	1839
Li	Lithium	Greek, *lithos*=stone	1	3	6·940	0·585	186	Arfvedson	1817
Lu	Lutecium	Lutetia, ancient name of Paris	3	71	175·0	..	..	Urbain and Welsbach	1907
Ma	Masurium	Masuria, East Prussia	..	43	..	..	..	Noddack, Tacke and Berg.	1925
Mg	Magnesium	Magnesia, district in Thessaly	2	12	24·32	1·74	651	Bussy	1829
Mn	Manganese	Latin, *magnes*=magnet	2, 3, 4, 6, 7	25	54·93	7·39	1220	Gahn	1774
Mo	Molybdenum	Greek, *molybdos*=lead	2 or 6	42	95·95	8·6	2500	Hjelm	1782
N	Nitrogen	Greek, *nitron*=saltpetre	3 or 5	7	14·008	Gas	−211	D. Rutherford	1772
Na	Sodium (natrium)	English, *soda*	1	11	22·997	0·978	97	Davy	1807
Nb	Niobium (columbium)	Latin, *Niobe*	See Columbium (Cb)						
Nd	Neodymium	Greek, *neos*=new and *didymos* =twin.	3 or 4	60	144·27	6·96	840	Welsbach	1885
Ne	Neon	Greek, *neos*=new	0	10	20·183	Gas	−248·6	Ramsay and Travers	1898
Ni	Nickel	Swedish, abbreviation of kupparnickel.	2 or 3	28	58·69	8·9	1452	Cronstedt	1751
O	Oxygen	Greek, *oxys*=acid+*gen*	2 or 4	8	16·00	Gas	−227	Priestley	1774
Os	Osmium	Greek, *osme*=odour	2 or 8	76	190·2	22·48	2700	Tennant	1803
P	Phosphorus	Latin, from Greek 'light-bearing.'	3 or 5	15	30·98	1·8–2·3	44	Brandt	1669
Pa	Protactinium	Greek, *protos*=first+*actinium*	5	91	231	..	..	Hahn and Meitner	1917
Pb	Lead (plumbum)	Anglo-Saxon, *lead*	2 or 4	82	207·21	11·37	327	Prehistoric	..
Pd	Palladium	Planet Pallas	2 or 4	46	106·7	11·4	1549	Wollaston	1804
Po	Polonium	Poland	2, 3 or 4	84	[210]	..	..	Mme. Curie	1898
Pr	Praseodymium	Greek, *prasios* = green and *didymos*=twin.	3 or 4	59	140·92	6·48	940	Welsbach	1885
Pt	Platinum	Spanish, *platina*=silver	2 or 4	78	195·23	21·5	1755	Wood	1741
Ra	Radium	Latin, *radius*=ray	2	88	226·05	6·0	700	Mme. and M. Curie and Bémont.	1898
Rb	Rubidium	Latin, *rubidus*=red	1	37	85·48	1·52	39	Bunsen	1860
Re	Rhenium	German, *Rhein*	2, 3, 4, 6, 7	75	186·31	21	3000	Noddack and Tacke	1925
Rh	Rhodium	Greek, *rhodon*=rose	2 or 3	45	102·91	12·1	1950	Wollaston	1804
Rn	Radon (niton)	Radium emanation	0	86	222	Gas	−150	Dorn	1901
Ru	Ruthenium	Ruthenia	3, 4 or 8	44	101·7	12·26	2400	Claus	1845
S	Sulphur	Latin, *sulfur*	2, 4 or 6	16	32·06	2·07	115–119	Prehistoric	..
Sb	Antimony (stibium)	L. Latin, *antimonium*	3 or 5	51	121·76	6·62	629	Valentine	1450
Sc	Scandium	Scandinavia	3	21	45·10	..	..	Nilson	1879
Se	Selenium	Greek, *selene*=moon	2, 4 or 6	34	78·96	4·5	170–220	Berzelius	1817
Si	Silicon	Latin, *silex*=flint	4	14	28·06	2·0–2·4	1370	Berzelius	1823
Sm	Samarium	Samarski, a Russian savant	3	62	150·43	7·7	1350	Boisbaudran	1879
Sn	Tin (stannum)	Anglo-Saxon, *tin*	2 or 4	50	118·70	7·3	232	Prehistoric	..
Sr	Strontium	Strontian, a Scottish village	2	38	87·63	2·54	800	Davy	1808
Ta	Tantalum	Tantalus (Greek myth)	5	73	180·88	16·6	2900	Ekeberg	1802
Tb	Terbium	Ytterby, a Swedish quarry	3	65	159·2	..	..	Mosander	1843
Te	Tellurium	Latin, *tellus*=earth	2, 4 or 6	52	127·61	6·0	446	Reichenstein	1782
Th	Thorium	God Thor	4	90	·232·12	11·00	1750	Berzelius	1828
Ti	Titanium	Latin, *Titanes*=sons of the earth.	3 or 4	22	47·90	4·54	1850	Gregor	1789

TABLE OF CHEMICAL ELEMENTS—*Continued*

SYMBOL	NAME	DERIVED FROM	VALENCE No.	ATOMIC		SPECIFIC GR.	MELTING OR FUSING PT. °C	DISCOVERED BY	DATE
				No	Wt.				
Tl	**Thallium**	Greek, *thallos* = budding twig	1 or 3	81	204 39	11 85	302	Crookes	1862
Tm	**Thulium**	Thule = Northland	3	69	169·4	..	.	Cleve	1879
U	**Uranium**	Planet Uranus	2 or 6	92	238 07	18 7	..	Klaproth	1789
V	**Vanadium**	Goddess Vanadis (Freya)	5	23	50 95	5·5	1710	Sefström	1830
W	**Tungsten (wolframium)**	Swedish, heavy stone	4 or 6	74	183 92	19 1	2900–3000	d'Elhujar	1781
Xe	**Xenon**	Greek, *xenos* = stranger	0	54	131 3	Gas	−140	Ramsay and Travers	1898
Yb	**Ytterbium (neo-ytterbium).**	Ytterby, a Swedish quarry	3	70	173·04	..	..	Marignac	1878
Yt	**Yttrium**	Ytterby, a Swedish quarry	3	39	88·92	3·8	.	Gadolin	1794
Zn	**Zinc**	German, *zink*	2	30	65·38	7·12	418	Unknown	before 1500
Zr	**Zirconium**	Persian, *zargun* = gold-coloured	4	40	91 22	4 15	2130	Berzelius	1824

THE PERIODIC TABLE

PERIODS	GROUP 0	GROUP I *a* *b*	GROUP II *a* *b*	GROUP III *a* *b*	GROUP IV *a* *b*	GROUP V *a* *b*	GROUP VI *a* *b*	GROUP VII *a* *b*	GROUP VIII
OXIDES HYDRIDES	.. ..	R_2O RH	RO RH_2	R_2O_3 .	RO_2 RH_4	R_2O_5 RH_3	RO_3 RH_2	R_2O_7 RH	RO_4 ..
First short period	**2 He** 4·003	**1 H** 1·0081 **3 Li** 6·940	**4 Be (Gl)** 9·02	**5 B** 10·82	**6 C** 12·010	**7 N** 14·008	**8 O** 16·0000	**9 F** 19·00	
Second short period	**10 Ne** 20·183	**11 Na** 22·997	**12 Mg** 24·32	**13 Al** 26·97	**14 Si** 28·06	**15 P** 30·98	**16 S** 32·06	**17 Cl** 35·457	
First long period, Even series	**18 A** 39·944	**19 K** 39·096	**20 Ca** 40·08	**21 Sc** 45·10	**22 Ti** 47·90	**23 V** 50·95	**24 Cr** 52·01	**25 Mn** 54·93	**26 Fe** 55·84 **27 Co** 58·94 **28 Ni** 58·69
First long period, Odd series		**29 Cu** 63·57	**30 Zn** 65·38	**31 Ga** 69·72	**32 Ge** 72·60	**33 As** 74·91	**34 Se** 78·96	**35 Br** 79·916	
Second long period, Even series	**36 Kr** 83·7	**37 Rb** 85·48	**38 Sr** 87·63	**39 Y** 88·92	**40 Zr** 91·22	**41 Nb (Cb)** 92·91	**42 Mo** 95·95	**43 Ma** ..	**44 Ru** 101·7 **45 Rh** 102·91 **46 Pd** 106·7
Second long period, Odd series		**47 Ag** 107·880	**48 Cd** 112·41	**49 In** 114·76	**50 Sn** 118·70	**51 Sb** 121·76	**52 Te** 127·61	**53 I** 126·92	
Third long period, Even series	**54 Xe** 131·3	**55 Cs** 132·91	**56 Ba** 137·36	**57 La** 138·92	**58 Ce** 140·13 **59 Pr** 140·92	**60 Nd** 144·27	**61 Il** .. **62 Sm** 150·43	**63 Eu** 152·0 **64 Gd** 156·9	**65 Tb** 159·2
	66 Dy 162·46	**67 Ho** 163·5 **68 Er** 167·2	**69 Tm** 169·4 **70 Yb** 173·04	**71 Lu** 175·0	**72 Hf** 178·6	**73 Ta** 180·88	**74 W** 183·92	**75 Re** 186·31	**76 Os** 190·2 **77 Ir** 193·1 **78 Pt** 195·23
Third long period, Odd series		**79 Au** 197·2	**80 Hg** 200·61	**81 Tl** 204·39	**82 Pb** 207·21	**83 Bi** 209·00	**84 Po** [210]	**85** ..	
Fourth long period, Even series	**86 Rn** 222	**87** ..	**88 Ra** 226·05	**89 Ac** ..	**90 Th** 232·12	**91 Pa** 231	**92 U** 238·07		

Based on the Table in 'A Text-book of Inorganic Chemistry' (Griffin and Co. Ltd).

The chemical elements are arranged in ascending order of atomic number (printed in heavy type), which is equal to the total number of planetary electrons in an atom of the element, or to the net positive charge on the nucleus. With four exceptions (A-K, Co-Ni, Te-I, and Th-Pa), this is also the order of increasing atomic weight (the values for 1939 are given). If elements of Group O, which are chemically inert, are excluded, metallic (electropositive) properties become more pronounced towards the bottom left-hand corner of the table, while non-metallic (electronegative) properties are most marked in the top right-hand corner (fluorine). Elements in the same vertical group, especially those in the same subgroup, have a similar character, and show a gradation of properties with increasing atomic weight. There is also a steady change in physical and chemical properties in passing from one end to the other of a horizontal period. The *rare earth elements* (57-71) are enclosed in a thick black line, as they are regarded as occupying a single position in the periodic system. See **periodic system, rare earth elements, transition metals.**

IGNEOUS ROCKS—A. GENERAL TABLE

	COARSE-GRAINED commonly occurring in deep-seated, major intrusions PLUTONITES	MEDIUM-GRAINED commonly occurring in minor intrusions	FINE-GRAINED commonly occurring as lava flows VULCANITES
ACID Silica percentage exceeding 66. Quartz > 10%	GRANITE CLAN (see also Expanded Table, p. 930)		
	ALKALI GRANITE Graphic granite ADAMELLITE GRANODIORITE	Graphic microgranite (=granophyre) MICROGRANITE GRANITE-PORPHYRY Quartz-porphyry Granite-aplite	RHYOLITE Spherulitic rhyolite Obsidian Pumice Pitchstone 'Perlite'
INTERMEDIATE Silica percentage 55 to 66. Normally, quartz < 10%	SYENITE CLAN (see also Expanded Table, p. 931)		
	Quartz-syenite SYENITE (alkali feldspar, e.g. orthoclase, albite, or feldspathoid in excess)	MICROSYENITE SYENITE-PORPHYRY	TRACHYTE LEUCITOPHYRE PHONOLITE
	MONZONITE CLAN		
	Quartz-monzonite (=Banatite) MONZONITE (=SYENODIORITE)	MICROMONZONITE MONZONITE-PORPHYRY Syenite-aplite, e.g. Bostonite	TRACHYANDESITE Vulsinite Banakite

INTERMEDIATE (*contd.*)	DIORITE CLAN		
	DIORITE (soda-lime feldspar in excess) Quartz-mica-diorite (=**TONALITE**)	**MICRODIORITE** **DIORITE-PORPHYRY** (=' Porphyrite ' of some Authors) Diorite-aplite	**ANDESITE**
BASIC Silica percentage <55.	GABBRO CLAN		
	ALKALI GABBRO (See Expanded Table, p. 931)	**ALKALI MICROGABBRO** e.g. **NEPHELINE-DOLERITE** **ESSEXITE-DOLERITE**, etc. **TESCHENITE** } in part **CRINANITE** } (See also Expanded Table, p. 932)	**FELDSPATHOIDAL BASALTS** **TEPHRITES** **BASANITES**, etc. (See also Expanded Table, p. 931)
	KENTALLENITE	**MICROKENTALLENITE**	**TRACHYBASALT**
	CALC-ALKALI (NORMAL) GABBRO including **NORITE** Gabbro-pegmatite } ultra-coarse Norite-pegmatite } (See also Expanded Table, p. 932)	**MICROGABBRO = DOLERITE** (=' **DIABASE** ' of some Authors) (See also Expanded Table, p. 932) Gabbro-aplite	**CALC-ALKALI (NORMAL) BASALT** including Tachylite =basalt-glass (See also Expanded Table, p. 932)
	ULTRAMAFIC TYPES (see also Expanded Table, p. 933)		
	PICRITE **PERKNITE** **PERIDOTITE** (See also Expanded Table, p. 933)		**ULTRAMAFIC BASALT** (=' **MAGMA-BASALT** ') **AUGITITE** **LIMBURGITE** Lamprophyres of some types: e.g. { **MONCHIQUITE** { **ALNOITE**

IGNEOUS ROCKS—B. EXPANDED TABLE

Note.—The Diorite Clan is omitted from the table, it being set out as fully as is necessary in Table A., p. 929.

COARSE-GRAINED	MEDIUM-GRAINED	FINE-GRAINED
GRANITE CLAN		
ALKALI GRANITES (alkali feldspar $> \frac{2}{3}$ of total) **POTASH-GRANITES** $\left(\begin{matrix}\text{orthoclase}\\ \text{microcline}\end{matrix} > \text{albite}\right)$ e.g. Charnockite Potash-leucogranite = aplogranite **SODA-GRANITES** (albite > orthoclase) e.g. Rockallite (mafic var.) Soda-leucogranite = aplogranite with $<5\%$ dark minerals Textural variants :— graphic granite = Runite orbicular granite granite-aplite, fine-grained granite-pegmatite, coarse-grained	0·5 mm. grain diameter POTASH-MICROGRANITES POTASH-GRANITE-PORPHYRIES (= 'Quartz-porphyries' of some Authors) SODA-MICROGRANITES SODA-GRANITE-PORPHYRIES some 'Quartz-porphyries.' Aegirine-microgranite = Grorudite Riebeckite-microgranite graphic microgranites = potash-granophyres soda-granophyres	0·05 mm. grain diameter POTASH-RHYOLITES (= LIPARITES) SODA-RHYOLITES (= LIPARITES) e.g. Pantellerites (with anorthoclase) rhyolitic pumice ,, obsidian ,, pitchstone perlitic pitchstone spherulitic rhyolite felsite (devitrified)
ADAMELLITES	MICRO-ADAMELLITES ADAMELLITE-PORPHYRIES	TOSCANITES
GRANODIORITES (plagioclase $> \frac{2}{3}$ total feldspar) Trondhjemite—orthoclase absent or accessory only	MICRO-GRANODIORITES GRANODIORITE-PORPHYRIES	DACITES

SYENITE CLAN

POTASH-SYENITES over-saturated: Quartz-syenite, e.g. Plauenite saturated: Potash-orthosyenite under-saturated: Leucite-syenite	POTASH-MICROSYENITES porphyritic = syenite-porphyry Leucite-microsyenite Leucite-syenite-porphyry	POTASH-TRACHYTES Quartz-trachytes Normal (Ortho-)trachyte Leucite-trachyte = Leucitophyre feldspar-free type = Wyomingite
SODA-SYENITES over-saturated: Quartz-syenite, e.g. Nordmarkite saturated: Soda-orthosyenite, e.g. Laurvikite	SODA-MICROSYENITES 'Soda-syenite-porphyry' e.g. microlaurvikite = 'rhomb-porphyry' (in part) Soda-syenite-aplites Bostonite	SODA-TRACHYTES Quartz-soda-trachyte Normal soda-trachyte, e.g. Keratophyre Soda-syenite-aplite, e.g. Bostonite (in part)
under-saturated:— Nepheline-syenites { Foyaite with orthoclase Laurdalite with anorthoclase Pulaskite with plagioclase Litchfieldite with albite dominant Monmouthite, feldspar accessory	Nepheline-microsyenites e.g. microfoyaite	Nepheline-trachyte = Phonolite Tinguaite (with aegirine) Kenyte (with anorthoclase) Haüyne-nepheline-trachyte = haüynophyre
Sodalite-nepheline syenite } Ditróite Sodalite-syenite Analcite-syenite	Sodalite-microsyenite Analcite-microsyenite	
Syenite-pegmatites (ultra-coarse)	Syenite-aplites	

GABBRO CLAN

Grain area > 1 sq. mm. ALKALI GABBROS POTASH-GABBROS Shonkinite Borolanite Missourite (feldspar-free)	ALKALI DOLERITES	Grain area < 0·05 sq. mm. FELDSPATHOIDAL BASALTS with leucite:— Leucite-basalts { Leucite-tephrite Leucite-basanite Leucitite } without feldspar Olivine-leucitite } without feldspar

IGNEOUS ROCKS—B. EXPANDED TABLE—*Continued*

COARSE-GRAINED	MEDIUM-GRAINED	FINE-GRAINED
	GABBRO CLAN—*Continued*	
SODA-GABBROS **nepheline essential :—** **Nepheline-gabbros**: Theralite (plagioclase-bearing) Covite (orthoclase-bearing) Ijolite, Jacupirangite: feldspar-free types **analcite essential :—** **Analcite-gabbros**: Teschenite Crinanite Lugarite **accessory nepheline and analcite :—** Essexite (Mafic facies = Kylite)	Nepheline-dolerites: Theralite, in part. Logically should be Microtheralite Micro-ijolite, etc. Analcite-dolerites: Teschenite, etc. in part. Logically should be Microteschenite Microcrinanite, etc.	with nepheline :— Nepheline-basalts: Nepheline-tephrite Nepheline-basanite Nephelinite, Olivine-nephelinite: without feldspar with analcite :— **Analcite-basalts**: Analcite-tephrite Analcite-basanite Analcitite, Olivine-analcitite: **without feldspar**
CALC-ALKALI GABBROS **clinopyroxene dominant**: Gabbro Quartz-gabbro Olivine-gabbro Hypersthene-gabbro Eucrite (olivine-hypersthene-gabbro) **orthopyroxene dominant**: Norite Orthonorite Quartz-norite Olivine-norite **pyroxene-free types**: Troctolite (labradorite plus olivine) Allivalite (anorthite plus olivine) **feldspar only**: Anorthosite	MICROGABBROS = DOLERITES Dolerite Quartz-dolerite Olivine-dolerite Hypersthene-dolerite Diabase of U.S.A. Geol. Surv. No known medium- and fine-grained equivalents.	CALC-ALKALI BASALTS Quartz-basalt Olivine-basalt Basalts (s.s.) Albite-basalt (=Spilite) Oligoclase-basalt including Mugearite Plateau-basalt Picrite-basalt (=Oceanite) Tachylyte (=tachylite, Basalt-glass) Variolite (variolitic basalt)

ULTRAMAFIC TYPES		
PICRITES (olivine essential, feldspar accessory) Hornblende-picrite Enstatite-picrite Augite-picrite PERKNITES (neither feldspar nor olivine)— Pyroxenites: essentially orthopyroxene — Enstatitite, Hypersthenite, Bronzitite Pyroxenites: essentially clinopyroxene — Diallagite Pyroxenites: with ortho- and clinopyroxenes — Websterite Pyroxenites: with mica — Biotite-pyroxenite Hornblendites Eclogites sometimes grouped here PERIDOTITES (olivine essential) with orthopyroxene — Saxonite, Harzburgite with diallage — Lherzolite with pyroxene and hornblende — Cortlandtite with hornblende and mica — Scyelite with mica — Kimberlite		Ultramafic lavas See TABLE A., p. 929.

Based on the classification by Hatch and Wells in *Petrology of the Igneous Rocks* (1937).

SEDIMENTARY ROCKS

FRAGMENTAL (CLASTIC) DEPOSITS			Indurated Equivalents
RUDACEOUS	blocks ← 250 mm. cobbles	SCREES (angular debris) BOULDER BEDS	BRECCIAS (in part) BOULDER CONGLOMERATES
	← 50 mm. pebbles ← 2 mm.	GRAVELS (pebbles and/or cobbles plus sand) PEBBLE BEDS { monogenetic polygenetic	CONGLOMERATES
ARENACEOUS	sand grain (rounded) grit grain (angular) very coarse ← 1·0 mm. coarse ← 0·5 mm. medium ← 0·25 mm. fine ← 0·10 mm.	SAND very coarse coarse medium fine	SANDSTONES GRITSTONES Quartzites Chalcedonic sandstones Calcareous ,, Ferruginous ,, Sideritic ,, Glauconitic ,, and gritstones ARKOSE (with > 10% feldspar)
	silt particle coarse ← 0·05 mm. fine ← 0·005 mm.	SILT coarse fine	SILTSTONES
ARGILLACEOUS	clay particle	CLAY = rock flour + clay minerals, e.g. kaolinite, dickite, montmorillonite, halloysite, nontronite, etc.	MUDSTONES, massive ARGILLITES, hard, with conchoidal fracture SHALES, fissile FLAGS, often sandy or calcareous
		MARINE CLAYS :— Blue mud Green mud Red mud Black mud	
		LACUSTRINE CLAY, e.g. Pipe clay of Bovey Tracey	
		AEOLIAN CLAYS Loess Adobe	
		GLACIAL CLAY Boulder clay (some)	Tillite
		Varve clay	Varve shale

CLAYS ultimately of volcanic origin:—
- Bentonite
- Fullers' Earth
- Palagonite muds

MARL = calcareous clay

Hydraulic limestone (= 'cement-stone')

CALCAREOUS DEPOSITS > 50% carbonate

1. ORGANIC
   - Shell-fragment limestone
   - Coral limestone—reef limestone (in part)
   - Foraminiferal limestone, e.g. nummulitic limestone
   - Crinoidal limestone
   - Algal limestone:—marine—modern and ancient reef limestones
     - fresh-water—Chara limestone
   - Pellet limestone

2. DETRITAL
   - product of disintegration and redeposition of pre-existing limestones
     - Limestone sand
     - Coral sand
     - Coral mud

3. CHEMICALLY PRECIPITATED
   - Aragonite mud (unconsolidated) ⟶ calcite mudstone (indurated)
   - =drewite (in marine environment)
     - Oolitic limestone
     - Pisolitic ,,
   - Hot spring and lacustrine deposits
     - Calcareous sinter
     - Travertine
     - Tufa
       - lithoid
       - thinolithic
       - dendritic
   - Cave deposits
     - Stalactite
     - Stalagmite

4. DOLOMITE- AND MAGNESITE-LIMESTONES
   - Dolomitic limestone, Dolomite rock
     - primary
       - detrital
       - precipitated
     - secondary
       - penecontemporaneous, e.g. laminosa dolomite
       - subsequent (vein-) dolomite
   - Pseudobreccia (partially dolomitised)
   - Magnesian limestone
   - Magnesite rock

SILICEOUS DEPOSITS

		INDURATED EQUIVALENTS
ORGANIC	Radiolarian ooze Radiolarian earth (Barbados earth)	Radiolarian chert 'phtanite' jasper (some) Radiolarite
	Diatomaceous ooze Diatomaceous earth Tripoli powder 'Infusorial earth' Kieselguhr	Diatomite Diatomaceous chert
	Spicular chert	

CARBONACEOUS DEPOSITS

RECENT		TERTIARY AND EARLIER
Peat	Tundra peat Moorland peat Fen peat	Lignite and jet Brown coal Humic coal Semianthracite Anthracite
Sapropel		Cannel (spore coal) Boghead coal (algal) torbanite tasmanite Oil shale

SEDIMENTARY ROCKS—*Continued*

SILICEOUS DEPOSITS—*Continued*

INORGANIC
- Siliceous sinter (=geyserite)
- Rhynie chert=silicified peat
- Silicified limestones } metasomatic in part
- Oölitic chert } metasomatic in part
- Spherulitic chert } metasomatic in part

CARBONACEOUS DEPOSITS—*Continued*

BITUMENS
- Asphalt, e.g. from Pitch Lake, Trinidad
- Maltha (semi-fluid asphalt)
- Albertite=gilsonite
- Elaterite
- Ozokerite

FERRIFEROUS DEPOSITS

I. PRIMARY, CONTEMPORANEOUS

(A) MARINE

classified as (1) ferrous (without) and (2) ferric, with free iron oxide

- Sideritic limestones, e.g. parts of the Marlstone
- Siderite mudstones
- Chamosite-siderite-rocks
  - Cleveland ironstone
  - Northampton ironstone
- Chamosite ironstones (=chamosite mudstone)
  - Marlstone (in part)
  - Pisolitic chamosites of N. Wales
  - Wabana iron ores, in Lower Ordovician of Newfoundland
- Primary haematitic limestones
  - Rhiwbina ore of S. Wales
  - Bryozoa Bed of S.W. Province of the Carboniferous
- Limonitic ironstones
  - Oöliths of limonite in chamosite (Frodingham)
  - ,, ,, ,, ,, sideritic clay (Claxby)
  - ,, ,, ,, ,, sandstone (Kellaway's Rock)
- Glauconitic sands, sandstones, and muds=greensands
- Greenalite ironstones

(B) FRESH-WATER

- Bog limonites (Recent) (=bog iron ores)
- Clay ironstones of Coal Measures (siderite-rich nodules)
- Blackband ironstone—free from clay, but with 10-20% coaly material

(C) RESIDUAL

- Pisolitic and oolitic limonites
- Sphaerosiderites in Coal Measures and Wealden
- Laterite

II. SECONDARY REPLACEMENT ORES (included here, though metasomatic)

- Haematite ores in Carboniferous of Lancashire, etc.

CHEMICAL DEPOSITS	PHOSPHATIC DEPOSITS
SALT DEPOSITS of marine origin ; or from salt lakes, e.g. Stassfurt. Below clay cover :— 4. carnallite zone 3. kieserite zone 2. polyhalite zone 1. rock-salt zone rock-salt in large excess, associated with anhydrite DEPOSITS OF BORATES, ultimately of volcanic origin Borax, e.g. at Searles Marsh, Cal. Colemanite (calcium borate) at Calico, Cal. Tincal (sodium borate) in Thibet DEPOSITS OF NITRATES Chile saltpetre (sodium nitrate) impure material = CALICHE DEPOSITS OF ALKALI CARBONATES occur in NATRON (SODA) LAKES :— Trona $Na_2CO_3 \cdot NaHCO_3 \cdot 2H_2O$ Gaylussite $CaCO_3 \cdot Na_2CO_3 \cdot 5H_2O$ See also under SILICEOUS and CALCAREOUS DEPOSITS	Minerals of phosphate deposits :— Collophane (=collophanite) $Ca_3(PO_4)_2 \cdot H_2O$ Apatite $Ca_3(PO_4)_2 \cdot CaF_2$ (or $CaCl_2$) Dahllite $4Ca_3(PO_4)_2 \cdot 2CaCO_3 \cdot H_2O$ Variscite $AlPO_4 \cdot 2H_2O$ Vivianite $Fe_3(PO_4)_2 \cdot 8H_2O$ PRIMARY PHOSPHATES Bone beds, e.g. Rhaetic bone bed Guano Marine coprolite deposits Bedded phosphorite Phosphatic nodules DERIVED PHOSPHATE DEPOSITS Nodule beds, e.g. Cambridge Greensand 'dark phosphate' (derived) 'light phosphate' (indigenous)
	Based on the classification by Black, Hatch, and Rastall in *Petrology of the Sedimentary Rocks* (1938).

THE VEGETABLE KINGDOM

Subkingdom	Division	Class	Subclass	Order
Thallophyta	Schizophyta	Schizomycetes		Eubacteriales Actinomycetales Chlamydobacteriales Thiobacteriales Myxobacteriales
	Myxothallophyta	Myxomycetes	Exosporeae	Ceratiomyxales
			Endosporeae	Amaurosporales Lamprosporales
		Phytomyxinae		Plasmodiophorales
		Acrasieae		Acrasiales
	Flagellatae	Pantostomatinae		Pantostomatales
		Protomastiginae		Protomastigales
		Distomatinae		Distomatales
		Chrysophyceae		Chrysomonadales
		Cryptophyceae		Cryptomonadales
		Chloromonadinae		Chloromonadales
		Eugleninae		Euglenales Colaciales
	Dinoflagellatae	Dinophyceae	Desmokontae	Desmomonadales Dinophysidales
			Dinokontae	Dinoflagellata
	Bacillariophyta	Bacillariophyceae		Centrales Pennales

	Cyanophyta	Myxophyceae		Chroococcales Chamaesiphonales Hormogoneales
	Algae	Chlorophyceae		Volvocales Ulotrichales Cladophorales Chaetophorales Oedogoniales Conjugales Siphonales
		Charophyceae		Charales
		Xanthophyceae		Heterochloridales Heterococcales Heterotrichales Heterosiphonales
		Phaeophyceae	Isogeneratae	Ectocarpales Sphacelariales Tilopteridales Cutleriales Dictyotales
			Heterogeneratae	Chordariales Sporochnales Desmarestiales Punctariales Dictyosiphonales Laminariales
			Cyclosporae	Fucales
		Rhodophyceae	Bangioideae	Bangiales
			Florideae	Nemalionales Gelidiales Cryptonemiales Gigartinales Rhodymeniales Ceramiales
	Fungi	Phycomycetes	Archimycetes	Chytridiales Ancylistales Protomycetales

THE VEGETABLE KINGDOM—*Continued*

Subkingdom	Division	Class	Subclass	Order
Thallophyta (*continued*)	Fungi (*continued*)	Phycomycetes (*continued*)	Oomycetes	Blastocladiales Monoblepharidales Leptomitales Saprolegniales Peronosporales
			Zygomycetes	Mucorales Entomophthorales
		Ascomycetes	Plectomycetes	Plectascales Erysiphales Exoascales
			Discomycetes	Pezizales Helvellales Tuberales Phacidiales Hysteriales
			Pyrenomycetes	Hypocreales Dothideales Sphaeriales Laboulbeniales
		Basidiomycetes	Hemibasidiomycetes	Ustilaginales
			Protobasidiomycetes	Uredinales Auriculariales Tremellales
			Autobasidiomycetes	Hymenomycetales Gasteromycetales
		Fungi imperfecti		Hyphomycetales Melanconiales Sphaeropsidales
	Lichenes	Ascolichenes		Pyrenocarpeae Gymnocarpeae
		Hymenolichenes		

Archegoniatae	**Bryophyta**	**Hepaticae**		Marchantiales Sphaerocarpales Jungermanniales Calobryales Anthocerotales
		Musci		Sphagnales Andreaeales Bryales
	Pteridophyta	Psilophytinae		Psilophytales Psilotales
		Lycopodinae		Lycopodiales Selaginellales Lepidodendrales Isoetales
		Equisetinae		Hyeniales Sphenophyllales Equisetales
		Filicinae	Primofilices	Coenopteridales Anachoropteridales Cladoxylales
			Eusporangiatae	Ophioglossales Marattiales
			Leptosporangiatae	Filicales
Spermophyta	Gymnospermae	Cycadophyta		Cycadofilicales Bennettitales Cycadales
		Coniferophyta		Cordaitales Coniferales Ginkgoales Gnetales.
	Angiospermae	Monocotyledones		Pandanales Helobieae Triuridales Glumiflorae Spadiciflorae Farinosae Liliiflorae Scitamineae Microspermae

THE VEGETABLE KINGDOM—*Continued*

Subkingdom	Division	Class	Subclass	Order
Spermophyta (*continued*)	Angiospermae (*continued*)	Dicotyledones	Monochlamydeae	Salicales
				Garryales
				Juglandales
				Julianiales
				Fagales
				Casuarinales
				Urticiflorae
				Proteales
				Santalales
				Aristolochiales
				Polygonales
				Piperales
				Centrospermae
			Dialypetalae	Ranales
				Rhoeodales
				Sarraceniales
				Parietales
				Cucurbitales
				Guttiferales
				Malvales
				Tricoccae
				Geraniales
				Rutales
				Sapindales
				Celastrales
				Rhamnales
				Rosales
				Myrtiflorae
				Opuntiales
				Umbelliflorae
			Sympetalae	Ericales
				Primulales
				Plumbaginales
				Ebenales
				Oleales
				Contortae
				Tubiflorae
				Plantaginales
				Rubiales
				Campanulales

THE ANIMAL KINGDOM

Subkingdom	**Phylum**	**Subphylum**	**Class**	**Subclass**	**Order**
Protozoa	**Protozoa**		Mastigophora	Phytomastigina	**Chrysomonadina Phytomonadina Cryptomonadina Chloromonadina Euglenoidina Dinoflagellata Volvocina**
				Zoomastigina	**Rhizomastigina Holomastigina Polymastigina Protomonadina**
			Sarcodina		**Amoebina Foraminifera Radiolaria Heliozoa Mycetozoa**
			Sporozoa	Telosporidia	Coccidiomorpha Gregarinidea
				Neosporidia	Cnidosporidia Haplosporidia Sarcosporidia
			Ciliophora	Protociliata	Opalinata
				Ciliata	Holotricha Heterotricha Oligotricha Hypotricha Peritricha Chonotricha
				Suctoria	

THE ANIMAL KINGDOM—*Continued*

Subkingdom	Phylum	Subphylum	Class	Subclass	Order
Parazoa	Porifera		Calcarea		
			Hexactinellida		
			Demospongiae		Tetractinellida Monaxonida Keratosa Myxospongida
Metazoa	Coelenterata	Cnidaria	Hydrozoa		Calyptoblastea Gymnoblastea Hydrida Trachylina Hydrocorallinae Siphonophora
			Scyphozoa		Stauromedusae Discomedusae Cubomedusae Peromedusae
			Anthozoa		Alcyonaria Zoantharia
		Ctenophora	Ctenophora	Tentaculata	Cydippidea Lobata Cestoidea Platyctena
				Nuda	Beroïdea
	Platyhelminthes		Turbellaria		Acoela Rhabdocoelida Tricladida Polycladida
			Temnocephaloidea		
			Trematoda		Heterocotylea Aspidocotylea Malacocotylea
			Cestoda		Monozoa Merozoa

	Nematomorpha				
	Nemertinea		Dimyaria		Heteronemertini
			Trimyaria		Pronemertini Mesonemertini Metanemertini
	Chaetognatha				
	Nematoda		Ascaroidea Strongyloidea Filarioidea Dioctophymoidea Trichinelloidea		
	Acanthocephala				
	Trochelminthes		Rotifera		Rhizota Bdelloïdea Ploima Scirtopoda Trochosphaerida Seisonida
			Gastrotricha		
	Annelida		Polychaeta	Phanerocephala	Nereidiformia Spioniformia Terebelliformia Capitelliformia Scoleciformia
				Cryptocephala	Sabelliformia Hermelliformia
			Oligochaeta		Microdrili Megadrili
			Hirudinea		Acanthobdellida Rhynchobdellida Gnathobdellida
			Archiannelida		
			Myzostomida		
			Echiuroidea		

THE ANIMAL KINGDOM—*Continued*

Subkingdom	Phylum	Subphylum	Class	Subclass	Order
Metazoa (*continued*)	Arthropoda	Onychophora			
		Crustacea	Branchiopoda		Anostraca Notostraca Conchostraca Cladocera
			Copepoda	Eucopepoda	Gymnoplea Podoplea
				Branchiura	
			Cirripedia		Thoracica Acrothoracica Apoda Rhizocephala Ascothoracica
			Ostracoda		Myodocopa Cladocopa Podocopa Platycopa
			Malacostraca	Phyllocarida	Nebaliacea
				Syncarida	Anaspidacea
				Peracarida	Mysidacea Cumacea Tanaidacea Isopoda Amphipoda Thermosbaenacea
				Eucarida	Euphausiacea Decapoda
				Hoplocarida	Stomatopoda
		Myriapoda	Pauropoda		
			Chilognatha		

			Symphyla		
			Chilopoda		Pleurostigmata Notostigmata
		Insecta	Apterygota		Thysanura Collembola Protura
			Pterygota	Exopterygota	Orthoptera Dermaptera Isoptera Plecoptera Embioptera Psocoptera Odonata Hemiptera Ephemeroptera Mallophaga Anopleura Thysanoptera
				Endopterygota	Neuroptera Mecoptera Trichoptera Lepidoptera Coleoptera Hymenoptera Diptera Aphaniptera Strepsiptera
		Arachnida	Xiphosura		
			Scorpionidea		
			Pedipalpi		
			Araneida		Liphistiomorpha Mygalomorpha Hypochilomorpha Dipneumonomorpha Apneumonomorpha
			Palpigradi		
			Ricinulei		

THE ANIMAL KINGDOM—*Continued*

Subkingdom	Phylum	Subphylum	Class	Subclass	Order
Metazoa (*continued*)	Arthropoda (*continued*)	Arachnida (*continued*)	Solifugae		
			Chelonethi		
			Opiliones		
			Acarina		Notostigmata Parasitiformes Trombidiformes Sarcoptiformes Tetrapodili Holothyroidea
		Pycnogonida			
		Tardigrada			
		Pentastomida			
	Mollusca		Amphineura		Polyplacophora Aplacophora
			Gastropoda	Streptoneura	Aspidobranchiata Pectinibranchiata
				Euthyneura	Opisthobranchiata Pulmonata
			Scaphopoda		
			Pelecypoda		Protobranchiata Filibranchiata Eulamellibranchiata Septibranchiata
			Cephalopoda	Tetrabranchiata	Nautiloidea
				Dibranchiata	Decapoda Octopoda
	Sipunculoidea				
	Phoronidea				

	Brachiopoda		Ecardines		**Atremata** **Neotremata**
			Testicardines		**Protremata** **Telotremata**
	Polyzoa		Endoprocta		
			Ectoprocta		**Phylactolaemata** **Gymnolaemata**
	Priapuloidea				
	Echinodermata	Eleutherozoa	Asteroidea		**Forcipulata** **Velata** **Paxillosa** **Valvata** **Spinulosa**
			Ophiuroidea		**Streptophiura** **Zygophiura** **Cladophiura**
			Echinoidea		**Endocyclica** **Clypeastroidea** **Spatangoidea**
			Holothuroidea		**Aspidochirota** **Pelagothurida** **Elasipoda** **Dendrochirota** **Molpadida** **Synaptida**
		Pelmatozoa	**Crinoidea**		
	Chordata	**Hemichorda**	**Balanoglossida** Pterobranchia		
		Urochorda	Larvacea		
			Ascidiacea		**Monascidia** **Synascidia**

THE ANIMAL KINGDOM—*Continued*

Subkingdom	**Phylum**	**Subphylum**	**Class**	**Subclass**	**Order**
Metazoa (*continued*)	Chordata (*continued*)	Urochorda (*continued*)	Thaliacea		Pyrosomatida Salpida Doliolida
		Cephalochorda			
		Craniata	Marsipobranchii		
			Selachii	Euselachii	Pleurotremata Hypotremata
				Holocephali	
			Pisces	Palaeopterygii	Chondrostei Cladistia
				Neopterygii	Ginglymodi Protospondyli Isospondyli Haplomi Ostariophysi Apodes Iniomi Lyomeri Heteromi Microcyprini Synentognathi Anacanthini Allotriognathi Solenicthyes Berycomorphi Zeomorphi Percomorphi Scleroparei Hypostomides Discocephali Heterosomata Plectognathi Xenopterygii Opisthomi Symbranchii Haplodoci Pediculati
				Crossopterygii	Dipnoi

			Amphibia		Apoda Caudata Salientia
			Reptilia		Rhynchocephalia Loricata Chelonia Squamata
			Aves	Archaeornithes	
				Neornithes	Struthiones Colymbiformes Sphenisciformes Procellariformes Ciconiiformes Anseriformes Falconiformes Galliformes Gruiformes Charadriiformes Opisthocomiformes Coraciiformes Passeriformes
			Mammalia	Prototheria	Monotremata
				Metatheria	Marsupialia
				Eutheria	Edentata Sirenia Cetacea Ungulata Hyracoidea Proboscidea Rodentia Carnivora Insectivora Chiroptera Primates

SUPPLEMENT

NOTE—A dagger † after the heading of an article indicates that the information given supplements that given in the main text of the Dictionary.

An asterisk ★ placed after a cross-reference means that the article to which reference is made occurs in the Supplement. Cross-references without an asterisk refer to the main text.

Abelian integral (*Maths.*). An integral of the form $\int R(x, y)dx$, where x and y are connected by a fundamental relation $f(x, y)=0$.

absolute block system (*Sig.*). See **block system***.

absolute convergence (*Maths.*). A series is ***absolutely convergent*** if the corresponding series of the moduli of the terms converges.

A.C.H. index (*Nut.*) The arm-girth, depth-of-chest, and width-of-pelvis index used for comparative measurements in studies of nutrition. See **Franzen's index***.

accommodation road (*Highways*) A limited-purpose road giving access to public or private properties

acnode (*Maths.*). A node at which the tangents are imaginary and distinct. A conjugate point. See **crunode***.

act'inodermati'tis (*Med.*). Inflammation of the skin due to the action of X-rays.

actinotherapy (*Med.*) Treatment of disease by means of ultra-violet, infra-red and luminous radiations. See also **ultra-violet therapy***, **infra-red therapy***.

ad'amsite (*Chem. War.*). $NH(C_6H_4)_2AsCl$. Toxic smoke. Mortality product 30,000 for ten minutes exposure, 19,500 for thirty minutes exposure. Abbrev. **D.M.**

adermin (*Chem.*). See **vitamin B_2 complex*** (*pyridoxin*).

adjugate determinant (*Maths.*) A determinant formed from another by replacing each constituent by its co-factor.

adjustable-port proportioning valve (*Ind Heat.*). A valve for use with gas or oil burners, usually combined with an air valve, both valves mounted on a common spindle and operated in unison by a single lever linked to a motor actuated by automatic temperature-control apparatus. The ports of the valve are adjustable so that the fuel and air flows may be accurately proportioned.

advance (*Sig.*). The length of line beyond a signal which is covered, as far as a train is concerned, by that signal.

aeration test burner (*Ind. Heat.*). Apparatus by which the combustion characteristics of practically all commercial gases can be correlated and calibrated. Abbrev. **A.T.B.**

aerial resistance (*Radio*). See **antenna resistance***.

aerothermother'apy, ār'ō-ther-mō- (*Med.*). Treatment by means of hot-air currents.

ae'tiopor'phyrin (*Chem.*). 1·3·5·8-tetramethyl-2·4·6·7-tetraethyl-porphin, obtained by reduction and decarboxylation of haematoporphyrin. It can be obtained also as a breakdown product of chlorophyll.

ainhum, ī-yūm', in-yūm (*Med.*). A chronic disease of negro races, terminating in spontaneous amputation of the fingers and toes by the formation of a constricting ring. The fifth toe is the most commonly affected

air-gas mixture. A mixture of air and gas in any ratio, which may or may not require additional air for complete combustion. See **total air-gas mixture***.

air-gas mixture system (*Ind. Heat.*) A method for mixing air and gas, in the desired proportions for combustion, in a mechanically operated apparatus by which air and gas volumes and pressures are automatically controlled at all rates of mixture flow.

air-gas ratio (*Ind. Heat.*). Practical: the known proportions of air to gas in an air-gas mixture Theoretical: the air volume needed to obtain conditions of perfect combustion, calculated according to the analysis of the gas.

air-heater (*Ind. Heat.*). As used for industrial heating and drying operations air-heaters fall within two main categories: (1) direct-fired heaters, in which the products of combustion are combined with the air; (2) indirect-fired heaters, in which the combustion products are excluded from the air flow. Both types of heaters can be operated on the re-circulation system, by which a proportion of the heated air is returned to and passed through the heating chamber.

air pocket (*Aero.*). A localised region of low density in the atmosphere, due, for example, to an ascent of differentially heated air, called a *thermal*. A sudden fall is experienced by lightly loaded aircraft

algebraic function (*Maths.*). One which can be derived by a finite number of algebraic operations, including root extraction.

algebraic number (*Maths.*). A number derived from a *real number** (q.v.) by algebraic processes, including root extraction.

alignment antenna array (*Radio*). See **end-fire antenna array***.

aluminothermic process † (*Chem.*). This process, also known as the *thermite process*, is used especially for the oxides of metals which are reduced with difficulty (e.g. titanium, molybdenum). On ignition, the mass may reach a temperature of 3000° C. Magnesium incendiary bombs have thermite as the igniting agent. See **Thermit***.

amino group (*Chem.*). The grouping $-\mathrm{N}{<}^{\mathrm{R}}_{\mathrm{R'}}$, where R and R′ may be hydrogen or organic radicles. If R and R′ are both H, it is a primary amine; if R is H, a secondary amine; if R and R′ are both organic radicles, a tertiary amine.

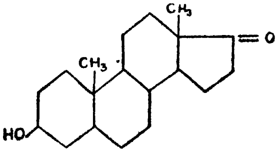
am'plosome (*Nut.*). The short, or stocky, type of human figure. Better term than *pyknosome*.

analysand (*Psycho-an.*). A person who is undergoing a psychological analysis.

anastigmat lens (*Optics*). A photographic objective designed to be free from astigmatism in at least one extra-axial zone of the image plane.

androgen'ic (*Chem*). Having the effects of the male sex hormone.

androsterone (*Chem.*). A steroid, obtained from the testis and from urine. It has male hormone activity, controlling the secondary male characteristics—development of accessory reproductive organs, growth and distribution of hair, etc.



aneu'rin (*Chem.*). Vitamin B$_1$.

angiotonin (*Physiol.*). See **hypertensin***.

angledozer (*Civ. Eng.*). See **bulldozer***.

angle of directivity (*Radio*). See **directivity angle***.

angle of nip (*Chem. Eng.*). The angle between the planes of the crushing surfaces of a crusher and the particle to be crushed.

angular height (*Radio*). Of an aerial: the actual height, in wave-lengths, multiplied by 2π radians, or 360 degrees.

annunciator† (*Sig.*). Any device for indicating audibly the passage of a train past a point.

answer signal (*Elec. Comm.*). A signal sent backwards along a transmission circuit, indicating that the subscriber has answered the call. The answer signal may or may not operate the calling subscriber's meter, or it may be for operator's use only.

antenna† (*Radio*).
See also **box—***
broadside—*
fishbone—*
multiple-unit steerable—*
periodic—*
T.W.—*
vee—*
end-fire antenna array*.

antenna resistance (*Radio*). The total power supplied to an antenna system, divided by the square of a specified current, e.g. in the feeder, or at the earth connection of an open-wire antenna.

anti-parallax mirror (*Elec. Eng.*). A mirror placed on an arc parallel to the scale of an indicating instrument, so that the parallax error in reading the indication of the pointer is avoided by aligning the eye with the pointer and its image in the mirror.

antip'odes, -dēz. On a sphere, such as the earth: points on the surface at either extremity of a diameter through the sphere.

aplanatic refraction (*Optics*). Refraction at a surface under conditions in which there is no spherical aberration and in which the sine condition is satisfied.

apochromatic lens (*Optics*). A lens so designed that light of three wavelengths from an object is brought to the same focus, thus reducing the secondary spectrum.

approach (*Sig.*). The length of track, before a signal, within which the train is under the control of the signal.

aq'uaculture (*Hort.*). The cultivation of plants without soil, the roots being supported in gravel flooded with water containing the salts necessary for growth. See **hydroponics***.

Argand diagram† (*Maths.*). A diagram with rectangular axes, on which complex numbers can be represented by a point, the real part of the complex number being the abscissa, and the imaginary part the ordinate. See ***j***.

armourplate (*Glass*). Plate glass toughened by heating and sudden cooling (see **safety glass**), and so made more resistant to impact and temperature changes.

arsenical smoke (*Chem. War.*). See **toxic smoke***.

Ascheim-Zondek test (*Med.*). A test for pregnancy, based on the urinary excretion, during pregnancy, of an anterior pituitary-like hormone which acts on the ovaries and causes development of the Graafian follicles. The urine under test is injected into immature female mice which are later killed for examination of the ovaries. A positive result, which consists in the finding of large haemorrhagic follicles and corpora lutea, indicates the presence of living placental tissue and is therefore obtained in certain conditions other than pregnancy—e.g. hydatid mole, carcinoma of the ovaries. Males suffering from malignant teratoma of the testis also give a positive result. The accuracy, on repeated tests, is about 98%. In the similar *Friedman's test*, non-pregnant mature rabbits are used

ascorbic acid (*Chem.*). Vitamin C.

ash (*Chem.*). The non-volatile inorganic residue remaining after the ignition of an organic compound, by means of which the percentage of the former is estimated; e g. ash of white flour 0·3-0 5 per cent. after prolonged heating at about 550° C.

aspect (*Sig.*). The indication given by a coloured-light signal, as contrasted with that of a semaphore-arm signal.

asphal'tenes, -tēnz (*Chem.*). Such constituents of asphaltic bitumens as are soluble in carbon disulphide but not in petroleum spirit. See **malthenes***, **carbenes***.

aspherical surface (*Optics.*). A lens surface which departs to a greater or less degree from a sphere, e.g. one having a parabolic or elliptical section.

asymptote, as'im-tōt (*Maths.*). A line which is tangent to a plane curve at infinity. Hence, a line whose distance from a curve approaches zero as the distance from the origin tends to infinity.

asymptot'ic curve (*Maths.*). A curve which gives a guide to the direction of flexion of an infinite branch of a curve, but is not necessarily a curvilinear *asymptote** (q.v.) to that branch.

A.T.B. (*Ind. Heat.*) Abbrev. for *aeration test burner*.

atmospheric gas-burner system (*Ind. Heat.*). A system normally entailing the use of natural-draught burner injectors, in which the momentum of a gas stream projected from an orifice into the injector throat inspirates from the atmosphere a part of the air required for combustion.

available heat (*Ind. Heat.*). The portion of the total heat of any fuel, expressed in British thermal units, that can be utilised to raise the temperature of the work in a furnace or other heating appliance and to overcome loss by radiation and other causes, the remainder of the heat passing out as a flue loss.

avitamino'sis† (*Med.*). Av. A is xerophthalmia, keratomalacia, nyctalopia or night-blindness; Av. B$_1$ is beriberi; Av. B$_2$ complex is pellagra and any of certain types of dermatitis and anaemia; Av. C is scurvy; Av. D is rickets. Lack of B$_2$, A, and C also result in growth disturbances; lack of A and C in certain forms of anaemia; lack of A, D, and C in dental defects. In some animals Av. E is characterised by the retardation of growth of sexual organs. See articles on the several vitamins.

axle counter (*Sig.*). A device used in signalling systems for counting the number of axles or wheels entering or leaving a block section, with means for comparing these totals.

back filling (*Civ. Eng.*). Excavated material which is to be replaced.

back focal length (*Optics*). The distance from the last lens surface in an optical system to the focus.

backlocking (*Sig.*). The holding of a signal lever partially restored until completion of a predetermined sequence of operations, after which it can be fully restored.

back-water† (*Hyd. Eng.*). The reverse flow in a tributary when the level of the main stream rises sufficiently high above normal because of obstruction or floods.

back wave (*Radio*). *Spacing wave* (q.v.).

balance weights† (*Elec. Eng.*). Small weights threaded on radial arms on the movement of an indicating instrument, so adjusted that the pointer gives the same indication whatever the orientation of the instrument.

band (*Radio*). See **frequency—, service—*.**

banner signal (*Sig.*) A small pivoted-arm signal enclosed in a box, illuminated at night.

bar (*Sig.*). A bar, mounted parallel to a running rail, which, being depressed by the wheels of a train, is capable of holding points or giving information respecting the position of a train.

barysphere. The solid heavy interior core of the earth inside the lithosphere, probably consisting largely of iron, with other metals.

basic slag (*Agric*). Phosphate fertiliser, frequently used for grassland improvement.

batch box (*Civ Eng*). See **gauge box*.**

B.B.C. (*Chem. War.*). See **bromobenzyl cyanide*.**

bell-type furnace (*Ind. Heat.*). A portable inverted furnace or heated cover operated in conjunction with a series of bases upon which the work to be heated can be loaded and then left to cool after heat treatment. Gas and electricity are the most commonly used sources of heat. Employed chiefly for bright-annealing of non-ferrous metals and bright-hardening of steels.

bellows or **sylphon bellows** (*Phys.*). A flexible corrugated tube which can be used for transmitting motion from outside into an evacuated vessel.

belly (*Acous.*). The sound-radiating surface of a musical instrument of the viol family, set in forced vibration by the oscillation of the strings.

bending (*Optics*). Of a lens : the process of varying the shape of a lens without altering its power. If r_1 and r_2 are the radii of the lens surfaces, the shape is varied keeping $(1/r_1-1/r_2)$ constant.

berth section (*Sig.*). A section within the approach to a stop signal.

B.H.N. Abbrev. for Brinell Hardness Number, the figure obtained in the *Brinell hardness test* (q.v.).

binoculars (*Optics*). Properly BINOCULAR GLASS or BINOCLE. A field glass having two tubes, one for each eye. See **Galilean—*, prismatic—*.**

binomial coefficients (*Maths.*). The coefficients of the powers of x which occur in the binomial expansion.

binomial equation (*Maths.*). An equation of the form $x^n=1$.

binomial series (*Maths.*). The expansion of $(1+x)^n$ in the form of an infinite series, when n is negative and/or fractional, valid for $|x|$ less than 1, and conditionally $|x|=1$.

binomial theorem (*Maths.*). That, for all positive integral values of n, the expansion of

$$(1+x)^n=1+nx+\frac{n(n-1)}{2!}x^2+\ldots+x^n.$$

bios† (*Chem.*). Bios I (inositol, possibly a vitamin for mice, protecting against a nutritional alopecia) ; bios IIA (see **vitamin B_2 complex***) ; bios IIB (biotin, vitamin H, probably identical with 'co-enzyme R,' which stimulates the growth of micro-organisms in the root nodules of certain leguminous plants).

biotin (*Chem.*). **See vitamin H*.**

black spot (*Television*). See **tilt-and-bend.**

blast†. Generally, a hammer-like blow progressing through the air, caused by the build-up of the wave-front from an explosion, due to the increased wave-velocity at high amplitude in the neighbourhood of the explosion.

blind-alley. A *cul-de-sac* (q.v.).

blind drain (*San. Eng*). See **rubble drain*.**

blind flying, blind landing (*Aero.*). The flying and landing of an aircraft by a pilot who, because of darkness or fog, or for other reasons, cannot see his course clearly, and must rely on the indications of instruments, some of which are operated by specially transmitted radio beams (see **blind-landing system**).

blister gas (*Chem. War*). See **vesicant*.**

block (*Rail*) See **Scotch block*.**

block section (*Sig.*). The length of track in a railway system that is limited by stop signals.

block system (*Sig*). The system of controlling the movements of trains by signals and by independent communication between block posts, where are situated the instruments indicating the position of trains, condition of the block sections, and controlling levers for signals, points, etc It is *absolute* if one train alone is permitted within a block section, and *permissive* if trains are allowed to follow into a block section already occupied by a train

blood groups. A classification of human bloods based on their mutual agglutination reactions. The classification used for transfusion purposes involves four groups, AB (I), A (II), B (III) and O (IV), and depends on the presence or absence of two agglutinins (α and β) in the plasma and two agglutinogens (A and B) in the red cells. The simultaneous presence of α and A or β and B causes agglutination. Hence there are four groups as follows :

Group.	*Agglutinogens.*	*Agglutinins.*
AB	A and B	o
A	A	β
B	B	α
O	O	$\alpha+\beta$.

Other classifications depend on similar agglutination systems (e.g. M and N factors, Rh. factor). Blood groups are inherited according to Mendelian laws.

Bloom gelometer (*Phys.*). A standard apparatus for determining the force required to depress a plunger a definite distance into a jelly, thus indicating the strength of the jelly.

B.N.A. (*Anat.*). *Basle Nomina Anatomica*, an international anatomical terminology accepted at Basle in 1895 by the Anatomical Society to standardise terms used in describing parts of anatomy.

bogie-type furnace (*Ind. Heat*). A furnace provided with a completely portable hearth supported on a bogie or by other means, enabling the work to be loaded and unloaded externally. A *live bogie* is one arranged to receive the hot gases directly from burners positioned in the side walls of the furnace, when the hearth of the bogie is raised to the working temperature, thus resembling an under-fired furnace. The alternative is a direct-fired furnace with the bogie placed in circuit with the waste-gas flues.

bone china (*Pot.*). See **china.**

bootleg (*Sig.*). The protecting tube-like projection for bringing electrical circuit wires from buried conduit or the ground.

Bouchard's index, boo-shar' (*Nut.*). A French index—weight in kilograms divided by height in decimetres ; the anthropometric segment used in measurements of the human frame in nutrition experiments.

box antenna (*Radio*). See **T.W. antenna*.**

bran (*Foods*). The outer protective layers of grain, usually wheat, after removal of the endosperm.

breakdown signal (*Teleph.*). A signal which releases a connection to a subscriber if he elects to take an offered call. See **trunk offering***, **offering signal***.

breakdown, breaking (*Phys.*). Of an emulsion: the re-union of the finely dispersed particles and their separation from the medium with which they form an emulsion.

break rolls (*Flour-Milling*). Grooved chilled-steel rollers, set in pairs, by means of which wheat is sheared open before separation of various parts of the grain.

breathing (*Cinema.*). A noise arising in noise-reduction systems when timed to operate too fast. See **hush-hush***.

bridle-path (-road, -way) (*Highways*). A road for animal or pedestrian traffic. Also called DRIFTWAY, DROVE, DROVEWAY, PACKWAY.

brig (*Maths.*). A proposed unit of ratio, equal to a ratio of 10 : 1; so called after Briggs, the inventor of logarithms to the base 10.

broadside antenna (*Radio*). An antenna array in which the main direction of the reception or radiation of electromagnetic energy is normal to the line of radiating elements.

bromobenzyl cyanide (*Chem. War.*). Formula Ph·CHBr·CN. Very persistent tear gas; oily brown liquid with bitter sweet smell. Mortality product 7500. Abbrevs. **B.B.C.** (Britain), **C.A.** (America); French name, CAMITE.

bulldozer (*Civ. Eng.*). A power-operated machine, provided with a blade for spreading and levelling material. Also called ANGLEDOZER.

burner (*Ind. Heat*).

See **drip-proof—***
gas and pressure air—*
impact—*
industrial gas—*
oil (or fuel oil)—*
piloted-head gas—*
ribbon-flame—*
sealing-in—*
tunnel—*
two-stage pressure gas—*
universal combustion—*

burner firing block (*Ind. Heat.*). A unit shape, made from refractory material, that fits into a furnace wall at the burner position, having a nozzle-protecting recess at back and a tunnel on the firing side. The tunnel serves to stabilise combustion conditions and to ensure positive flame retention after reaching a state of incandescence at or above the ignition temperature of the air-gas or oil-air mixture. Also called QUARL in oil-firing practice.

burner loading (*Ind. Heat.*). The quantity of potential heat that can be liberated efficiently from a burner. Usually expressed in B.Th.U. per hour.

burner turndown factor (*Ind. Heat.*). The minimum gas-rate at which a burner is capable of stable flame propagation without the flame flashing back to the air-gas mixing point or blowing off from the burner nozzle or head. The factor usually is expressed as a percentage of turndown in relation to the maximum gas-rate of the burner.

busy-flash signal (*Teleph.*). The return signal to indicate *outlet busy* by means of a supervisory lamp.

butter-rock (*Min.*). Halotrichite.

C.A. (*Chem. War.*). See **bromobenzyl cyanide***.

calcif'erol (*Chem.*). Vitamin D_2.

calorific value† (*Heat.*). Since most fuels contain hydrogen, which burns to form water vapour, it is possible to have two heating values, namely, *gross* and *net*. The *gross heating value* of a fuel is the total heat developed after the products are cooled back to the starting point, and all the water vapour produced condensed. The *net value* is the heat produced on combustion of the fuel at any given temperature (with gas at 60° F.), with the flue products cooled to the initial temperature, the water vapour remaining uncondensed.

camber (*Highways*). The curvature given to a road surface to prevent the accumulation of water.

camite (*Chem. War.*). See **bromobenzyl cyanide***

camouflet, kam'oo-flā (*Mil.*). A concealed cavity caused by the explosion of a bomb or shell under the surface of the ground. Frequently contains toxic gases.

candolumines'cence (*Phys.*). Luminescence, beyond normal light radiation depending on temperature alone, evinced by certain slightly impure substances when placed in contact with the flame from the burning of hydrogen.

C.A.P. (*Chem. War.*). Tear gas. See **chloracetophenone***.

carbenes (*Chem.*). Such constituents of asphaltic material as are soluble in carbon disulphide but not in carbon tetrachloride. See **malthenes***, **asphaltenes***.

carotenoids (*Chem.*). A group of yellow, orange, or red plant pigments whose structure resembles that of the carotenes but does not necessarily include an unsubstituted β-ionine ring (or even a ring at all). Those with an unsubstituted ring can act as vitamin A precursors (e.g. cryptoxanthin) but those with only a substituted ring (e.g. xanthophyll) or no ring (e.g. lycopene) can not. Carotenoids are also found in animal structures, e.g. feathers.

carot'id arteries (*Zool.*). In Vertebrates, the principal arteries carrying blood forward to the head region.

carotid gland (*Zool.*). A small ductless gland situated at the bifurcation of the carotid artery in Vertebrates.

carrier suppression (*Radio*). (1) The transmission of a modulated carrier wave with the carrier suppressed, with re-insertion of the carrier at the receiving end.—(2) Suppression of the carrier from the radiating system when not required for modulation, especially on board ship to protect the receivers from noise arising from variability of eddy-current paths in the rigging, etc. Cf. *floating carrier system*.

Carte'sian co-ordinates (*Maths.*). (1) Of a point in a plane: the distances x and y of the point from two axes OY and OX, measured parallel to OX and OY respectively.—(2) Of a point in space: the distances x, y, and z of the point from the planes YOZ, ZOX, and XOY, measured parallel to OX, OY, and OZ, respectively.

catch points (*Rail.*). Trailing points placed on an up-gradient for the purpose of derailing rolling stock accidentally descending the gradient. See **spring points***.

cate'nary (*Maths.*). The plane curve assumed by a perfectly flexible string or chain supported at both ends, viz. (1) *common* (or *simple*) *catenary*, that formed by a uniform chain hanging under its own weight; (2) *parabolic catenary*, that formed by a light and uniform chain supporting continuously a uniform horizontal load; (3) *catenary of uniform strength*, that formed by a graded chain equally likely to break at any point.

centre line (*Eng.*, *Surv.*, etc.). A datum line on a drawing, map, or survey from which all dimensions are measured. In engineering drawings, axes of rotation or symmetry are taken as principal or subsidiary centre lines.

ceratoid cusp (*Maths.*). See **cusp***.

characteristic curves (*Maths.*). The family of curves representing the complete primitive of a differential equation.

chemical engineering. Design, construction, and operation of plant and works in which matter undergoes change of state and composition.

chemical warfare. The use in war of any solid, liquid, or gaseous chemical, other than explosive and incendiary material, for harassing and disabling enemy personnel.

chem'urgy (*Chem.*). (1) The application of chemistry to agriculture.—(2) Agriculture prosecuted for chemical purposes, e.g. potato-growing for the purpose of making industrial alcohol by fermentation. Chiefly U.S.A.

chloracetophenone (*Chem. War.*). $C_6H_5 \cdot CO \cdot CH_2Cl$. White crystalline solid, subliming at moderate heat to give a non-persistent particulate cloud. Lachrymatory. Abbrevs. **C.A.P., C.N.** (U.S.A.).

chlorocruorin†. Chlorocruorin is a conjugated protein containing a prosthetic group similar to, but not identical with, reduced haematin.

chloropicrin (*Chem. War.*). $CCl_3 \cdot NO_2$. A lung-irritant non-persistent war gas. Yellow oily liquid. Musty sweetish smell, with lachrymatory properties. Mortality product 2000.

chromidro'sis (*Med.*). The excretion of sweat containing pigment.

chromo-therapy (*Med.*). Electro-therapeutic treatment with luminous rays of specific colours.

chrysother'apy (*Med.*). Treatment by means of gold injections.

circular points (*Maths.*). Two conjugate imaginary points on the line at infinity in a plane, common to all circles in the plane; usually denoted by I and J.

class (*Maths.*). Of a curve or surface: the number of tangents, real, coincident, or imaginary, which can be drawn from a point to the curve; or the number of tangent planes, real, coincident, or imaginary, which can be drawn through a line to the surface.

class A, AB, B, C amplifiers† (*Elec. Comm.*). The suffix 1, e.g. A-1, denotes that grid current does not flow during any part of the cycle. The suffix 2, e.g. AB-2, denotes that grid current does flow through part of the cycle.

clay† (*Geol.*). In the mechanical analysis of soil, clay, according to international classification, has a grain-size less than 0·002 mm.

clear signal (*Teleph.*). Any signal sent by the operator in taking down a connection, or by a subscriber replacing his receiver, thus releasing apparatus and circuits.

click (*Acous.*). A transient noise, characterised by having a wide distribution of energy in its spectrum, without sufficient localisation of such energy to give it a definite character.

clicks, key (*Radio*). See **key clicks*.**

close (*Highways*). A *cul-de-sac* (q.v.).

C.N. (*Chem. War.*). See **chloracetophenone*.**

co-acting signal (*Sig.*). A signal adjacent to a main signal, and repeating its indications for greater convenience of observation.

coasting of temperature (*Ind. Heat.*). The rise above correct predetermined operating temperatures in furnaces when the fuel supply has been checked or shut-off; due to excessive thermal storage in the furnace brickwork through prior overheating. In gas-fired and oil-fired furnaces the fault usually lies with oversize burners. See also **optimum gas rate*.**

coaxial line (*Radio*). See **concentric tube feeder.**

Coddington lens (*Optics*). A magnifying lens cut from a solid piece of glass. It has concentric spherical surfaces of equal radius at the ends, and a V-cut round the centre of its length to act as a stop at the centre of the sphere.

co-factor (*Maths.*). If the expansion of the *determinant** (q.v.) is written as $a_1(b_2c_3-b_3c_2)$, etc., a_1 and the minor $(b_2c_3-b_3c_2)$ are *co-factors.*

cold junction. The junction of thermocouple wires with conductors leading to a thermo-electric pyrometer or other temperature indicator or recorder.

cold-set jelly. In flour confectionery, the jelly produced when a sweetened pectin syrup is blended with a suitable acid such as tartaric.

collineation (*Maths.*). An analytical transformation having a (*1, 1*) correspondence between points, collinear points being projected into collinear points.

colloidal graphite (*Eng.*). An extremely fine dispersion of ground graphite in oil. The graphite lowers the surface tension of the oil without lowering the viscosity; thus the oil spreads more easily, taking the graphite to rough surfaces where it can build up a smoothness. See **Aquadag, Oildag.**

colophonic acid (*Chem.*). *Abietic acid* (q.v.). It is the chief constituent of colophony resin.

colorimator (*Light*). See **trichromatic colorimator*.**

colour code (*Chem. War.*). Used to designate war gases:—*yellow cross*, vesicants; *blue cross*, sternutators; *green cross*, lung irritants; *white cross*, lachrymatory gases.—(*Elec. Comm.*, etc.) A convention for the visual identification of resistances, condensers, wires, etc., by combination of colours.

combine (*Agric. Mach.*). A harvesting machine which cuts, threshes, and ejects the straw on to the land for subsequent collection or burning in.

combustion. The chemical union of oxygen with gas, accompanied by the evolution of light and rapid production of heat.

See **perfect—* submerged—* surface—***

combustion tube furnace (*Ind. Heat.*). Laboratory appliance having one or more horizontal refractory tubes heated by gas or electricity; used chiefly for the estimation of carbon content of steels. Working temperatures are between 1100° and 1300° C.

commercial gases (*Ind. Heat.*). Typically these comprise town gas, coke-oven gas, hydrogen, producer gas, blast-furnace gas, blue water gas, carburetted water gas, natural gas, reformed natural gas, oil gas, butane, propane, and various mixtures of any of these gases.

compaction (*Civ. Eng.*). The operation of inducing a closer packing in loose material, e.g. shaking or pressing sand.

complete combustion (*Ind. Heat.*). A process whereby the whole of the fuel is burned without trace of unburned gases in the products of combustion, a condition usually accompanied by excess air in the flue products. Cf. *perfect combustion.*

complete primitive (*Maths.*). The solution of a differential equation containing the full number of arbitrary constants.

complex number (*Maths.*). A number comprising a real number added algebraically to an imaginary number. See ***j*, algebraic number*, conjugate complex numbers*, Argand diagram*.**

component (*Teleph.*). Any part of a signal (including a space) which is uniform in frequency and amplitude during its allotted duration.

compost (*Hort.*). Any known mixture of soils for potting plants, for use in frames or green-houses, or for ordinary garden purposes. The main constituent is obtained from leaves and other vegetable matter, which has been left to rot in the open air, assisted by chemicals.

compound signal (*Teleph.*). A signal comprising more than one frequency, contrasted with a simple signal of one frequency only.

compressed air inspirator (*Ind. Heat.*). A device of the injector type, used in conjunction with gas burners of the pressure-air class, by which a stream of compressed air is directed through a venturi throat to inspirate the additional combustion air from surrounding atmosphere, thus breaking down the initial pressure to a final pressure of a few inches water-gauge.

conche (*Confectionery*). A machine in which melted chocolate is agitated for prolonged periods to give a smooth product.

conjugate complex numbers (*Maths.*). Two complex numbers are conjugate if their real parts are equal, and their imaginary parts equal but of opposite sign.

conjugate, harmonic (*Maths.*). See **harmonic conjugate***.

conjugate point (*Maths.*). An isolated point on a curve, the co-ordinates of which satisfy the equation of the curve, but through which no branch passes.

connected domain (*Maths.*). A domain in which the value of the variable can pass from one point to another within the domain.

constant-amplitude recording (*Acous.*). In gramophone recording, the technique whereby the response of recording, i.e. amplitude of the track divided by the root of the applied power, is independent of frequency. Cf. *constant-velocity recording*.

constituent (*Maths.*). Of a determinant: one of the numbers in the square array which forms the determinant. Also called ELEMENT.

constringence (*Optics*). The inverse of the dispersive power of a medium. The ratio of the mean refractive index diminished by unity to the difference of the refractive indices for red and violet light.

contex (*Chem. War.*). An additional filter, consisting of closely packed feathers, etc., fitted on a respirator to give protection against toxic smokes.

continued fraction (*Maths.*). A terminated or infinite fraction of the form

$$a+\cfrac{1}{b+\cfrac{1}{c+\cfrac{1}{d+\dots}}} \quad \text{or } a+\frac{1}{b+}\,\frac{1}{c+}\,\frac{1}{d+}\,\dots$$

continuous diffusion. A counterflow system of extracting sugar from beet whereby fresh beet slices (cosettes) are extracted by hot dilute sugar solution, and partially extracted slices are finally extracted with fresh hot water.

convergence (*Maths.*). See **absolute convergence***.

conurbanisation (*Town Planning*). The building up of an area into a town.

convergent (*Maths.*). A *convergent* to a continued fraction is the fractional result obtained by stopping at a given stage in the *continued fraction** (q.v.).

convergent sequence (*Maths.*). A sequence in which members approach a finite limit as the number of terms tends to infinity.

co-ordinates (*Maths.*). Numbers which determine the position of points or lines relatively to an arbitrary frame of reference.

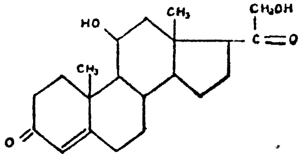
See **Cartesian—*** **polar—***

co-ordinate axes (*Maths.*). A frame of reference consisting of (1) two intersecting lines in a plane, or (2) three non-co-planar lines meeting in a point.

core (*Civ. Eng.*). A cylindrical sample of material obtained by driving a hollow-core drill into strata to ascertain the variation of composition.

correlation (*Maths.*). An analytical transformation giving a (*1, 1*) correspondence between points in one plane, or space, and lines or planes in another plane, or space, which may coincide.

corticosterone (*Chem.*). One of the hormones of the adrenal cortex. It is a steroid with the structure:



Other active substances from the cortex include *dehydrocorticosterone* in which the OH attached to the rings is replaced by oxygen, *desoxycorticosterone* in which this OH is replaced by hydrogen (and which can be obtained by partial synthesis and is used therapeutically in Addison's disease, etc.), *hydroxycorticosterone* with an extra hydroxyl group, etc. These substances all prolong the life of adrenalectomised animals, controlling the sodium and water metabolism and being concerned in glycogen formation, etc.

counter-transference (*Psycho-an.*). A state of emotional reaction, partly unconscious, in which there are positive (love) or negative (hate) feelings in the analyst towards the analysand.

county road (*Highways*). A main road maintained by county authorities, as contrasted with a *trunk road* (q.v.).

crazing† (*Highways*). The cracking of a road surface.

crepe rubber (*Chem.*). Raw, unvulcanised sheet rubber, not chemically treated in any way.

cross fall (*Highways*). The difference in vertical height between the highest and lowest points on the cross-section of a road surface. Also, the average rate of fall from one side to the other, or from the crown to a side of a road.

cross-over (*Thermionics*). In an electron lens system, the location where the streams of electrons from the object pass through a very small area, substantially a point, before forming an image.

cross ratio (*Maths*). The cross ratio of four co-linear points (*ABCD*) is equal to *AB.CD*/*AD.CB*. The cross ratio of a plane pencil of four lines, or of a pencil of planes, is that of the points of intersection of any transversal.

crunode (*Maths.*). A node at which the tangents to the two branches are real and distinct. See **acnode***.

culvert† (*Civ. Eng.*). A similar construction for the total enclosure of a drain or watercourse along its length.

curvilinear asymptote (*Maths.*). A curve which has double contact with a given curve at infinity. Hence, a curve whose distance from a given curve approaches zero as the distance from the origin tends to infinity.

cusp (*Maths.*). A multiple point on a curve where two branches touch but through which the branches do not pass. A *ceratoid cusp* is one where both branches lie on the same side of the common tangent, a *ramploid cusp* is one where the two branches lie on opposite sides of the common tangent.

cyclic curve (*Maths.*). The plane locus of a fixed point on a circle which rolls without slipping, viz. (1) *cycloid*, when the point is on the circumference and the circle rolls on a straight line; (2) *trochoid*, when the point is on a radius and the circle rolls on a straight line; (3) *epicycloid*, when the point is on the circumference of a circle which rolls on the outside of another circle; (4) *hypocycloid*, when the point is on a circle which rolls on the inside of another circle; (5) *Steiner's tricusp*, the *hypocycloid of three cusps*, the rolling circle having a radius one-third of the radius of the fixed circle; (6) *pericycloid*, when the point is on the circumference of a circle which rolls on another circle within it.

cycloid (*Maths.*). See **cyclic curve***.

D method or operator (*Maths.*). Used in determining the particular integral. D represents d/dx, and, under certain conditions, can be treated as an ordinary algebraic function.

D.A. (*Chem. War.*). Ph_2AsCl. One of the toxic smokes. Mortality product 4000 to 15,000 for ten minutes.

Dag. See **Aquadag, Oildag.**

D.C. (*Chem. War.*). Ph_2AsCN. One of the toxic smokes. Mortality product 4000 to 10,000 for ten minutes.

dead-hand (*Med.*). A disease of pneumatic-drill operators. There is cyanosis, anaesthesia of finger-tips, and sometimes bone absorption.

deep therapy (*Radiology*). Treatment of disease by deep X-rays.

defecation (*Sugar-refining*). Removal of impurities from a sugar solution—usually by coagulating the albuminoids and neutralisation with milk of lime.

deficiency (*Maths.*). The number by which the number of singular points of a curve is less than the maximum possible for a curve of that order.

definite integral (*Maths.*). If $F(x)$ equals $\int f(x)dx$, then $\int_a^b f(x)dx = F(b) - F(a)$ is the *definite integral* over the range a to b.

derailer (*Sig.*). An arrangement of rails for deliberately turning off runaway trucks from running rails.

derivative (*Maths.*). See **differential coefficient***.

derris (*Chem.*). An extract of the root of the *Derris* species of tree, found in the tropics, of which rotenone is the chief toxic constituent; highly effective insecticide, also used by natives as a fish poison.

describer (*Sig.*). The apparatus, either in signal cabins or for public use, which indicates movements, destinations, etc., of trains.

determinant (*Maths.*). A square array of numbers representing the algebraic sum of the products of the numbers, one from each row and column, the sign of each product being determined by the number of interchanges required to restore the product to its proper order, e.g.

$$\begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix} = \begin{array}{l} a_1b_2c_3 - a_1b_3c_2 \\ +a_3b_1c_2 - a_2b_1c_3 \\ +a_2b_3c_1 - a_3b_2c_1 \end{array}$$

See **matrix*** and **adjugate determinant***.

detour (*Highways*). See **loop road***.

Dettol (*Chem.*). A proprietary non-toxic and non-irritant germicide of which the active principle is chloroxylenol dissolved in a saponified mixture of aromatic oils, e.g. terpineol.

devil (*Civ. Eng.*). A travelling fire-box with a horizontal grate for heating or burning road surfaces, and for heating tools used in finishing asphalting.

Diakon (*Plastics*). A proprietary acrylic resin in the form of moulding powder. Similar to *Perspex*.

dielectric guide (*Radio*). A possible transmission path of very-high-frequency electromagnetic energy functionally realised in a dielectric the dielectric constant of which differs from its surroundings.

diet (*Nut.*). The human intake of food and liquid. According to age, size and activity, etc., the diet should consist of minimum quantities of proteins, carbohydrates, fats, mineral salts, vitamins and water, to ensure adequate available energy, repair and growth of the body tissues, protection from general and specific diseases, potency for reproduction, and sufficient moisture to regulate the body temperature.

differential coefficient (*Maths.*). If $y = f(x)$, the differential coefficient, or derivative, of y with respect to x is given by

$$\underset{h \to 0}{Lt} \frac{f(x+h) - f(x)}{h},$$

if this limit exists, and is written as dy/dx, $f'(x)$, or D_xy.

differential equation (*Maths.*). An equation involving total or partial differential coefficients. *Ordinary differential equation*, a differential equation involving only one independent variable. *Exact differential equation*, an equation of the form

$$R + N\frac{dy}{dx} = 0,$$

which can be solved by direct integration, where R and N are functions of x and y.

differentiation (*Maths.*). The operation of finding a differential coefficient.

diffusion flame (*Ind. Heat.*). A long luminous gas flame holding practically a constant rate of radiation for its designed length of travel, together with uniform precipitation of free carbon, diffusion occurring between adjacent strata of air and gas.

diplex transmission† (*Radio*). The modulation of a carrier with two independent signals.

direct-fired (*Ind. Heat.*). Said of a furnace in which the fuel is delivered directly into the heating chambers.

directivity angle (*Radio*). The angle of elevation of the direction of maximum radiation or reception of an electromagnetic wave by an antenna.

director (*Radio*). A free element in front of an antenna array which assists the directivity of the array in the same direction.

directrix (*Maths.*). Of a conic: the intersection of the plane of the conic with the plane of the circular contact of the cone and the focal sphere. See **ellipse, hyperbola***, and **parabola.**

disbudding (*Hort.*). The removal of some of the buds on a plant in order to assist the development of the remaining buds.

discriminant (*Maths.*). The discriminant of an equation is a special function of the roots of the equation, expressible in terms of the coefficients. If it equals zero, at least two of the roots are equal.

dispersion (*Maths.*). The mode of distribution of observed values, as exhibited by a frequency-distribution curve. The dispersion may be symmetrical or asymmetrical, according to the symmetry or otherwise of the frequency-distribution curve about the modal, or most frequent, value.

dispersion index (*Maths.*). See **standard deviation.**

dissociation of gases (*Ind. Heat.*). A chemical combustion reaction occurring at the highest temperature of the flame where carbon dioxide and water vapour tend to dissociate into carbon monoxide and hydrogen and oxygen respectively. In high-temperature furnaces the dissociation of gases in this way forms a scaling element which cannot be directly traced in analyses of furnace atmospheres or flue gases.

district road (*Civ. Eng.*). A road maintained by the authorities of a district. See **county road***, **trunk road.**

divergent sequence (*Maths.*). A sequence in which members approach an infinite limit.

divider (*Bread-making*). A machine used for automatically cutting dough into pieces of predetermined size.

D.M. (*Chem. War.*). *Adamsite** (q.v.).

doll (*Sig.*). A small arm or post for carrying signalling apparatus, mounted on a gantry or bridge.

domain (*Maths.*). Of the coefficients of an equation:

any number which may be found by rational operation on the coefficients.

See **connected—***
multiply-connected—*
simply-connected—*

donner effect (*Cinema.*). Non-linear photographic distortion occurring in variable-area recording for sound-films.

double series (*Maths.*). A series of numbers which may tend to infinity in two independent ways.

double trenching (*Agric.*). A digging technique whereby the effective depth for root penetration is increased and the upward passage of water facilitated.

dough (*Bread-making*). The product obtained by kneading together flour or meal, yeast, salt and water into a plastic mass.

drag roller (*Cinema.*). A sprocket roller for guiding film through a cinematograph or sound-on-film mechanism, which, by means of an internal friction arrangement, puts tension in the film.

draughtsman, draftsman (*Eng.*). One who makes engineering drawings (of models, articles to be made, electrical circuits, plans, etc.), from which prints, usually blue-prints, are made for actual use. See **tracing***. The draughtsman who makes such drawings frequently designs the details, the main design being laid down by an engineer or architect.

drip-proof burner (*Ind. Heat.*). A type of industrial gas burner designed to prevent the choking of flame ports or nozzles by foreign matter that may drip or fall on to the burner.

drove, droveway (*Highways*). See **bridle path***.

drug. Any substance, natural or synthetic, which has a physiological action on a living body, especially when used for the treatment of disease or the alleviation of pain.

Dühring's rule (*Chem. Eng.*). If the temperatures at which two chemically similar liquids have the same vapour pressure be plotted against each other, a straight line results, i.e. $t'=\alpha+\beta t$, where t' and t are the boiling points of the two liquids on the same scale of temperature, and at the same pressure, and α and β are constants.

dyke† (*Hyd. Eng.*). A similar bank remote from a river, built to control flooding. In Scotland, a stone wall, esp. one constructed without mortar (*dry-stane dyke*).

dysadaptation (*Med.*). Marked reduction in rapidity of adaptation of the eye to suddenly reduced illumination, as in vitamin A deficiency.

dysla'lia (*Med.*). Articulation difficulty due to defects in speech organs.

earth system (*Radio*). See **ground system***.

eccentricity (*Maths.*). Of a conic: the ratio of the distances of a point on a conic from a focus and the corresponding directrix. See **ellipse, hyperbola***, and **parabola.**

electric eye (*Thermionics*). A miniature cathode-ray tube in a radio receiver which exhibits a pattern determined by the rectifier output voltage depending on the received carrier, thus assisting in tuning the receiver.

electro-desiccation (*Med.*). Treatment whereby diseased tissue is destroyed by the application of sparks from a high-frequency current generator Also called FULGURATION.

electromagnetic horn (*Radio*). A metal horn designed to radiate a beam of ultra-short-wave energy originated by a dipole within the horn.

electron volt (*Thermionics*). The unit of energy associated with an electron which has freely dropped its potential by one volt.

element (*Maths.*). See **constituent***.

elliptic integrals (*Maths.*). Integrals which can be connected with the length of the arc of an ellipse, but which can be evaluated only by approximate methods.

emergency gas producer (*Ind. Heat.*). A small unit for generating clean cool producer gas from anthracite or coke, for emergency (e.g. war-time) use on road transport vehicles and for industrial heating operations in the event of failure of the normal town gas services.

end-fire antenna array (*Radio*). An antenna array in which the main direction of the reception or radiation of electromagnetic energy is in line with the elements of the array. Also ALIGNMENT ANTENNA ARRAY, END-ON ANTENNA ARRAY.

end gauge (*Eng.*). A gauge consisting of a metal block or cylinder the ends of which are made parallel within very small limits, the distance between such ends defining a specified dimension. See **limit gauge.**

enema† (*Med.*). See **opaque enema***.

entrance pupil (*Optics*). The diaphragm, or image of the diaphragm in the object space, which limits the diameter of the cone of rays entering an optical system.

envelope (*Geom.*). Of a family of plane curves: the locus of the points of intersection of consecutive members of the family.

epicycloid (*Maths.*). See **cyclic curve***.

epuré, ā-pu-rā' (*Civ. Eng.*). Refined natural asphalt from which volatile matter and water have been sufficiently removed.

equitonic scale (*Acous.*). The musical scale in which the main notes progress by whole-tones, as contrasted with the Pythagorean diatonic, which uses both whole-tones and half-tones.

equivalent focal length (*Optics*). The focal length of a thin lens which is equivalent to a thick lens in respect of the size of image it produces.

ethyl iodoacetate (*Chem. War.*). $CH_2I\cdot COOEt$. Oily dark-brownish violet liquid (colourless when pure). Persistent lachrymator; odour of 'pear-drops.' Mortality product 1500. Abbrev. **K.S.K.**

Euler's constant (*Maths.*). The limit of

$$\sum_{1}^{n}\frac{1}{n}-\log_e n, \quad \text{as } n\to\infty.$$

excess air (*Ind. Heat.*). An excess of the volume of air required for theoretically correct combustion, passing through the combustion space or chamber of a furnace or other heating appliance and leaving with the flue gases.

exciter† (*Radio*). Also, the section of an array, other than the reflector, which is driven by the power from the transmitter.

exhalted carrier (*Radio*). In a frequency-demodulating or homodyne radio receiver, the resulting carrier of the modulation when a locally generated carrier, of exactly the same frequency as that in the received signal, is added to this signal.

explicit function (*Maths.*). A variable x is an explicit function of y when x is directly expressed in terms of y. See **implicit function***.

extraordinary ray (*Light*). Of the two plane-polarised components into which a ray is split in passing through a doubly refracting crystal, the extraordinary ray is the one for which the ratio of the sine of the angle of incidence to the sine of the angle of refraction is not constant, and for which the incident ray, the normal to the surface, and the refracted ray may not lie in one plane.

face-on (*Mining*). Said of the working of a mine in a direction parallel to the natural cleats. Opposite of *end-on*.

facing points (*Sig.*). See **points***.

far point (*Optics*). The object point conjugate to the retina when accommodation is completely relaxed. This is at infinity in emmetropia, between infinity and the eye in myopia, and behind the eye in hyperopia.

fats† (*Chem.*). Fats are essential components of the human diet, repairing the wastage of human fat, and, by breakdown and oxidation, providing some of the required energy.

fertiliser (*Agric.*). A specific chemical for application to the soil to rectify its growth-promoting qualities for various types of plants, and for adjusting its acidity or alkalinity. Typical fertilisers are sulphates and nitrates of ammonia or sodium, superphosphate of lime, basic slag, lime See **manure***, **liquid manure***.

fertility rate (*Sociology*). The criterion by which the numerical stability of a population is measured. It is unity if, on the average, each female produces one fertile female child. If it is greater than unity the population increases; if less than unity (which condition obtains in nearly all white-race countries), the population declines.

fiducial points (*Elec. Eng.*). The points on the scale of an indicating instrument which have been located by direct calibration, as contrasted with the intervening points, which are inserted by interpolation or sub-division.

field (*Maths.*). Of coefficients: comprises all numbers within the *domain** (q.v.) of the coefficients.

field lens (*Optics*). A lens placed in or near the plane of an image to ensure that the light in the outer parts of the image is directed into the subsequent lenses of the system and thus ensure uniform illumination over the field of view.

filtration (*Highways*). Authorised turning of certain traffic from a carriageway while the main stream of traffic is held up.

fishbone antenna (*Radio*). An end-fire array comprised of vertical resonators spaced along a transmission line.

flame blow-off factor (*Ind. Heat.*). Associated with the performance of gas burners, this expresses the relation between the velocity of combustible mixture and the rate of flame propagation, the latter varying appreciably with gases of different composition. See also **burner firing block***, **flame retention***, **piloted-head burner*** and **tunnel burner***.

flame failure control (*Ind. Heat.*). A device comprising a direct-flame thermostat with interconnected relay valve, which provides a constantly burning pilot flame for igniting the main gas burners, and automatically shuts off the gas supply to the main burner in the event of the pilot flame becoming extinguished through any cause.

flame propagation, rate of (*Ind. Heat.*). The rate of flame propagation of gases is the velocity or speed of a flame. This is dependent upon the combustion characteristics of the gas used in relation to the ratio of air added to the gas before or after ignition. Also described as FLAME VELOCITY and IGNITION VELOCITY.

flame retention (*Ind. Heat.*). The ability to retain a stable flame with gas burners at all rates of gas flow, irrespective of adverse combustion characteristics and conditions. See also **burner firing block***, **flame blow-off factor***, **piloted-head burner*** and **tunnel burner***.

flame temperature (*Ind. Heat.*). Usually the temperature at the hottest spot of a flame. Flame temperature measurement is normally performed by means of a thermo-electric temperature indicator connected to a special thermocouple having exposed wires of dissimilar metals at its tip. Calculated flame temperatures can be closely approximated by use of accepted equations having factors based upon combustion characteristics and flue gas analyses.

flame-thrower (*Mil.*). Apparatus designed to project a jet which ignites at the point of impact; the jet may consist of 70% water-gas tar (flash-point about 120° C.) and 30% crude benzine (flash-point about 26° C.).

flame trap (*Ind. Heat.*). A device inserted in pipe lines carrying air-gas mixture of a combustible or self-burning nature to arrest the flame in the event of a flashback (or backfire) occurring at the burner.

flame velocity (*Ind. Heat.*). See **flame propagation (rate of)***.

flanks† (*Build.*, *Civ. Eng.*). Also, the two outer quarters of the width of a carriageway. Also called HAUNCHES, QUARTERS, SHOULDERS.

flash-back chamber (*Ind. Heat.*). In certain types of acetylene generators, a compartment filled with water which serves the dual purpose of washing the gas and forming a water seal between the service pipe and the acetylene in the generator.

Flesch's index (*Nut.*). The measurement of the carpus, or wrist girth, in millimetres, an index which relates the individual to the average.

flexible progressive (*Sig.*). Said of a traffic-light system in which changes of aspects can be effected at any time within the cycles of operation as determined by a master controller

floating temperature control (*Ind. Heat.*). A condition of operation obtained with a furnace by the use of an automatic temperature controller which functions in conjunction with electrically operated valves. The exact rates of fuel and air flows are thus maintained to give a constant uniform working temperature, as opposed to the more commonly used method of 'on-off' control.

flue baffler (*Ind. Heat.*). An inverted cowl situated above the outlet of the flue of a gas-fired furnace or other heating appliance, and connected to ventilating piping, by which the combustion products are exhausted to open atmosphere, enabling the correct degree of flue draught to be constantly maintained irrespective of changing atmospheric conditions.

flue gas temperature (*Ind. Heat.*). The temperature of flue gases at the point in the flue where it leaves the furnace or other appliance.

flutter echo (*Acous.*). A multiple echo caused when an impulsive sound is reflected between parallel surfaces at a sufficient distance apart for the individual echoes to be appreciated by the ear.

focal sphere (*Maths.*). The sphere inscribed in a cone and touching a plane section of the cone in a point (called the focus of the conic section).

focometer (*Optics*). An instrument for measuring the focal length of a lens.

focus (*Maths.*). The point of contact of the focal sphere. See also **ellipse**, **hyperbola***, **parabola**.

fondant (*Confectionery*). A white plastic product made by boiling a sugar-water syrup to 245° F., cooling and creaming.

Foucault knife-edge test, foo-kō (*Optics*). A method of testing the aberrations of a lens or mirror by placing a knife-edge in the focus of a point source and observing the pattern of light and shade as seen in the lens when an observer places his eye immediately behind the knife-edge.

fouling point (*Sig.*). The location before the meeting of two tracks where the loading-gauge outlines come into contact.

Fourier half-range series† (*Maths.*). A Fourier series with only sine or cosine terms, valid for x between 0 and π.

Franzen's index (*Nut.*). A complex index for nutrition studies, involving the relation between the weight of the subject, the muscular development, as exhibited by arm girth, the development of the subcutaneous cellular tissue at the surface of the biceps, the vitality index, and Pryor's index.

frequency distribution curve (*Maths.*). A curve exhibiting a series of observations of values such that the base shows the values, the ordinates from which show the number of times these values occur.

frequency tolerance (*Radio*) The extent to which the frequency of the carrier of a transmission is permitted to deviate from its allocation.

Freon (*Refrigeration*). Dichlorodifluoromethane, CCl_2F_2, non-inflammable; suitable for use in refrigerators for air-conditioning, ships, etc.; no effect on ordinary domestic articles, and (up to 20% concentration in air) no odour.

fretting (*Highways*). Break-up of the road surface because of binder failure.

Friedman's test (*Med.*). See **Ascheim-Zondek test***.

frit (*Pot.*). Calcined flint, sand, or glass, ground finely after fusing, and used in body pastes or glazes so as to reduce, by chemical combination, any tendency of the ceramic materials to dissolve in water.

fulguration (*Med.*). See **electro-desiccation***.

function (*Maths.*). Of one or more variables: an expression in mathematical form involving variables. Usually written in the form $f(x)$.

See **algebraic—***
complementary—
explicit—*
gamma—*
implicit—*
integral—*
inverse—*
inverse trigonometrical—*
transcendental—*
trigonometrical —*

furnace (*Ind. Heat*).

See **bell-type— ***
bogie-type—*
combustion-tube—*
oven-type—*
radiant-tube—*
semi-muffle type—*
direct-fired*
salt bath.

furnace atmospheres (*Ind Heat*). Fall within three main classes: (1) *oxidising*, produced when air volumes are in excess of fuel requirements; (2) *neutral*, when air to fuel ratios are perfectly proportioned; (3) *reducing*, due to deficiency of combustion air. See also **protective furnace atmospheres***.

Galilean binoculars (*Optics*). Binoculars in which the objectives are of the usual doublet telescope objective type and the eyepieces are negative lenses.

gamma function (*Maths.*). The limit of an infinite product, denoted by Γ, such that

$$\Gamma(x) = \mathop{L^t}_{n\to\infty} \frac{n^{x-1}\, n!}{(1-x)(2-x)\dots(n-x)}.$$

gas-and-pressure-air burner (*Ind. Heat.*) A class of industrial gas burners designed to operate with low-pressure gas and with air under pressure from fans and compressors, proportioning and mixing of the two supplies being regulated at the burner inlets.

gas burner (*Ind. Heat.*). See references at **burner***.

gas combustion theory (*Ind. Heat.*). A group of molecules at the instant of chemical union emits waves of radiant energy, the resultant molecules dispersing with the remaining energy; some of the initial radiation is absorbed according to the properties and size of the enclosure in which combustion occurs, the remainder being returned through the chemical constituents of the unburned gas and air and the flue products, and transformed by thermal diffusion into the kinetic energy of the hot gas.

gas conditioning (*Ind. Heat.*). See **protective furnace atmospheres***.

gas orifice (*Ind. Heat.*). That part of a natural-draught-type gas burner or injector through which gas is directed into a throat or venturi tube, creating a velocity flow for the entrainment of primary combustion air.

gas pressure regulator (*Ind. Heat.*). A governor having a diaphragm-operated valve or other device actuated by gas pressure and balanced to produce a constant outlet pressure irrespective of fluctuating initial pressures.

gauge box (*Civ. Eng.*). A box which measures a known quantity of material such as cement, or similar material, for testing or making mixtures.

gelometer. See **Bloom gelometer***.

gentian violet (*Chem.*). A mixture of the three dyes, methyl rosaniline, methyl violet, and crystal violet, which is antiseptic and bactericidal. Used for the modern treatment of serious burns.

geodesic (*Maths.*). The shortest path between two points on any surface.

gluten † (*Bread-making*). The resilient protein product, chiefly glutenin and gliadin, remaining when starch has been washed from dough.

gnomon, nō′mon (*Maths.*). The remainder of a parallelogram after a similar parallelogram has been removed from one corner.

grader (*Civ. Eng.*). A power-operated machine provided with a blade for shaping excavated surfaces to the desired shape or slope.

green manuring (*Agric.*). The growing and subsequent ploughing in of plants, such as beans, rape, mustard.

grip† (*Build.*). Also, a small channel across the road-side to conduct surface water to a drain or ditch. Also called OFFLET.

ground (or **earth**) **system** (*Radio*). A system of wires, usually buried beneath an antenna system, to increase the conductivity of the ground in the neighbourhood of the antenna and make it more nearly a perfect reflector.

grubbing (*Agric., Civ. Eng.*). The removal of obstacles in the soil, such as roots of trees, hedges, etc., preparatory to cultivation or erection of works.

guard band (*Radio*). Any additional frequency band on either side of an allocated band (including any *frequency tolerance**, q.v.), to ensure freedom from interference from other transmissions.

half-toric sector (*Sig.*). A section of a signal-lamp lens which diverts a part of the light over a wide angle for local observation, the remainder of the light being focused over a small angle for distant observation.

Hardmetal (*Met*). Sintered tungsten carbide. Used for the working tip of high-speed cutting tools. See **sintered carbides***.

harmonic conjugate (*Maths.*). Two points are harmonic conjugates with two other points if the cross ratio of the range of the four points is harmonic.

harmonic ratio (*Maths.*). If the cross ratio of four co-linear points equals −1, it is harmonic.

Hartmann test (*Optics*). A test for aberration of a lens, in which a diaphragm containing a number of small apertures is placed in front of the lens and the course of the rays is recorded by photographing the pencils of light in planes on either side of the focus.

heat balance (*Ind. Heat.*). The evaluation of operating efficiency of a furnace or other appliance, the total heat input being apportioned as to heat in the work, heat stored in brickwork, loss by conduction, loss by radiation, loss by unburnt gases in waste products, sensible heat in dry flue gases and latent heat of water vapour, thus determining the quantity and percentage of heat usefully applied and the sources of heat losses.

heat density (*Ind. Heat.*). The degree of weight and pressure of live gases in heating chambers of industrial furnaces, upon which the rate of heat transfer depends.

heat detector (*Ind Heat.*). A special form of industrial thermostat of the indirect-acting type for operation in conjunction with a relay gas-flow control valve, and for controlling working temperatures in furnaces and heating appliances up to about 1000° C.

hiding power (*Paint.*). Of a paint: effectiveness in masking a given test surface when applied in a specified manner. The hiding power is an inverse function of the diameter of the particles in the paint.

horn, electromagnetic (*Radio*). See **electromagnetic horn*.**

hush-hush (*Cinema.*). The variation in background noise in sound-film or other types of reproduction, when a noise-reduction system is in use.

hydroponics (*Hort.*). The technique of growing plants over water instead of in soil, in the water being dissolved suitable chemicals, which feed the plant through the dipping roots.

hydroxylation theory (*Ind. Heat.*). Based on the idea that when a hydrocarbon is oxidised there is a natural tendency for its hydrogen atoms to be successively converted into OH groups, thus producing hydroxylated molecules with consequent heat evolution.

hyp (*Elec. Comm.*). One-tenth of a *néper* (q.v.)

hyper'bola (*Maths.*). (1) Section of a right circular cone by a plane which intersects the cone on both sides of the apex.—(2) The plane locus of a point such that the differences of the distances of the point from two fixed points (*foci*) is constant.—(3) The plane locus of a point such that the ratio of the distance of the point from a fixed point (*focus*) to the distance from a fixed line (*directrix*) is constant, and greater than unity, the ratio being the *eccentricity* The *major axis* is the diameter passing through the foci, the *minor axis* bisects this at right-angles. The equation is of the form $x^2/a^2-y^2/b^2=1$.

hypertensin (*Physiol.*). A substance, probably a polypeptide, formed by the reaction of renin and hypertensinogen, and acting as a vasopressor and vasoconstrictor, thus increasing the blood pressure. Also called ANGIOTONIN

hyperten'sinogen (*Physiol.*). A blood globulin which, reacting with renin, forms hypertensin.

hypocy'cloid (*Maths.*). See **cyclic curve*.**

hy'povitamino'sis (*Med.*). Any slight or ill-defined abnormal condition which results from partial deficiency in vitamins.

ignition temperature (*Ind. Heat.*). In the combustion of gases, the temperature at which the heat loss due to conduction, radiation, and other causes is more than counterbalanced by the rate at which heat is developed by the combustion reaction.

ignition velocity (*Ind. Heat.*). See **flame propagation (rate of)*.**

ignitron (*Thermionics*). A mercury-arc rectifier having an anode and pool of mercury, and fitted with an auxiliary dipping control electrode which initiates the main discharge during any part of the cycle when the anode is sufficiently positive.

imaginary number (*Maths.*). A real number x multiplied or operated on by i or $\sqrt{-1}$; i.e. $\sqrt{-1}.x$, or ix. See ***j***.

impact burner (*Ind. Heat.*). A nozzle-type burner designed to impact the flame on to a surface of broken refractory material, producing conditions of surface combustion, and effecting heat transfer mainly by radiation without direct flame contact with the object being heated. Principally used for the firing of low-temperature metal-melting furnaces, tinning pots and galvanising baths.

implicit function (*Maths.*). A variable x is an implicit function of y when x and y are connected by a relation which is not explicit (see **explicit function***)

implosion. The collapse inwards of an evacuated vessel, especially the glass envelope of a lamp or thermionic valve.

impulsing signal (*Elec. Comm.*). The signal containing the requisite impulses for operating mechanisms for routing calls in setting up connections; e.g. voice-frequency impulses over trunk lines.

incendiary bomb (*Mil.*). Any bomb designed primarily to cause damage by fire. Three main types are: (1) magnesium casing ignited by thermite, with or without a relatively small high-explosive charge; (2) oil-filled, containing benzine or crude oil; (3) phosphorus-filled, in which the phosphorus may be dissolved in carbon disulphide or other liquid, or be present in some other form.

incline (*Surv*). See **gradient.**

indeterminate equations (*Maths.*). Simultaneous equations which by reason of certain relations between the coefficients, or from insufficient data, have an infinite number of solutions.

index (*Nut*). A parameter of the human frame, used in nutritional and growth studies.

See **A.C.H.—*** **pelidisi—***
Bouchard's—* **Pignet's—***
Flesch's—* **Pryor's—***
Franzen's—* **Quetelet's—***
Livi's—* **vitality—***
Manouvrier's— *

indications (*Sig.*). The removable boards, discs, or lamps carried on the front of engines, or on the rear of trains, to describe the train, its destination, etc.

industrial gas burners (*Ind. Heat.*). The main types of these are: (*a*) low-pressure natural draught, (*b*) high-pressure natural draught, (*c*) low-pressure gas with pressure air, (*d*) high-pressure gas with pressure air, (*e*) air-gas mixture natural draught, (*f*) air-gas mixture positive pressure, (*g*) luminous or radiant flame burners. Each type possesses its own particular features in design, construction, and application.

inflammability, limits of (*Ind. Heat.*). The lower and higher percentages of air volumes in proportion to gas volumes whereby a combustible mixture is formed.

inflexion (*Maths.*). See **point of inflexion*.**

infra-red therapy (*Med.*). The treatment of disease by means of generators producing ether vibrations of a wavelength between 8000 and 160,000 A.U.

inositol (*Chem.*). See **bios*.**

inspirator (*Ind. Heat.*). The injector of a pressure gas burner, combined with a venturi mixing tube, primary combustion air being entrained from surrounding atmosphere by the projection of a gas stream into the injector throat.

instantaneous specific heat (*Ind. Heat.*). The specific heat value at any one temperature level, occasionally called ***true specific heat*** to distinguish from mean specific heat.

integral function or **integral** (*Maths.*). The function which, when differentiated, equals the given function. If $\phi(x)$ is the derivative of $f(x)$, then $f(x)$ is the integral of $\phi(x)$.

See **Abelian—*** **elliptic—***
definite—* **particular—***

integrating factor (*Maths.*). A multiplying factor which enables a differential equation to be transformed into an exact equation.

intensifying screen (*X-rays*). A screen treated with zinc sulphide which fluoresces under the action of X-rays and so contributes to the exposure of a photographic surface in contact with it.

intermodulation (*Elec. Comm.*). The modulation of each of the components of a signal or modulated wave by each other.

invariant (*Maths.*). A function of the coefficients of the equation of a curve or surface, unaltered by a *projective transformation** (q.v.).

inverse function (*Maths.*). If $y=f(x)$ and a function $\phi(y)$ is found such that $x=\phi(y)$, then $\phi(y)$ is the inverse function of $f(x)$, e g. $\log_e x$ is the inverse function of ϵ^x.

inverse trigonometrical function (*Maths.*). If y is a trigonometrical ratio of the angle x, then x is the inverse trigonometrical function of y: e.g. if $y=\sin x$, the inverse trigonometrical function is $x=\text{arc} \sin y$ or $\sin^{-1}y$, where arc sin y or $\sin^{-1}y$ is the angle whose *sine* is y.

Irish bridge (*Civ. Eng.*). A ford or watersplash treated so as to be permanent.

irrational number (*Maths.*). A number which can be interpolated on a scale of rational numbers, but which cannot be derived as a rational number, e g. $\sqrt{2}$.

island (*Highways*). A reserved area in a roadway, larger in extent than a street refuge, used for controlling the flow of traffic, and as a platform for pedestrians using public vehicles.

isthmus armature (*Teleph.*). A relay armature with a constriction near the end covering the pole of the core. Saturation of the isthmus during operation tends to equalise the operating and release currents.

key clicks (*Radio*). Transient radiation of electromagnetic energy outside the allotted frequency band when a telegraph transmitter is keyed, resulting in interference in other channels; due to sudden changes in antenna current.

keying wave (*Radio*). Same as *marking wave.*

Kick's law (*Chem. Eng*). Assumes that the energy required for subdivision of a definite amount of material is the same for the same fractional reduction in average size of the individual particles, i.e. $E=k_k \log_e d_1/d_2$, where E is the energy used in crushing, k_k is a constant, depending on the characteristics of the material and on the type and method of operation of the crusher, and d_1 and d_2 are the average linear dimensions before and after crushing.

king lever (*Sig.*). A master lever in an interlocking signal-lever frame which controls the system of interlocking.

Kohler's disease (*Med.*). Inflammation of the bone and cartilage of one of the tarsal bones.

kopf'ring (*Mil.*). (Ger.; literally, 'head-ring'). A metal ring fixed to the shoulder of a bomb to reduce its terminal velocity after release.

Kromayer lamp (*Med.*). Apparatus for the administration of ultra-violet rays locally. It has a quartz mercury-vapour arc and a cold-water cooling device, and is used in treatment of diseases of the ear, nose, and throat, and in gynaecological conditions. See **ultra-violet therapy*.**

K.S.K. (*Chem. War.*). *Ethyl iodoacetate** (q.v.).

laboratory sand-bath (*Ind. Heat.*). A gas-heated steel bath containing sand in which crucibles or other vessels are indirectly heated. Chiefly employed for drying precipitates, evaporating solutions to dryness, and for bringing materials into solution when steady heating is necessary.

lactoflavin (*Chem.*). See **vitamin B_2 complex*.**

land (*Acous.*). The uncut surface between the grooves in the surface of a recording material.

landing beam (*Radio*). The beam of radiation from a transmitter along which an aircraft approaches a landing field during blind landing.

landscape lens (*Optics*). A photographic objective of meniscus form, generally with the concave surface towards the object and with the diaphragm on the object side of the lens.

lauryl thiocyanate (*Chem.*). $C_{12}H_{25}SCN$. A salt of lauryl alcohol; used as a disinfectant.

layby (*Highways*). A widening of the carriageway so that vehicles can draw in to the kerb without causing obstruction to through traffic.

laying the bearings (*Acous.*). In tuning fixed-pitch instruments, such as the piano or organ, the technique of tuning the 12 semi-tones of a central octave. All other notes are then tuned by unison or octaves.

leptosome (*Nut.*). The tall or slender type of human figure.

lethal index (*Chem. War.*). See **mortality product*.**

level† (*Civ. Eng.*). Also, a ditch or channel for drainage, especially in flat country (e g. the Fens).

Lewis Jones condenser (*Med.*). Apparatus for testing muscle reactions. See **R.D.***

lewisite (*Chem. War.*). $ClCH=CH \cdot AsCl_2$. Dark-coloured oily liquid (colourless when pure) with a strong smell of geraniums. Vesicant having lachrymatory and nose-irritant action. Mortality product, 3000 to 5000.

limit (*Maths.*). A sequence of terms approaches a *limit L* when every term after a given term differs from L by less than a finite quantity, however small.

line (*Maths.*). In a plane: the shortest distance between two points. On a sphere: a portion of a great circle.

line splitting (*Teleph.*). The disconnection of a trunk line at a switching point by a prefix signal, so that the signal required for switching at the point is not passed on unnecessarily.

line stabilisation (*Radio*). The dependence of a valve oscillator on a section of transmission line for stabilisation of its frequency of oscillation; e.g. a quarter-wave line acts as a rejector circuit of very high Q, thus giving a highly critical change in phase at the resonant frequency.

liquefied petroleum gases (*Ind. Heat*) These fall within three main categories, viz, propane, butanes, and pentanes. The two sources are natural gas wells and oil refinery separation.

liquid heat treatments (*Ind. Heat.*). See **salt bath.**

liquid limit (*Agric.*). Of a soil: the moisture content corresponding to a specific degree of consistency as indicated by a standardised apparatus.

liquid manure (*Agric.*). A fertilising liquid made by steeping animal or poultry droppings in water.

live fence (*Highways*). A hedge.

Livi's index (*Nut*). An obsolescent index of the human frame, given by 100-times the cube-root of the weight divided by the height.

loam (*Agric.*). A soil mixture consisting of an indefinite mixture of clay and sand or silt.

lockspit (*Surv.*). A continuous shallow excavation of V-shape along a defined line over the surface of the ground.

longitudinal magnification (*Optics*). The ratio of the length of the image to the length of the object in a lens system when the object is small and lies along the axis of the system.

loop road (*Highways*). A road route made or used to avoid obstructions.

lumino-therapy (*Med.*). *Chromo-therapy** (q.v.).

luminous gas flame (*Ind. Heat.*). Produced by admitting no primary combustion air to the burner. The principal reaction which causes luminosity is the thermal breakdown of the hydrocarbons into carbon and hydrogen, the carbon being heated to incandescence by the heat of the flame.

lune (*Maths.*). The portion of the surface of a sphere intercepted by two great circles.

Maclaurin's series (*Maths.*). Modification of *Taylor's series** (q.v.), putting $a=0$.

magnetic shield (*Elec. Eng.*). A surface of magnetic material which reduces the effect on one side of a magnetic field on the other side. A substantially complete shield is thus used to protect A.C. indicating instruments from errors arising from external alternating magnetic fields.

magnetic suspension (*Elec. Eng.*). Any arrangement whereby a magnet is used to assist in the support of, for example, a vertical shaft in a meter, thereby relieving the jewelled bearings of some of the pressure.

Magnuminium (*Met*). A series of magnesium-base alloys similar to Elektron; sp. gr. 1·8.

malthenes (*Chem.*). Such constituents of asphaltic bitumen as are soluble in carbon disulphide and petroleum spirit. See **asphaltenes*, carbenes*.**

maltose † (*Chem.*) In cereal chemistry, the *maltose figure* indicates the natural sugar content and diastatic activity of flour or meal samples.

Manouvrier's index, ma-noov'ri-ā (*Nut.*). The height of the human frame, divided by the sitting height, less unity. A comparative index, which may indicate a disturbance of nutrition.

Mansell disc wheel-bond (*Sig.*). Electrical connection between the fixed axle and the tyre of a wheel.

manual hold† (*Auto. Teleph.*). Also, the condition when neither the calling subscriber nor the controlling operator can release the connection in the normal manner.

manure (*Agric.*). Natural or artificial food material for plants and trees, supplying phosphates, nitrogen and potash. Natural manure from the farmyard contains these constituents, and is helped out by decayed leaves (compost) and animal products, wood ash, and soot.

marker beacon (*Radio*). A small transmitter, usually emitting a highly directed vertical beam of radiation, intended to indicate a known point or boundary, especially in blind-landing systems.

marker groove (*Acous.*) A groove cut at the beginning or end of a recording.

marker light (*Sig.*) An indicating light on a signal post, to indicate the position or aspect of the main signal should its light have failed.

marl† (*Agric*). A soil consisting of an indefinite mixture of calcareous clay or calcareous loam.

massage (*Med.*). Treatment of the body tissues by means of scientific manipulations. See **effleurage, petrissage*.**

matrix (*Maths.*). A system of elements of real or complex numbers arranged in a square or rectangular formation; e.g., given a set of linear equations $\sum_{j=1}^{j=n} a_{ij} . x_i = y_i$, the equations can be replaced by the equation $A . x = y$, where A represents the matrix of the coefficients. See **determinant*, non-singular matrix*, order*, rank*.**

Maxwellian viewing system (*Optics*). In some photometers, spectrophotometers, colorimeters, etc., an arrangement in which the field of view is observed by placing the eye at the focus of a lens, e.g. in the plane of a spectrum, instead of using an eyepiece.

median, median value (*Maths.*). That value in a series of observed values which has exactly as many observed values above it as there are below. See **mode*.**

melamine (*Chem.*). A cyclic trimer of cyanamide with the formula $C_3H_6N_6$; condensed with formaldehyde it gives a thermosetting plastic which, combined with α-cellulose pulp, is used for moulding, especially for table-ware owing to its heat-resisting properties and chemical inertness. The unfilled resin is used for varnishes and laminates.

mes'osome (*Nut.*). The medium type of human figure.

mesotron (*Phys.*). A short-lived or transitory positive or negative particle observed as a result of cosmic radiation and having a mass about 200 times that of an electron.

Mev (*Thermionics*). A unit equal to one million *electron volts** (q.v.)

microscope † (*Optics*). See also **ultra-violet microscope*.**

minor (*Maths.*). A sub-determinant, i.e. a determinant contained in another determinant of higher *order** (q.v.).

mode, modal value (*Maths.*). The value of a series of observed values that is the most frequently observed, as exhibited by a frequency-distribution curve representing the observed values. See **median*.**

modulating fuel-air proportioning valve (*Ind. Heat*). See **floating temperature control*.**

modulation factor (*Radio*). Same as *depth of modulation.*

mole drainer (*Agric.*). A cylinder on the lower edge of a blade, which is drawn longitudinally through soil so as to form a natural drainage channel.

molecular distillation (*Chem.*). Distillation at a pressure of *ca.* 10^{-3} cm. Hg., such that the mean free path of the molecules is of the same order of magnitude as the distance between the heated and cooled surfaces. Used for fractionation of thermolabile organic compounds, e.g. vitamin A and essential oils.

molecular formula (*Chem.*). The formula giving the number of atoms in a molecule of the compound, e.g. benzene C_6H_6, formaldehyde H·CHO, aluminium chloride $AlCl_3$. In organic chemistry, elements are usually given in the following order, C, H, O, N, S, halogen, etc. Functional groups are written separately, e.g. Prontosil $(NH_2)_2C_6H_3{\cdot}N{=}N\,C_6H_4{\cdot}SO_2NH_2$, not $C_{12}H_{13}O_2N_5S$.

mon'ochord (*Acous.*). A laboratory apparatus for demonstrating the properties of single stretched wires and the sounds generated thereby.

monoton'ic sequence (*Maths.*). A sequence such that all members either do not increase, or do not decrease.

mortality product (*Chem. War*). A measure of the toxicity of a *war gas** (q.v.), given by the formula $W = c . t.$, where W is the mortality product, c the concentration in milligrams per cubic metre, and t the time in minutes for exposure to this concentration to result in certain death.

motorised fuel valve (*Ind. Heat*). See **adjustable-port proportioning valve*.**

mulching (*Agric.*). The process of covering the top-soil with manure, compost, decaying leaves, or bracken, to protect the underlying plant-roots from frost.

multiple modulation (*Radio*). The use of a modulated wave for modulating a further independent carrier.

multiple point (*Maths.*). On a curve: a point through which pass more than one distinct branch of the curve.

multiple-unit steerable antenna (*Radio*). An extended antenna comprising a number of units, the total polar diagram of which can be rotated by varying the relative phases of the contributions of the individual elements. Abbrev. **musa.**

multiplex transmission (*Radio*). Transmission in which two or more signals modulate the carrier wave.

multiply-connected domain (*Maths.*). A domain which is not *simply-connected** (q.v.).

musa (*Radio*). Anagrammatic abbrev. for *multiple-unit steerable antenna** (q.v.).

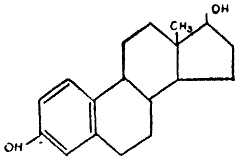
mustard gas† (*Chem. War.*). Very persistent vesicant; oily brown liquid (colourless when pure). Stable and penetrating; faint garlic-like odour Insidious effects on the human body, delayed 6-24 hours. Mortality product 1500.

N.A. (*Optics*). See **numerical aperture***.
near point (*Optics*). The nearest position to the eye at which an object can be seen distinctly. The object point conjugate to the retina when accommodation is exerted to its fullest extent
negative transference (*Psycho-an*). *Transference* (q v) in which the infantile emotions displaced on to the analyst are those of hostility and hate.
Neoprene (*Chem.*). The first commercial synthetic rubber (U.S.A , 1931). It is a polymer of chloroprene $CH_2=CCl\ CH=CH_2$ derived from acetylene and hydrochloric acid
net fertility rate (*Sociology*) See **fertility rate***.
neutral flame (*Ind. Heat.*) In the welding of metals a neutral flame is produced by a mixture at the torch of acetylene and oxygen in equal volumes, the additional oxygen necessary to complete combustion being absorbed from surrounding atmosphere It is claimed that a neutral flame does not produce chemical changes detrimental to the metal with which it is in contact
nicotinic acid (*Chem.*). See **vitamin B_2 complex***.
nip (*Chem. Eng.*). See **angle of nip***.
node (*Maths.*). A multiple point on a curve through which pass two distinct branches which do not have a common tangent at the point. See **crunode*, acnode***.
nom'ogram (*Maths*) An alignment chart arranged so as to obviate specific types of calculation.
non-persistent (*Chem. War.*). Said of a true gas which quickly dissipates under normal atmospheric conditions
non-singular matrix (*Maths.*). A square matrix the determinant of which is not equal to zero.
null indicator (*Elec. Eng*). Any device, such as head telephones or a sensitive galvanometer, for determining zero current, or voltage, in a specified part of an electric circuit, as in a bridge. See **nodaliser.**
number (*Maths.*). An attribute of objects or labels obtained according to a law or rule.

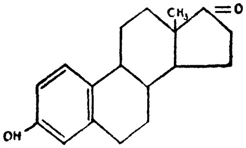
See **algebraic—***
complex—*
imaginary—*
irrational—*
ordinal—*
rational—*
real—*
conjugate complex numbers*

numerical aperture (*Optics*). The product of the refractive index of the object space and the sine of the semi-aperture of the cone of rays entering the entrance pupil of the objective from the object point. The resolving power of the objective is proportional to its numerical aperture. Abbrev. **N.A.**
nylon (*Plastics*). Generic name for synthetic, colourless, fibre-forming polymeric amides of protein-like structure, characterised by extreme toughness, tensile strength and elasticity. It can be produced in fibres and sheets, and in flake form for moulding.

oblique axes (*Maths.*). Co-ordinate axes which are not mutually perpendicular.
occupation road (*Highways*). A road which gives access to properties but is not maintained by the owners of the properties.
octave (*Acous.*). The musical interval between two notes when the frequencies of their fundamental components are in the ratio 2 : 1.
oestra'diol (*Physiol.*). The hormone secreted by the ovarian follicle (follicular hormone) and responsible for the development of the sexual characteristics of the female. Sometimes known by the proprietary term, Oestilin. Oestradiol ($C_{18}H_{24}O_2$) is a sterol having the following structural formula :



oestrogen (*Physiol*). The generic term for female sex hormones.
oestrone (*Physiol.*). The urinary excretion product of oestradiol. Oestrone ($C_{18}H_{22}O_2$) has the following structural formula :



offering signal (*Teleph*) A signal which breaks through an opposing *busy* to offer a call (e.g. a trunk call) to an engaged subscriber, who is busied by his final selector.
offlet (*Civ. Eng*). See **grip***.
oil (or **fuel oil**) **burner** (*Ind Heat.*) A device designed primarily for oil atomisation by means of a stream of low- or high-pressure air or steam passing over the oil-flow orifice, thus producing a combustible mist composed of myriads of oil particles held in suspension in the air or steam, and enabling, with a firing block (or quarl) as an adjunct, stable flames to be propagated.
oiticica oil, —sē'ka (*Chem.*). A quick-drying oil obtained from the nuts of *Conepia grandifolia* of Brazil ; used for same purposes as *tung oil* (q.v.).
oleo-resin (*Paint.*). Oily resinous sap of plants, partially deprived of volatile constituents.
Oligot'richa (*Zool.*). An order of *Ciliata* having the cilia reduced or absent, the sole motile organs being membranelles; peristome usually at right-angles to long axis of body; adoral zone of membranelles winds to left, forming nearly or quite complete ring around peristomial margin.
Opalinata (*Zool.*). The only order of *Protociliata** (q.v.) having the characteristics of the subclass.
opaque enema (*Radiology*). An enema of barium sulphate used in radiology to outline the colon.
optical path (*Optics*). The distance travelled through a medium by a ray of light multiplied by refractive index of medium, being length of equivalent path in air (strictly vacuum).
optimum gas rate (*Ind. Heat.*). The correct rate of gas flow to a burner in relation to the actual heat requirements of a furnace or other appliance.
order (*Maths.*). Of a curve or surface : the number of points, real, coincident, or imaginary, in which the curve or surface is intersected by a straight line.—Of a matrix : (1) a square matrix of *n* rows and *n* columns is of order *n* ; (2) a rectangular matrix of *n* rows and *m* columns is of order *n*×*m*, or *n* by *m*. See **rank***.
ordinal number (*Maths.*). A number derived from the notion of counting, and possessing the fundamental property of order or position in an aggregate.
oven-type furnace (*Ind. Heat.*). An industrial heat-treatment furnace fired under the hearth, the live gases flowing directly into the heating

chamber through live-gas flues disposed along each side of the hearth. Frequently known as a SEMI-MUFFLE FURNACE.

over-gassing (*Ind. Heat.*). A condition resulting in a gas-heated furnace or appliance when the burners are calibrated for, and operated at, a higher gas rate than that actually required.

osculation (*Maths.*). See **point of osculation***.

overhaul (*Civ. Eng.*). The excess of the actual *haul* (q.v.) above the free haul (i.e. the haul which is conveyed without extra cost).

overlap (*Sig.*). The length of advance track beyond a stop signal which must be unoccupied before the previous stop signal can clear.

overs (*Print.*). Extra sheets allowed to a job to provide for ordinary *spoilage** (q.v.). See also **printer's ream.**

overspun wire (*Acous.*). A wire for a musical instrument (e.g. for a low note in a piano) round which a loading wire is tightly spun in order to lower its fundamental pitch.

oxytocin (*Physiol.*). A hormone secreted by the posterior lobe of the pituitary body, which stimulates the uterine muscle to contract.

π (*Maths.*). The ratio of the circumference to the diameter of a circle; i.e. 3·14159 . . . Calculated to any degree of precision by the summation of a converging series.

packway (*Highways*). See **bridle-path*.**

pad roller (*Cinema.*). A non-sprocket roller for pressing the edges of cinematograph film on to sprockets, so that a sufficient number of teeth of the latter may be engaged by the sprocket holes in the film.

pantothenic acid (*Chem.*). See **vitamin B_2 complex*.**

parabolic catenary (*Maths.*). See **catenary*.**

paraly′sant (*Chem. War.*). A war gas which acts on the central nervous system, e.g. prussic acid.

paraxial focus (*Optics*). The point at which a narrow pencil of rays along the axis of an optical system comes to a focus.

partial air-gas mixture (*Ind. Heat.*). A mixture in which the proportion of air pre-mixed with a gas is below that needed for combustion, the remaining air volume being entrained or otherwise introduced at a secondary stage in or near the burners.

partial differential coefficient (*Maths.*). If $z=f(x, y,$ etc.), then the partial differential coefficient of z with respect to x is the limit

$$\underset{h \to o}{L^t} \frac{f(x+h, y, etc.)-f(x, y, etc.)}{h},$$

if this limit exists, and is written $\partial z/\partial x$, or f_x $(x, y,$ etc.).

particular integral (*Maths.*). Solution of a differential equation formed by assigning values to the arbitrary constants in the complete primitive. Alternatively, a non-singular solution of a differential equation containing no arbitrary constants.

partic′ulate. Said of a material consisting of particles.

particulate cloud (*Chem. War.*). Any war 'gas' which consists of a finely divided solid suspended in air; e.g. D.M., D.A., D.C.

pegs (*Surv.*). Shaped sticks of wood driven in the ground, marks on the flat top indicating a point and level for surveying purposes. See **recovery pegs*.**

pegtop paving (*Civ. Eng.*). A paving of setts each of which is small in visible area.

pelidisi index (*Nut.*). Index obtained by dividing the sitting height in cm. into the cube-root of ten-times the weight in grams.

pencil (*Maths.*). Of lines: a number of lines passing through a fixed point called the *vertex.*—Of planes: a number of planes having a common join.

penic′illin (*Chem.*). An ether-soluble substance, not yet obtained in pure form, produced by certain strains of the mould *Penicillium*, and having an intense growth-inhibiting action against various bacteria. It has been successfully used in combating infection in, e.g., wounds. Similar substances appear to be produced by other moulds.

penning (*Civ. Eng.*). The same as *pitching.*

perfect combustion (*Ind. Heat.*). A condition only attained by exact and precise proportioning of fuel and air, so that the products of combustion contain neither unburnt gas nor excess air.

pericycloid (*Maths*). See **cyclic curve*.**

perilla oil (*Paint.*). Substitute for linseed oil; derived from the nuts of *Perilla ocymoides*

periodic antenna (*Radio*). An antenna depending on resonance in its elements, and thereby presenting a periodic change in input impedance as the frequency of the drive is varied.

persistent (*Chem. War.*). Said of a war 'gas' when this is a liquid which, having a low vapour pressure, evaporates very slowly in ordinary atmospheric conditions.

Perspex (*Plastics*). A proprietary thermoplastic resin of polymethyl methacrylate, of exceptional transparency and freedom from colour; widely used in sheet form for windscreens, transparent gun-turrets in aeroplanes, etc.

petrissage, -sahj′ (*Med.*). A kneading manipulation in massage. See **massage*, effleurage.**

Petzval curvature (*Optics*). The curvature of the image surface of a lens system in which spherical aberration, coma, and astigmatism have been corrected.

phosgene† (*Chem. War.*). Non-persistent colourless war gas. Faint odour of musty hay. Lung irritant, with delayed oedema; highly lethal, mortality product 450 to 5000.

phosphatase (*Chem.*). A non-proteolytic enzyme of protein nature occurring in the kidneys, intestines, and bones. Its action is to hydrolyse orthophosphoric esters to phosphoric acid and alcohol, and also to synthesise the ester from the components.

photo-engraving (*Print.*). Preparation of a printing surface by photography followed by chemical and mechanical treatment.

photo-mechanical (*Print.*). Said of any process involving a printing surface prepared by photography from which copies are made mechanically.

photon† (*Light*). A unit of retinal illumination. The illumination on the retina is one photon when a surface with a brightness of one candle per square metre is seen through a pupil of 1 sq. mm. area.

photopic luminosity curve (*Light*). The curve giving the relative brightness of the radiations in an equal-energy spectrum when seen under ordinary intensity levels.

phylloquinone (*Chem.*). See **vitamin K*.**

Pignet's index, pēn-yā (*Nut.*). The height in centimetres, less the weight in kilograms, less the chest girth in centimetres; an index which gives an inverse qualitative indication of corpulence.

pile-up (*Teleph.*). The collection of moving and fixed spring-contacts, with their insulators, formed as a unit for incorporation in a relay.

piloted-head gas burners (*Ind. Heat.*). A special class of burner, principally employed for general and critical direct-flame heating processes. They incorporate in the burner head or nozzle a by-pass system by which low-pressure feeder flames are produced around the main flame, to secure positive retention when the velocity of the combustible mixture is in excess of the flame speed.

pinhole camera (*Photog.*). A camera in which the lens is replaced by a small pinhole.

Pirquet's index, pĕr-kā (*Nut.*). See **pelidisi index***.

pivot factor (*Elec. Eng.*). In an electrical indicating instrument, the factor full-scale torque/weight of movement, which is a measure of freedom from error due to friction in the bearings of the movement.

plansifter (*Flour-milling*). A machine used for separating into various particle sizes the different intermediate products of the milling of wheat It consists essentially of a series of horizontal sieves mechanically operated.

plastic limit (*Agric*). Of a soil: the moisture-content corresponding to a departure from a plastic condition, as indicated by a standardised apparatus.

plate, platter (*Acous.*). Colloquialisms for *disc record.*

point (*Maths.*).

See **conjugate**—* **singular**—*
multiple—*

points (*Rail*). Movable tapered blades or tongues of metal for setting alternative routes of running rails. Each such blade is pivoted at the *heel*, its *toe* being locked against the *stock* rail. Points are termed *facing points* if the train approaches the toe, and *trailing points* if the train approaches the heel.

See **catch**—* **spring**—* **trap**—*

point of inflexion (*Maths*). On a curve: a point at which the tangent to a curve also cuts the curve.

point of osculation (*Maths.*). On a curve: a multiple point through which two branches pass which have a common tangent at that point.

polar (*Maths.*). Of a point with respect to a curve or surface: the line or plane through the points of intersection of tangents from the point to the curve or surface, drawn through the given point, which is called the *pole* of the line or plane.

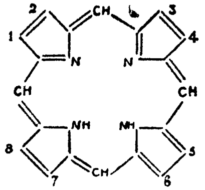
polar co-ordinates (*Maths.*). (1) Of a point *P* in a plane: the distance of the point, *OP*, from a fixed point *O* in the plane, called the *pole*, and the angle made by *OP* with a fixed direction. (2) Of a point *P* in space: the distance of the point, *OP*, from a fixed point *O*, called the *pole*, and the angles made by *OP* with two fixed planes which are not parallel.

polar reciprocation (*Maths.*). A method of transformation in which lines are replaced by points and points by lines; usually by replacing a line by its pole and a point by its polar with respect to the imaginary circle $x^2+y^2+1=0$. Sometimes called DUALISING.

Polaroid. Transparent plastic sheet containing orientated doubly-refracting crystals of an organic iodine compound. Transmits plane-polarised light. Used in spectacles and filters for minimising reflections.

pole (*Maths.*). (1) Of a line with respect to a conic: the intersection of the tangents drawn from the points of intersection of the line and the conic.—(2) Of a plane with respect to a quadric: the apex of the tangent cone to the quadric drawn at its intersection with the plane.—(3) Of a line on a sphere: the ends of a diameter of a sphere normal to the plane of the line.—(4) Of a circle: the ends of the diameter of a sphere normal to the plane of the circle, which need not be a great circle.

porphin (*Chem.*). A group of four pyrrole nuclei linked by methene groups, and having a complete system of conjugated double bonds, which accounts for the (reddish) colour of its derivatives.



por'phyrin (*Chem.*). A substituted porphin free from metal.

positive feedback (*Radio*). Interconnexion between the output and input circuits of an amplifier so as to facilitate the voltage, current, or power drive of the input by the addition of voltage, current, or power from the output, thus reducing the resistance of the source of amplified power and, if the feedback is sufficient, setting up sustained oscillations independently of the input drive. See **negative feedback.**

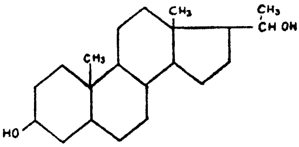
positive transference (*Psycho-an*). The type of *transference* (q.v.) in which the infantile emotions displaced on to the analyst are those of love.

power level† (*Elec. Comm.*). Though usually identified with transmission level, the term frequently refers to the actual power passing a point in a transmission system. See **zero power-level.**

pozzolana† (*Civ. Eng.*, etc.) Other substances (burnt clay, slag, etc.), having the same effect. See **gaize.**

prefix (*Teleph*). The signal which precedes an operational signal and prepares apparatus for receiving the operational signal. See **suffix***.

pregnandiol (*Chem.*). A steroid which is apparently the end product of the metabolism of progesterone, and is found in the urine during pregnancy and at one stage of the menstrual cycle. It is excreted partly free and partly combined with glycuronic acid. Its structure is:



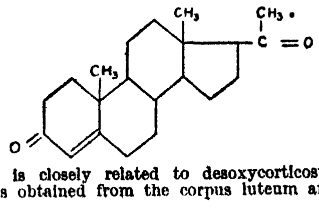
primitive (*Maths.*). See **complete primitive***.

principal ray (*Optics*). The ray from an object point lying off the axis and passing through the centre of the entrance pupil of the system.

prismatic binoculars (*Optics*). Binoculars in which the two tubes, instead of being straight and parallel, are formed thus: , and are fitted with total reflecting prisms at the angles.

process-engraving (*Print.*). Photo-engraving.

progesterone (*Chem.*). One of the female sex hormones. It is a steroid:



and is closely related to desoxycorticosterone. It is obtained from the corpus luteum and the placenta. It is concerned in preparing the uterus to receive the fertilised ovum, and in maintaining the continuance of pregnancy. It has been used therapeutically in cases of habitual abortion.

projection† (*Geog.*, *Surv.*). An arbitrary method of representing on a plane surface (e.g. a map or plan) details existing on a spherical surface (e.g. the earth). Types: (1) *cylindrical* (*equal-area*), in which projection is made from a sphere on to the surface of an enveloping cylinder from the axis; (2) *conical*, projection from the centre of the sphere on to the developed surface of a tangent cone; (3) *gnomic*, projection from the centre of the sphere on to a tangent plane; (4) *Mercator's* (not strictly a projection), derived from a correction of cylindrical projection; (5) *Mollweide's*, development of the spherical surface along its latitudes, giving a true ellipse

projective properties (*Maths*). Of a figure · properties unaltered by projection, e.g. the class or order of a curve.

projective transformation (*Maths*). A transformation projecting one figure into another

proof†. Proof spirit is taken as the standard strength of alcoholic liquids for fiscal purposes. A spirituous liquid which is x% *overproof* contains as much alcohol in 100 vols. as in $100+x$ vols of proof spirit. A liquid which is x% *underproof* contains as much alcohol in 100 vols. as is in $100-x$ vols. of proof spirit.

protective furnace atmospheres (*Ind. Heat*) An inert gas produced from the products of combustion of gas and air in predetermined proportions, the atmosphere being first cooled, cleaned, dehydrated and desulphurised before delivery to heating chambers of furnaces operated for bright-annealing of non-ferrous metals and bright treatment of steels. See also **furnace atmospheres***.

Protociliata (*Zool.*). A subclass of *Ciliophora*, having no mouth (astomatous) or peristome; parasitic forms.

protopathic. Said of painful cutaneous stimuli.

pro′topor′phyrin (*Chem.*). 1 3·5 8-tetramethyl-2·4-divinyl-6·7-dipropionic acid-porphin. It combines with ferrous iron to give reduced haematin, the prosthetic group of haemoglobin.

provitamin (*Chem.*). A substance, not a vitamin, which is readily transformed into a vitamin within an organism; thus, *β*-carotene results in vitamin A, and ergosterol, after irradiation, in vitamin D_2.

Pryor's index (*Nut.*). An index, basiliac diameter to height, which, used in human growth studies, numerically expresses constitutional types, e.g. *leptosome**, *mesosome**, and *amplosome** (qq.v.).

pug† (*Hyd. Eng.*). To prevent leakage by packing cracks with clay: the material so used.

pug mill (*Civ. Eng.*). A mixing machine for wet materials, as used in the making of mortar.

pugging (*Paint*). The process of mixing pigment with minimum oil in a special stirring machine, to form a very thick paste. The mixture itself.

pyknosome (*Nut.*). See **amplosome***.

pyridoxin (*Chem.*). See **vitamin B_1 complex***.

Pythagorean (diatonic) scale (*Acous.*). See **equitonic scale***.

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quadric (*Maths.*). The surface represented by the general equation of the second degree in three dimensions; e.g. ellipsoid, paraboloid, hyperboloid, or quadric cone. Alternatively, a surface whose intersection with any plane is a conic.

quarl (*Ind. Heat.*). See **burner firing block***.

quarters (*Build.*, *Civ. Eng.*). See **flanks***.

quarter-wave line (bars, or transformer) (*Radio*). A quarter-wavelength section of transmission line designed to operate as a matching device between lines of different impedance level.

Quetelet's index, ket′lā (*Nut.*). The weight of the human body divided by the cube of the height; an obsolescent index used in growth studies.

racking (*Cinema.*). *Framing* (q.v.).

radiant gas flame (*Ind. Heat.*). See **luminous gas flame***.

radiant-tube furnace (*Ind. Heat.*). A modified form of muffle furnace, the heating chamber being provided with a series of steel alloy tubes in which the fuel is burned, thus excluding products of combustion from the heating chamber.

radiolocation (*Radio*). The technique of ascertaining the relative position in space of a reflecting object, such as an aeroplane. A radio pulse is broadcast, and the direction of arrival and the time-delay of the reflection, analogous to acoustic echo, give the required data.

ramploid cusp (*Maths*). See **cusp***.

rank (*Maths*) Of a matrix: a matrix is of rank r if it contains at least one determinant of order r ($\neq 0$) and all higher-order determinants are zero.

rarefaction (*Phys*). Diminution of air-pressure below normal, as in alternate half-cycles in the transmission of a sound-wave.

ratio (*Maths.*). See **cross—*** **harmonic—***

rational number (*Maths.*). A number which can be derived from ordinal numbers by the four fundamental algebraical processes—i.e. addition, subtraction, multiplication, division.

ravelling (*Highways*). *Fretting** (q v.).

R.D. (*Med.*). Reaction of degeneration. Term used in physiotherapy for abnormal responses to the electrical reactions of muscles.

ray† (*Light*). See **extraordinary—*, ordinary—, principal—***.

Rayleigh limit (*Optics*). A limit of one-quarter of a wavelength, representing the maximum difference in optical paths between rays from an object point to the corresponding image point for perfect definition in a lens system.

re-alignment (*Eng.*, *etc.*). The alteration of machinery or the layout of a road with respect to another centre line or axis.

real number (*Maths.*). Any rational or irrational number. See **complex number***.

re-circulation heating system (*Ind. Heat.*). A method of heating industrial ovens and low-temperature furnaces whereby the atmosphere of the working chamber is under constant re-circulation throughout the complete heating system, movement being obtained by some form of fan.

recovery pegs (*Surv.*). Special reference pegs established in known survey relation to the working setting-out pegs, so that the location of these can be recovered if disturbed.

rectangular axes (*Maths.*). Co-ordinate axes which are mutually at right-angles.

reducible equation (*Maths.*). An equation which can be expressed rationally in the *field** (q.v.) of the coefficients.

reference mark (or object) (*Surv.*). A distant mark from which the angular distances to other marks may be taken at a station.

reflector (*Radio*). Part of an antenna array which reflects energy that would otherwise be radiated in a direction opposite to that intended.

regular convex solids (*Maths.*). Solids having all faces bounded by plane surfaces and all corners congruent. They are (1) *tetrahedron*, four equilateral triangular faces, (2) *hexahedron* or *cube*, six equal squares as faces, (3) *dodecahedron*, twelve regular pentagons as faces, (4) *octahedron*, eight equilateral triangles as faces, (5) *icosahedron*, twenty equilateral triangles as faces.

regulus (*Maths.*). One of the sets of lines forming a *ruled surface** (q.v.).

release signal (*Teleph.*). A signal sent through a connection, which, after its cessation, releases all lines and apparatus used for the temporary connection.

relief road (*Highways*). See **by-pass road.**

remodulation (*Elec. Comm.*). Transferring the modulation from one carrier to another carrier, as in the frequency-changer in a supersonic heterodyne radio receiver.

renin (*Physiol.*). A protein liberated from the ischaemic kidney into the blood-stream, where it reacts with hypertensinogen to produce *hypertensin** (q.v.).

resolvant equation (*Maths.*). An equation used in the solution of a higher-order equation.

respirator. See **gas-mask.**

rheology (*Phys.*). The science of flow of matter. The critical study of elasticity, viscosity, and plasticity.

ribbon-flame burner (*Ind. Heat.*). A tubular gas-burner on which a ribbon of flame is produced by means of alternating corrugated and plain steel strips inserted in a milled slot, thus forming honeycombed flame ports, or by the tube being drilled with lines of very fine holes in close formation.

riboflavin (*Chem.*). See **vitamin B_2 complex*.**

ripple† (*Elec. Eng.*). Also, the alternating components in a direct current or voltage obtained from rectified alternating current.

ripple percentage (*Elec. Eng.*). The ratio of the r.m.s. ripple voltage to the average voltage, expressed as a percentage.

rise† (*Highways*). The vertical distance between the crown of a road and the lowest point of its surface.

Rittinger's law (*Chem. Eng.*). States that the energy required in a crushing operation is directly proportional to the area of fresh surface produced, i.e. $E = k_r(1/d_2 - 1/d_1)$, where E is the energy used in crushing, k_r is a constant, depending on the characteristics of the material and on the type and method of operation of the crusher, and d_1 and d_2 are the average initial and final linear dimensions of the material crushed.

road (*Highways*).

See **accommodation—*** **loop—***
arterial— **relief—***
by-pass— **service—***
county—* **trunk—**
district—* **bridle-path*.**

roller (*Cinema.*). See **drag—*** **pad—*.**

roller mill (*Eng.*). In its simplest form, consists of two rolls of suitable material, mounted with their axes horizontal, running in opposite directions; used for a wide variety of crushing and mixing operations.

root (*Maths.*). A value of the variable in a conditional equation for which the equation is true.

rope (*Bread-making*). A condition of bread, caused by *B. mesentericus*, in which the crumb of the loaf develops an objectionable smell and later is partially liquefied.

rubble drain (*San. Eng.*). A drain partially filled with stones so that the drainage can percolate into the soil. Also called STONE DRAIN, BLIND DRAIN, SPALL DRAIN.

ruled surface (*Maths.*). A surface defined by sets of straight lines the whole of which lie in the surface, e.g. a hyperboloid of one sheet.

rummel (*San. Eng.*). See **soakaway*.**

running sand. See **quicksand.**

Sabouraud pastille, sa-boo-rō (*Radiology*). A means for measuring the dose of X-rays to which a surface has been exposed.

sagittal field (*Optics*). The image surface formed by the sagittal foci of a series of object points lying in a plane at right angles to the axis.

sagittal focus (*Optics*). The focus of an object point lying off the axis of an optical system in which the image is drawn out by the astigmatism of the system into a line radial to the optical axis.

sand† (*Geol.*). In the mechanical analysis of soil, sand, according to international classification, has a size between 0·02 and 2·0 mm. See **silt*.**

scalper (*Civ. Eng.*). See **sledger*.**

Schnee bath (*Med.*). An electro-therapeutic method in which the four limbs are immersed in four separate baths, when currents such as sinusoidal, galvanism, or faradic, are used.

Schott treatment (*Med.*). Treatment of heart disease by means of baths and regulated exercises.

Schotten-Baumann reaction (*Chem.*). The introduction of a benzoyl group into hydroxyl, amino, or imino compounds, by shaking with benzoyl chloride and excess aqueous alkali.

Scotch block (*Rail.*). An arrangement for attachment to running rails, to prevent the passage of rolling stock.

scotopic luminosity curve (*Light*). The curve giving relative brightness of the radiations in an equal-energy spectrum when seen at a very low intensity level.

screed† (*Civ. Eng.*). A strip of wood or metal temporarily inserted in a road surface to form a guide for the template for forming the final surface of the road.

screen (*Elec. Eng.*). See **electrostatic shield.**

screening (*X-rays*). Visual inspection of images cast on a fluorescent screen when X-rays pass through the object under examination.

sealing-in burner (*Ind. Heat.*). A gas or oxy-gas burner employed for sealing glass containers such as the envelopes of electric lamps and radio transmitting and receiving valves.

secondary spectrum (*Optics*). The residual longitudinal chromatic aberration in a lens corrected to bring two wavelengths to the same focus.

sedimentation analysis (*Chem.*). A method of analysis particularly suited for the study of suspensions which undergo changes in concentration. The apparatus consists of a beam balance, having a disc suspended from one beam and a compensating spring at the other end. The disc is dipped into the suspension and the increase in weight due to the settling of the particles on the disc is balanced by the spring.

sele'nophone (*Acous.*). A sound-recording and reproducing system in which a variable-area track is recorded and multiplied by printing on a narrow paper tape. Reproduction is effected by collecting the light reflected from a slit, focused on the track, with a light-sensitive cell.

semi-muffle-type furnace (*Ind. Heat.*). See **oven-type furnace*.**

sequence (*Maths.*). A set of numbers derived according to a rule, each member being determined either directly or from the preceding terms.

See **convergent—*** **divergent—***

sequence signal (*Teleph.*). A signal with more than one component but no spaces between, e.g. when the components have different frequencies.

series (*Maths.*). The sum of a number of terms of a sequence.

See **binomial—*** **Maclaurin's—***
double—* **sum of infinite—***
Fourier— **Taylor's—***
Fourier half-range—*

service band (*Radio*). The band allocated in the frequency-spectrum specified for a definite class of radio service.

service road (*Highways*). A minor road parallel to a main road, and serving local traffic without obstructing the main road.

sett paving (*Civ. Eng.*). A pavement constructed with setts on a suitable foundation. Termed a CAUSEWAY in Scotland.

settling (*Chem.*). Sedimentation under gravity of a solid suspension in a liquid. See **Stokes' law***.

shading (*Television*). *Tilt-and-bend* (q.v.) adjustments.

shielded line (*Elec. Comm.*). A line or circuit which is specially protected from external electric or magnetic induction by suitable shields.—(*Radio*) A transmission line enclosed within a sheath so that energy is confined within the sheath and so not radiated.

shift (*Surv.*). The movement of a circular arc from a tangent line to accommodate a transition curve between the arc and the tangent.

shock (*Med.*). An acute peripheral circulatory failure due to diminution in the volume of circulating blood and usually characterised by a low blood pressure and a weak thready pulse. It occurs (often associated with congestive cardiac failure) in, e.g., coronary thrombosis, pulmonary embolism, acute infection, or following trauma. The essentials of treatment are (1) warmth, (2) morphine in the initial stages but not later, (3) plasma or serum given intravenously in large amounts, (4) cardiac stimulants. Adrenalin is contra-indicated and oxygen therapy is useless unless there is some degree of central failure.

short-wave therapy (*Med.*). Treatment by means of short-wave generators in the electrical condenser field with high-frequency energy of from 6 to 30 metres wavelength. Therapeutic results of short-wave therapy are due, principally, to the heat produced in the body tissues. See also **diathermy.**

shoulders (*Build., Civ. Eng.*). Of an arch or road, see **flanks***.

sight distance (*Highways*). The distance over which objects at a specified height above the surface of a road can be sighted from each other.

signal face (*Sig.*). The side of a signal head or set of signal lights which exhibits an aspect or indication of the signals.

signal generator (*Radio*). A specialised high-frequency oscillator, designed to provide known voltages, from one volt down to fractions of microvolts, over a wide range of wavelengths; used for testing or ascertaining the performance of radio-receiving equipment.

silica gel (*Chem.*). Hard amorphous granular form of hydrated silica; chemically inert but very hygroscopic. Used for absorbing water and vapours of solvents. The gel is regenerated by heat.

silt† (*Geol.*). In the mechanical analysis of soil, silt, according to international classification, has a grain-size between 0·002 and 0·02 mm.

simply-connected domain (*Maths.*). A domain in which any closed curve may be contracted to a point without leaving the domain.

singular point (*Maths.*). See **point of inflexion***, **multiple point***, and **conjugate point***.

singular solution (*Maths.*). Of a differential equation: a solution which cannot be derived as a particular integral from a complete primitive.

sintered carbides (*Met.*). A better term than *cemented carbides* (q.v.). The process of sintering as used in powder metallurgy consists in mixing metal powders having different melting-points, and then heating the mixture to a temperature approximating the lowest m.p. of any metal included. In sintered carbides, powdered cobalt, having the lowest m.p., acts as the binder holding together the unmelted particles of the hard carbides.

sinusoi'dal current (*Med.*). An alternative current of considerable value in the treatment of paralysed or weakened muscles.

skate (*Rail.*). A *retarder* (q.v.).

skew lines (*Maths.*). Non-parallel straight lines which do not intersect.

skimming (*Agric., etc.*). (1) The superficial cultivation of soil, the weeds being sheared off and left to die before ploughing.—(2) The removal of the top layer of the ground, or of the irregularities of the surface.

sledger (*Civ. Eng.*). A machine for the first stage of crushing of rock in quarrying. Also called SCALPER.

sleeve control (*Teleph.*). The control of signalling and switching on trunk boards by the third wire attached to the sleeve of the plugs terminating the cords.

slip† (*Pot.*). Used also for casting pottery in plaster moulds and for the centrifugal casting of electrical porcelain insulators.

slip (*Civ. Eng.*). A small or local *landslip* (q.v.).

slipper (*Rail.*). A *retarder* (q.v.).

S/N ratio (*Elec. Comm.*). See **speech/noise ratio***, **signal/noise ratio.**

soakaway (*San. Eng.*). An excavation for drainage which percolates away into the soil. (Scottish term, RUMMEL).

soil (*Agric.*). The uppermost layer of the earth, which supports the growth of plant life. Soils may be heavy clay, loam (natural mixture of sand and clay), peaty (excess of decaying leafy matter), light or sandy (chiefly silica). The loamy type is most generally useful for agriculture, and other types may be corrected by the admixture of clay, manure, or fertiliser with the sandy types, and by breaking up the clay with the subsoil for weathering. Sour soil (excess acidity) is corrected by lime dressings.

soil mechanics. The description, theory, and application of information respecting the properties of soil, its structure, and movement.

soil sampler (*Civ. Eng.*). A hollow circular tool, with a sharp edge, for extracting specimens of soil for examination or analysis. Also SOIL BORER, SOIL PENCIL.

solid angle (*Geom.*). Of an area subtended to a point: the area on the surface of a unit sphere intercepted by the cone whose base is the area and apex the point, which is also the centre of the sphere.

soluseptasine (*Chem.*). See **sulphonamides***.

somatomet'ric (*Nut.*). Concerned with measurements made on the human body, especially for statistical purposes.

sonom'eter (*Acous.*). A *monochord** (q.v.).

soya-bean oil (*Chem.*). Drying oil, abundant in soya beans (the seed of *Glycine Soja* and *G. hispida*, widely grown in the Orient). Used in soaps, paints, varnishes, and rubber substitutes.

spall† (*Masonry*). Also, such a fragment detached by weather action.

spall drain (*San. Eng.*). See **rubble drain***.

spar (*Aero.*). A main structural member of a main plane, tail, or control surface, which carries the applied loads. The ribs forming the aerofoil surface are attached to spars.

speech/noise ratio (*Acous.*). The number of decibels by which reproduced speech must be attenuated before it becomes unintelligible because of the accompanying noise.

spherical triangle (*Maths.*). A triangle formed by three lines (see **line***) on the surface of a sphere.

spherometer (*Optics*). An instrument for measuring the curvature of a lens surface.

spit (*Agric.*). The unit of depth of digging—the length of a fork or spade.

spoilage, spoils (*Print.*). Sheets spoilt in printing (e.g. at beginning of job) or otherwise imperfectly executed (e.g. owing to misapprehension of instructions). See **printer's ream, overs***.

sponson (*Aero.*). (1) In a flying-boat, a stub *plane* (q.v.).—(2) Sometimes, a wing-section to give extra lift in flight.

spring points (*Rail.*). Points which are normally held closed by springs in determining the route when they are *facing points*, but can be passed through as *trailing points* (see **points***).

spurious radiation (*Radio*). Radiation of frequencies outside the band allotted to the transmission.

Stabilovolt (*Elec. Comm.*). A partially evacuated tube containing a gaseous discharge through a series of electrodes, the potentials between which tend to a greater constancy than the voltage applied through a resistance to the end electrodes.

stacked array (*Radio*) See **tier array***.

stand oil (*Paint.*). A lithographic varnish, also used in printer's inks, paints, and enamels. Obtained, by heating, from old clarified tanked oil, or by burning off linseed oil at its ignition point.

ster'nutator (*Chem. War.*). A war gas which has an irritant effect on the respiratory passages, e g. D.A., D M., D.C.

Stokes' law (*Chem. Eng.*). An expression of the behaviour of small spheres falling freely in a fluid, i.e.

$$v=\frac{2}{9}\,gr^2\frac{(S-1)}{\mu}$$

where v=velocity of fall in cm. per sec., g= gravitational constant, r=radius of particle in cm , S=its specific gravity, and μ the coefficient of viscosity of the fluid in c.g.s. units. The critical radius of a sphere above which Stokes' law no longer holds is stated by Allen (*Phil. Mag.*, 1900, p. 324) to be,

$$r=\frac{0\cdot 00846}{\sqrt[3]{S-1}}\text{ cm.}$$

stone drain (*San. Eng.*). See **rubble drain***.

stub (*Radio*). A quarter-wave resonating line, of high impedance, used for anchoring antenna arrays without insulators.

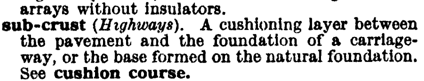
sub-crust (*Highways*). A cushioning layer between the pavement and the foundation of a carriage-way, or the base formed on the natural foundation. See **cushion course.**

submerged combustion (*Ind. Heat.*). A method of heating liquids by submerged burner equipment of special design, which maintains the flame in direct contact with the liquid being heated.

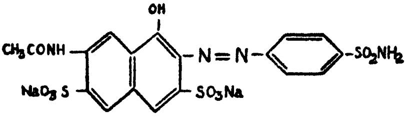
suffix (*Teleph.*). The operational or functional signal transmitted after the *prefix** (q.v.).

sulphon'amides (*Chem.*). A group of drugs with a powerful anti-bacterial action, used in the treatment of various infections. They are more effective in the body than in the test-tube, and are believed to act by interfering with the metabolic processes of bacteria, which are thereby rendered more susceptible to the natural defences, the leucocytes and immune bodies. The earlier drugs were most effective against haemolytic streptococci, but later members of the group are potent against other organisms. Many compounds of this group have been tested and used. A comprehensive list cannot be accommodated here, but the following are representative members:

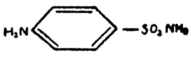
The first to be used was PRONTOSIL, a reddish powder, the hydrochloride of 2'·4'-diaminoazo-benzene-4-sulphonamide:



PRONTOSIL-SOLUBLE, which has greater anti-bacterial effect, and is more soluble, is the disodium salt of 4'-sulphonamido phenylazo-7-acetylamino-1-hydroxy naphthalene-3·6-disulphonic acid:

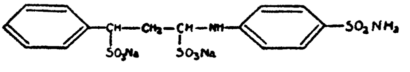


PRONTOSIL ALBUM (*sulphanilamide*), a white powder with still greater effect, is *p*-aminophenyl sulphonamide:—



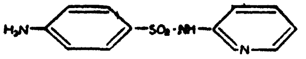
It is particularly valuable in the treatment of wounds, to which it is applied direct. It has the virtue of simplicity and consequent cheapness.

SOLUSEPTASINE,



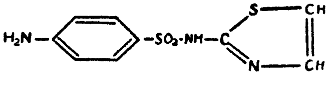
less effective than sulphanilamide, was prepared as suitable for injection, for which purpose sulphanilamide and the sodium salts of sulphapyridine and sulphathiazole (amongst others) are also suitable.

SULPHAPYRIDINE (*M. and B.* 693), 2-(*p*-amino benzene sulphonamido) pyridine,



is a white crystalline powder, sparingly soluble in water. It is usefully effective against pneumococci, gonococci, meningococci, and staphylococci.

SULPHATHIAZOLE (*Thiazamide*) is the thiazole analogue of sulphapyridine (which it resembles in physical properties):



It is more active than Sulphapyridine against staphylococci, but less so against pneumococci.

SULPHAGUANIDINE is the guanidine analogue of sulphapyridine. It is almost insoluble in water and is therefore useful in infections of the alimentary track—e.g. dysentery. Good results have been claimed in ulcerative colitis and in cholera.

sum of infinite series (*Maths.*). More precisely, sum to infinity. The limit, as n tends to infinity, of the sum of the first n terms.

superphosphate (*Chem.*). Superphosphate of lime, an agricultural fertiliser; a mixture of calcium sulphate and dihydrogen calcium phosphate; made by treating bone ash or basic slag (calcium phosphate) with sulphuric acid.

sun-ray treatment (*Med.*). Popular but erroneous term for *ultra-violet therapy*.

surface combustion (*Ind. Heat.*). Occurs by bringing a combustible mixture of gas and air into contact with a suitable refractory material in such a manner as to produce a flameless or nearly flameless state of combustion, the surface of the refractory material being maintained in a state of incandescence.

sylphon bellows (*Phys.*). See **bellows***.

T 773 (*Chem. War.*). $\beta\beta'\beta'''$-trichlortriethylamine, T 773 (U.S.), which has been shown to have vesicant action.

tangential field (*Optics*) The image surface formed by the tangential foci of a series of object points lying in a plane at right angles to the axis.

tangential focus (*Optics*). The focus of an object point lying off the axis of an optical system, in which the image is drawn out by the astigmatism of the system into a line tangential to a circle centred on the optic axis.

tank line (*Radio*). A quarter-wavelength line used as a frequency stabiliser in an ultra-short-wave radio transmitter

Taylor's series (*Maths.*). A series expansion for a continuous function giving the value of the function for one value of the independent variable in terms of that for another value. Under specified conditions the series is

$$f(a+h)=f(a)+hf'(a)+\frac{h^2f''(a)}{2!}\ldots\text{etc.}$$

T.C.P. (*Chem*). A proprietary antiseptic and germicide of which the active principle is trichlorophenylmethyliodosalicyl dissolved in water.

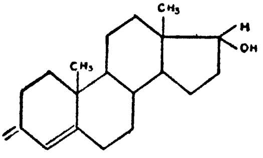
telecentric stop (*Optics*). A stop placed in the second focal plane of a positive lens, forming a viewing system by which a scale can be read without parallax errors.

temperature control (*Ind Heat.*). Control, by means of instruments of the thermo-electric and thermostatic types, of operating temperatures in furnaces and heating appliances; it is achieved by relayed automatic control of the fuel and air flows according to the predetermined temperature setting of the instruments.

terrestrial eyepiece (*Optics*). An eyepiece consisting of four separated lenses to erect the inverted image formed by a telescope objective.

terrestrial telescope (*Optics*). A telescope consisting of an objective and a four-lens eyepiece (terrestrial eyepiece), giving an erect image of a distant object.

testosterone (*Chem.*). A steroid,



obtained from the testis. It is the most active androgenic substance so far isolated and is probably the male sex hormone. See also **androsterone***.

Thermit (*Eng.*). A mixture of aluminium with half an equivalent amount of iron oxide, used in welding and repairing machinery. See **aluminothermic process.**

Thermolux (*Glass*). A proprietary *safety glass* (q.v.) the middle layer of which consists of a felt of glass fibres; the edges are hermetically sealed.

hiamin (*Chem.*). Vitamin B_1.

Thiazamide (*Chem.*). See **sulphonamides*** (*sulphathiazole*).

Thomas bar (*Med.*). A leather bar placed externally on the sole of the shoe in the treatment of hallux rigidus.

ier array (*Radio*). An antenna comprising a number of radiating elements, one above the other. Also STACKED ARRAY.

ocopherol (*Chem.*). Vitamin E.

one-arm (*Acous.*). The swivelling tube connecting the sound-box to the horn (of which it forms a part) in an acoustic gramophone. By extension, the arm which carries the electric pick-up when reproducing from sound records electrically.

toroidal surface (*Optics*). A lens surface in which the curvature in one plane differs from that in a plane at right angles.

total air-gas mixture (*Ind. Heat.*). A mixture in which the proportion of air pre-mixed with a gas represents the total volume needed for perfect or complete combustion.

toxic smoke (*Chem. War.*). A war 'gas' in the form of a particulate cloud, i.e. arsenical compounds released by heat generators or detonators; odourless and invisible, except at the point of discharge. See **D.A.***, **D.C.***, **D.M.***

toxicity (*Chem. War.*). See **mortality product***.

tracing (*Eng.*). An engineering drawing transferred to transparent tracing paper or cloth, in indian-ink for permanence and for making good blueprints. A *tracer's* work carries no design responsibility. See **draughtsman***.

tracking (*Highways*). (1) The driving of vehicles in an approximately single track.—(2) Lines of wear in the carriageway from so doing.

trailing points (*Rail.*). See **points***.

transcendental functions (*Maths.*). Functions of a variable which are not rational or algebraical, but are usually expressible as an infinite series or product, e g. trigonometrical or gamma functions.

transfer instrument (*Elec. Eng.*). An instrument which gives an indication independent of frequency, including zero frequency, so that it can be used for calibrating a c. instruments when calibrated with d.c., e.g. an electrostatic wattmeter.

transfer signal (*Teleph.*). A signal which transfers a connection to a distant operator.

transformation ratio† (*Elec. Eng.*). More precisely, the ratio of the electromotive forces in the windings, or the ratio of the number of turns in the windings —(*Elec Comm*) The *turns-ratio** (q.v.) of windings on a transformer.

transparency (*Thermionics*). The ratio of the free space (window) between grid or screen wires in a thermionic valve to their total area.

trap points (*Rail.*). Points placed in running rails to prevent unauthorised switching of trains.

treadle (*Sig.*) An electrical contact operated by the deflection in running rails caused by the passage of wheels.

trichromatic coefficients (*Light*). The relative intensities of three primaries of a given trichromatic system of colour specification required to match a colour sample. Generally the three coefficients add up to unity.

trichromatic colorimator (*Light*). An instrument for measuring colour. Three radiations, usually specified red, green, and blue, are mixed together, the intensities of these required to make a match giving the specification.

tricusp (*Maths.*). See **cyclic curve***.

trigonometrical functions (*Maths.*). Sines and cosines, their inverses, and functions derived from them.

trochoid (*Maths.*). See **cyclic curve***.

trunk offering (*Teleph.*). The practice whereby an operator can offer a trunk call to a subscriber who is already engaged on a local call.

tunnel burners (*Ind. Heat.*). A general class of industrial gas burners using a refractory tunnel at the burner exit for the main purpose of positive flame retention. The tunnel serves as an ignition zone and accelerates the rate of flame propagation, through turbulence and temperature rise, to a point where it is in equilibrium with the relatively high air-gas mixture velocity employed with burners of this kind.

turnover frequency (*Acous.*). In disc recording, the frequency, generally between 200 and 500 cps., where the change from constant-amplitude to constant-velocity recording takes place.

turns-ratio (*Elec. Comm*). The ratio *N* of the turns in any pair of windings on a transformer. Power passing between such windings changes its impedance level inversely as N^2, because in a given winding space the electromotive force is proportional to the number of turns.

T.W. antenna (*Radio*). An antenna in which the radiating and non-radiating elements are formed into the edges and diameters of a series of adjacent rectangular boxes.

twin plate (*Glass*). The normal type of plate glass as now made. Grinding is done on both sides at once, as is the subsequent polishing, giving a high degree of flatness without wave or distortion.

two-stage pressure-gas burner (*Ind. Heat*). A burner of the natural-draught type designed for operating with gas under pressure, normally about 5 lbs. per sq. inch, and having primary and secondary air inspirating stages in the injector Unlike most other types of natural-draught gas burners, the two-stage type is capable of entraining maximum and even excess volumes of combustion air.

U.A.X. (*Teleph.*). Abbrev. for *unit automatic exchange.*

ultra-violet microscope (*Optics*). A microscope in which ultra-violet rays illuminate the object. The lens system is constructed of materials (such as quartz) which are transparent to such rays, the image being registered photographically.

ultra-violet therapy (*Med.*). Treatment of disease by means of ultra-violet rays. The therapeutic rays (3000-4000 A.U.) are generated by two types of apparatus: carbon and tungsten arc lamps, and quartz mercury-vapour lamps.

unit processes. Operations (e.g. size-reduction, evaporation, distillation) which, suitably modified, are common to many industries and form integral parts of a complete manufacturing process.

universal combustion burner (*Ind. Heat.*). An industrial gas burner of the natural-draught type having one injector for the entrainment of primary air prior to combustion, and a secondary injector through which the flow of additional air into the combustion chamber can be regulated. By inter-adjustment of the two injectors it is possible to obtain a full range of combustion conditions such as a fully aerated flame, a partially aerated flame with diffused secondary air, or a luminous flame with the total volume of air for complete combustion admitted at the secondary stage.

uridro'sis (*Med.*). A condition in which the constituents normally found in urine are excreted by the sweat glands.

vane relay (*Sig.*). A relay used in railway signalling in which the moving element carrying the contacts comprises a disc or vane, which is propelled by the reaction of eddy-currents induced therein by a coil-excited magnet.

vasopres'sin (*Physiol.*). A hormone secreted by the posterior lobe of the pituitary body, which increases blood pressure by constricting the small blood-vessels.

vasopres'sor (*Med.*). Causing a rise of blood pressure. A substance which causes a rise of blood pressure.

vee antenna (*Radio*). A line radiator folded in the form of a V in the horizontal plane, either alone or multiplied in an array.

vesicant (*Chem. War.*). Any war 'gas' the action of which on the body causes blistering and destruction of tissues; e.g. mustard gas.

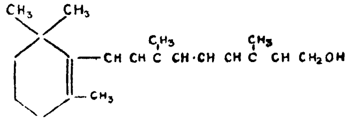
vinyl resins † (*Plastics*). These are now widely used in the making of gramophone records, water-tubes, floor-coverings, etc.

visual acuity (*Light*). The power of the eye to resolve fine detail Expressed as the angular separation of object points or lines when they can just be resolved.

vitality index (*Nut*). The index of chest girth divided by the height, the former being the average of inspiration and expiration.

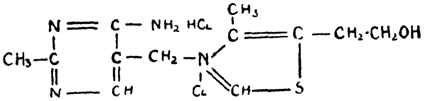
vitamins†. Further details regarding known vitamins are given below.

vitamin A†. This is an unsaturated alcohol with the structure:



Animals can obtain it from its precursors, or 'provitamins,' the *carotenes* (q.v.). Lack of vitamin A causes night-blindness and, in more severe cases, xerophthalmia, excessive keratinisation of other epithelia (and hence, perhaps, increased susceptibility to infection) and, in the young, deficient growth. The richest natural sources are the liver oils of fish (halibut, cod, etc.), but valuable sources of the vitamin and its precursors are milk, butter, eggs, and various vegetables. The daily requirement of the normal adult is not certainly known but is believed to be at least 3000 International Units (1 8 mg.).

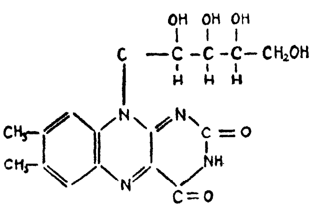
vitamin B_1†. This is isolated as its chloride-hydrochloride, with the structure:



Vitamin B_1 is essential for the proper metabolism of carbohydrate (of especial importance to brain and nerve tissue), its pyrophosphate ester forming the co-enzyme of the enzyme carboxylase. The richest natural sources are yeast and the germs of cereals, but it is present in most foods. The minimum daily requirement is about 1 mg. (333 I.U).

vitamin B_2 complex†. The group includes:

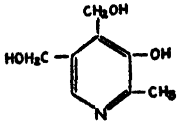
RIBOFLAVIN (*lactoflavin, vitamin B_2*), a yellow crystalline substance with the structure:



Its phosphoric acid ester is, or forms part of, the active group of various oxidising enzymes. Lack of it causes failure of growth and, in man, a syndrome characterised by thickening and cracking of the lips and by corneal lesions. The daily requirement is believed to be 1 to 3 mg.

NICOTINIC ACID (*pellagra-preventing factor*, pyridine-*m*-carboxylic acid) also forms an essential part of various oxidising enzymes. Lack of it leads to *pellagra* (q.v.), maize being an extremely poor source. The daily requirement is unknown but may be about 5 to 10 mg.

PYRIDOXIN (*adermin*, *vitamin B_6*) is also a pyridine derivative.



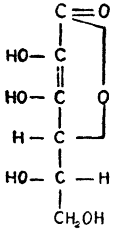
It may be concerned in oxidations and possibly in haemoglobin formation. In rats, deprivation causes a characteristic dermatitis. Human requirements are unknown.

PANTOTHENIC ACID (*bios* IIA) forms part of the 'filtrate factor' which has been of therapeutic value in the treatment of certain anaemias It has the structure:

$HO \cdot CH_2—C(CH_3)_2—CH(OH)—CO—NH \cdot CH_2\ CH_2 \cdot CO \cdot OH.$

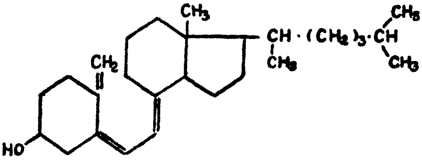
Deprivation causes a characteristic dermatitis in chickens. It is necessary for rat growth. Human needs are unknown.

vitamin C†. This is probably concerned in oxidation-reduction reactions in the living organism. Its structure is:



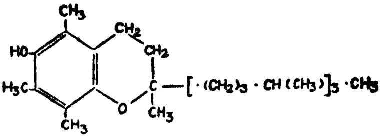
Almost complete lack leads ultimately to scurvy, partial lack to vague ill-health. The daily requirement is at least 15 mg. Certain fruits are very rich in ascorbic acid (rose-hips, black-currants, citrus fruits, etc.), as are many green vegetables; potato and turnip are also valuable sources.

vitamin D†. Some ten antirachitic substances have been obtained by ultra-violet irradiation of sterol precursors, but only two have been isolated from natural sources. Of these, *calciferol* (D_2) is usually prepared artificially from ergosterol; the other, *D_3*, appears to be the commonest natural vitamin. They are white crystalline substances. Vitamin D_2 has the structure:



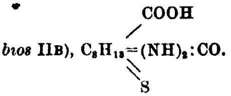
The richest natural sources of vitamin D are the fish liver oils, but it is present, in smaller amounts, in most animal fats. The daily requirement of the growing child and of the pregnant or lactating woman is believed to be about 500 I.U. (=12·5 micrograms of calciferol); that of the normal adult is unknown.

vitamin E†. In some species at least, deficiency causes, in the females, inability to reproduce, the foetus dying and being resorbed; the condition is cured by the vitamin. In the males of the same species complete deprivation of the vitamin ultimately produces degenerative changes and permanent sterility. Human requirements are not known, but good results have been claimed from the therapeutic use of tocopherol in cases of habitual abortion. Three closely related tocopherols are known; the most active of these, α-tocopherol, has the structure:



The richest natural sources are the oils of cereal germs

vitamin F. Highly unsaturated fatty acids (linoleic, linolenic) required in small amounts, possibly to aid in the absorption of ordinary fatty acids.



vitamin H (*biotin*, *bios* IIB), $C_8H_{13}\overset{\diagup COOH}{\underset{\diagdown S}{=}}(NH)_2:CO.$

A water-soluble vitamin essential for normal growth of yeast, and protecting rats or chicks against a nutritional injury caused by eating excess of raw egg-white. Human needs, if any, are unknown

vitamin K. A fat-soluble vitamin required for the production of prothrombin and therefore for normal blood coagulability. Two active substances have been isolated. Vitamin K_1 (*phylloquinone*), found most abundantly in the green leaves of plants, is 3-phytyl-2-methyl-1·4-naphthoquinone, K_2, formed by putrefactive bacteria, is 3-difarnesyl-2-methyl-1 4-naphthoquinone. Active analogues, all derivatives of 2-methyl-1·4-naphthoquinone (some water-soluble) have been synthesised and used therapeutically in various conditions involving delayed blood clotting.

vitamin P. A water-soluble vitamin, possibly related to the (yellow) flavanone, hesperidin, present in citrus fruits, black-currants, etc., and believed to be concerned in maintaining the resistance of the capillary walls to changes in pressure.

vizor (*Sig.*). A hood placed over a signal light to prevent both spurious aspects caused by reflection of external lights, and visibility of the aspect from unintended angles.

Vocoder (*Acous.*) Electrical arrangement for coding, transmitting, decoding, and reconstituting speech.

vulcanite. Hard vulcanised rubber, in the making of which a relatively high proportion of sulphur is used. *Ebonite* (q.v.) is one form; coloured varieties are obtained by adding various ingredients. See **vulcanisation of rubber.**

war gas (*Chem. War.*). Any solid, liquid, or gaseous chemical substance used in warfare to produce poisonous or irritant effects upon the human body. War gases are broadly classified according as they are or are not rapidly dispersed by atmospheric action (see **non-persistent***, **persistent***), or according to the principal effect of the gas, viz. (1) *acute lung irritants* (e.g. chlorine, phosgene); (2) *lachrymators*, 'tear gases' (e.g. bromobenzyl cyanide); (3) *paralysants*, acting on the nervous system (e.g. prussic acid); (4) *sternutators*, 'toxic smokes' (e.g. D.A., D.C., D.M.); (5) *vesicants*, 'blister gases' (e.g. mustard gas).

wave angle (*Radio*). Either the angle of elevation or the azimuth of the arrival or departure of a radio wave with respect to the axis of an antenna array.

wave-guide (*Radio*). A hollow metal conductor within which very-high-frequency energy radiated from a dipole can be transmitted efficiently.

wearing course (*Highways*). The accepted term for the uppermost layer in a carriageway construction. Also termed WEARING (or ROAD) SURFACE, COAT, SHEETING, TOPPING, VENEER, CARPET, CRUST.

Weir-Mitchell treatment (*Med.*). The treatment of neurasthenia by rest, liberal feeding and massage.

wen (*Med.*) A *sebaceous cyst* (q.v.).

Wheelabrating. A method of cleaning metal surfaces of sand, scale, and foreign materials by means of steel shot or grit hurled by centrifugal force under control from the rapidly spinning Wheelabrator unit

wig-wag (*Sig.*). A level-crossing signal which gives its indication, with or without a red light, by swinging about a fixed axis.

wired glass (*Glass*). Glass in which a wire mesh has been incorporated during rolling. Effective against fire and explosion blast.

wolf note (*Acous.*). An extraneous non-harmonic note made by a bow on a violin string.

zone plate (*Optics*) A transparent plate divided into a series of zones by circles whose radii are in the ratio $1 . \sqrt{2} . \sqrt{3} . \sqrt{4}$, etc. Alternate zones are blacked out and a concentration of light is formed at a point on the axis if a plane wave is normally incident on the plate, which thus acts as a lens.

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